DM-4600

Operator's Manual

MONOSEM

Monosem, Inc.

1001 Blake St.

Edwardsville, KS 66111

(913) 438-1700

www.monosem-inc.com

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NOTES:

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1 Introduction

1.1 System Overview

The DM-4600 Planter Monitor is designed for maximum performance in the field and is easy to install and use. The system is capable of monitoring up to 32 rows and provides not only seed population, but also will display area, hopper level, RPM and vacuum information when sensors are connected, and has capabilities of monitoring liquid flow with Monosem Liquid Monitoring.

- ✓ 7" Color Touch Screen
- ✓ DM-4600 1-32 Row Monitoring
- ✓ Built in GPS Speed option
- ✓ Bar graphs
- ✓ Setup assist for easy programming
- ✓ Adjustable accumulating time
- ✓ RAM 1 1/2" Ball Mount
- ✓ Adjustable Back light
- ✓ Day/Night Mode
- ✓ Adjustable Audible Alarm
- ✓ Optional Visual Alarm Light
- ✓ View Home or Dashboard
- ✓ View Seed population or GPM
- ✓ View 20 sec. Row History
- ✓ Visu-Flo Option
- ✓ Optional Lift Switch
- ✓ 2 Hopper Level, 2 RPM, 2 Vac. Opt.
- ✓ Section grouping

1.2 Specifications

Power	10–16 VDC, 3.5 A maximum
Operating temperature	-20°C to 70°C (-4°F to 158°F)
Storage temperature	-40°C to 85°C (-40°F to 185°F)
Size	27.30 cm W x 16.50 cm H x 5.08 cm D (10.75" W x 6.5" H x 2" D)
Weight	3.08 kg (6.8 lbs.) for 32-row DM-4600 system
Wire Harnesses	The DM-4600 includes detachable harnesses to supply the unit's power (fused) and sensor inputs (to hitch). Connectors on the back for GPS Antenna, USB on Front, Radar on Bottom
Sensors	Compatible with Monosem and other major brands of seed sensors.
Standard mounting	RAM Mount 1 ½" Ball Mounting
Alarm adjustment	Four levels audible alarm with mute onscreen selection. Optional external light available.
Backlight adjustment	Five increments plus Day/Night mode

SAFETY NOTICES

CAUTION

CAUTION should be taken when connecting the monitor to the battery to assure that the Positive + (Red) wire is connected to the Positive terminal of the battery and the Negative – (Black) wire is connected to the Negative terminal of the battery.

The power cable is provided with a 5 amp fuse. DO NOT REPLACE with anything other than a 5 amp as this could damage the monitor and void the warranty. Fuses are for your protection and the protection of your equipment.

1.3 Installation

Your DM-4600 comes with a RAM 1 ½" Mounting Ball. Any RAM Mount 1 ½" fixtures will adapt to your monitor.

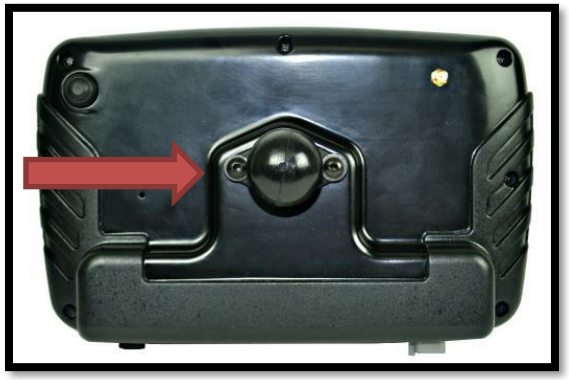


Figure 1 Monitor Mounting

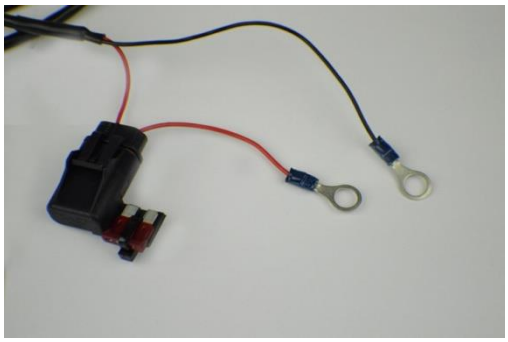
Install the RAM-238-U 1 ½" Ball supplied with your console by removing the two screws from the rear of the unit and use them to attach the ball.

Any RAM configuration may be used to attach your console to a convenient location in your cab. If you need a base mount, see the above for more options. See your local dealer for brackets and arms that are available, or visit www.agdirectusa.com to purchase online.

1.4 Monitor and Power Connections (Harness 301104)

Route the power leads of the main harness to the battery. Allow some slack to tie the harness off to a secure location in the cab to provide strain relief and for the protection of the harness.

The monitor operates on 12 VDC only. The red (Fused) lead should be connected to the positive battery terminal and the black lead should be connected to the negative battery terminal.



There is a short two pin Deutsch connector at the monitor end of the power cord. This is for connecting the optional Visual Alarm Light (Part No. 301109)

1.5 DM-4600 Console Main Harness (Harness 301106)

Route the main harness to the rear of the tractor. Attach the connector to the bottom of the monitor with a ¼" nut driver. Tie the harness securely in the cab as a strain relief.

The 647120 harness will attach to your planter or implement with a 37 pin AMP CPC style connector. This connector is pinned to match standards used by Dickey-john, Agco, Kinze and many other manufacturers. Be aware that Deere uses the same connector but uses a different wiring pattern. **If you are connecting to a Deere harness, you will need a 37D37J adapter for each harness available online from www.agdirectusa.com.**

If you are using an external speed source such as a radar or external GPS, connect it to the 4 pin AMP connector on the bottom of the monitor. (Adapters are available for most common radar and GPS connectors)

If you are using the internal GPS, attach the antenna to the coax connector on the back of the monitor.

Once your implement is connected, you are ready to operate your monitor.

1.6 Internal GPS

The DM-4600 comes with the onboard GPS enabled.

2 Quick Start

The Quick Start feature of the Monitor is a method that will step you through a complete setup of your monitor. This feature will insure proper configuration while providing you with a good working knowledge of the parameters that need to be set for your implement.

This Quick Start section will discuss typical implement configurations, for more in depth configurations or implements with Accessory Sensors please reference the Optional Step Up section that immediately follows the Quick Start.

This Quick Start section uses your monitors Setup Assistant feature to walk you through configuring your monitor. In the Setup Assistant you will be provided a list of parameters that need to be entered. Once you have entered the required information a GREEN "Exit Finish" Button will appear, you are then ready to Exit the Quick Start.

2.1 Entering Setup Assistant

The Setup Assistant feature is automatically entered when you power up your monitor for the first time. If you have to leave the Setup Assistant early, don't worry when you return you will come back into the Setup Assistant to finish configuring you implement. At any time there after, you can re-enter this mode using the Navigation Buttons at the top of the monitor. By pressing the "Setup" navigation button, the "Setup" button will change to the "Setup Assist", by pressing this button again you will re-enter the Setup Assistant feature.

2.2 Setup Assistant Features

When in the Setup Assistant the Normal Navigation Buttons will change to 3 Control Buttons (Exit, Previous and Next Buttons). An Instruction Area to the right of the Control Buttons will instruct you on the next required parameters that are required prior to you advancing to the next Page. On the left side of the screen you will see a list of the "Required Parameters Remaining", if this area is empty you will be allowed to proceed. The items in the list are also highlighted in RED on the main area of each screen.

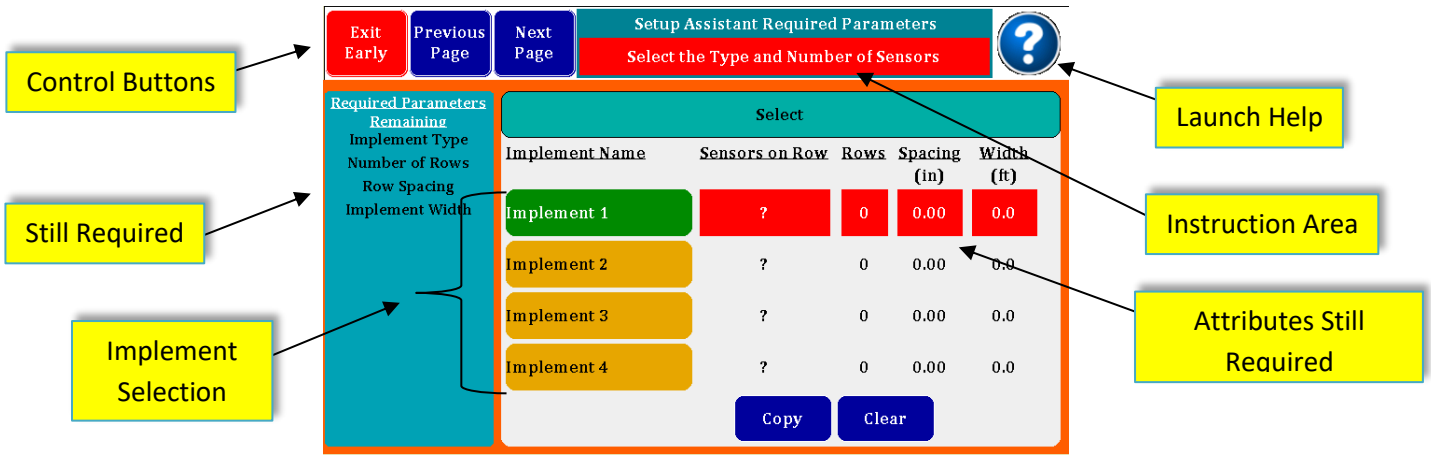


Figure 2 Setup Assistant Region explanation

2.3 Quick Start Screens

Your Monitor is very configurable, however it is very easy to setup. We will walk you through a typical Seed and Liquid Flow implement configuration. Don't worry if this configuration is not exactly what you have we will discuss more details in a later section.

The following screen is our starting page for the Setup Assistant.

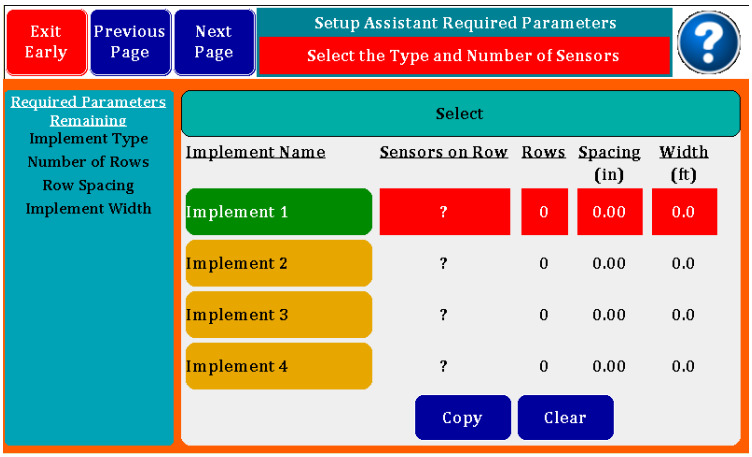


Figure 3 Setup Assistant Start Page

2.3.1 Implement Sensor Select

By pressing the Red ? Button in the "Sensors on Row" column, the following dialog box will appear.

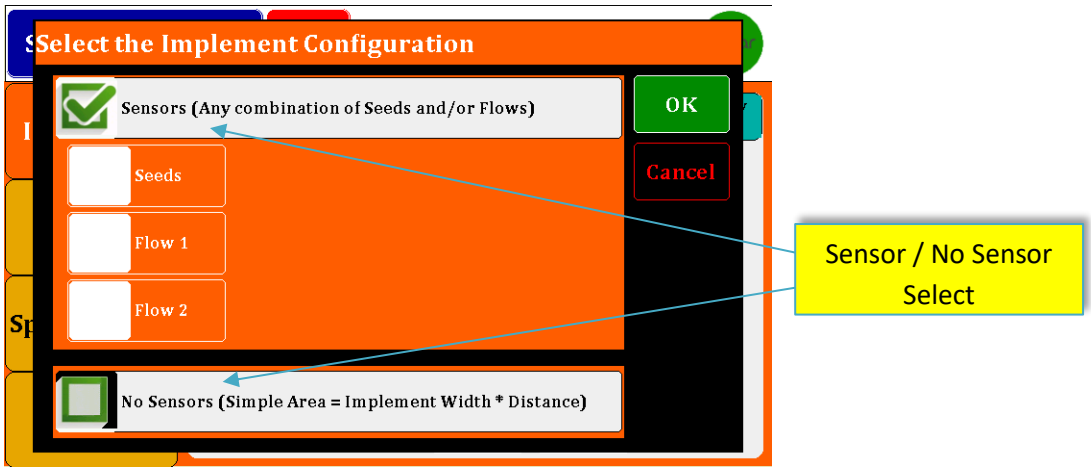


Figure 4 Implement Configuration Dialog

You have two options by selecting the "Sensors" check box at the top of the screen you may select your implement Sensors. The "No Sensor" selection is discussed in the Optional Setup Section.

2.3.2 Implement Type Select

Use the Check Boxes to select if your monitor is connected to seed sensors, flow meters or both. If you select Flow 1, you may select Flow 2 as well if you are using two different flow rates on your system. Keep in mind that you are limited to 32 total sensors on this monitor. Depending on your selections the monitor will configure itself to ask for only the required parameters.

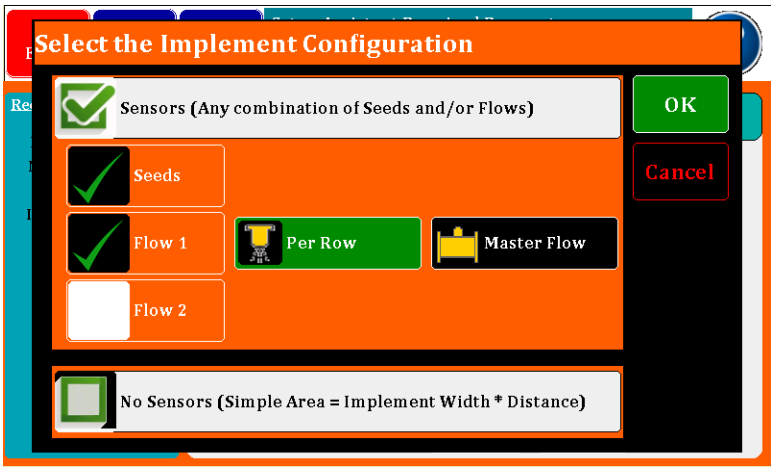
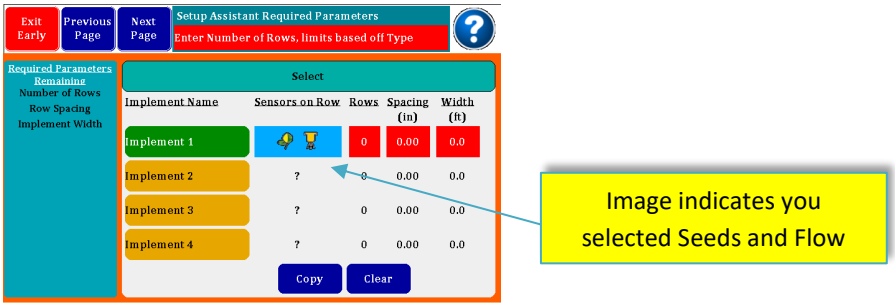


Figure 5 Implement Configuration with All Sensors

For each Flow you have set, you may selection if there is a Sensor per Row, or only Sensor at the pump or Master Flow. This Flow selection is independent for each Flow (1/2). In the page above you would have an Implement with Seeds and Flow 1 with sensors at each row.

Press Ok will return you to the Starter page which will now look like this.



2.3.3 Implement Row, Spacing and Width settings

For the Row, Spacing and Width settings press the appropriate button and a Numeric keypad will pop-up. Enter your number of Rows first, if you then enter the Spacing your Width will be calculated for you. If after the Row entry, you enter the Width the Spacing will be calculated for you. You can override the calculated values if you desire.

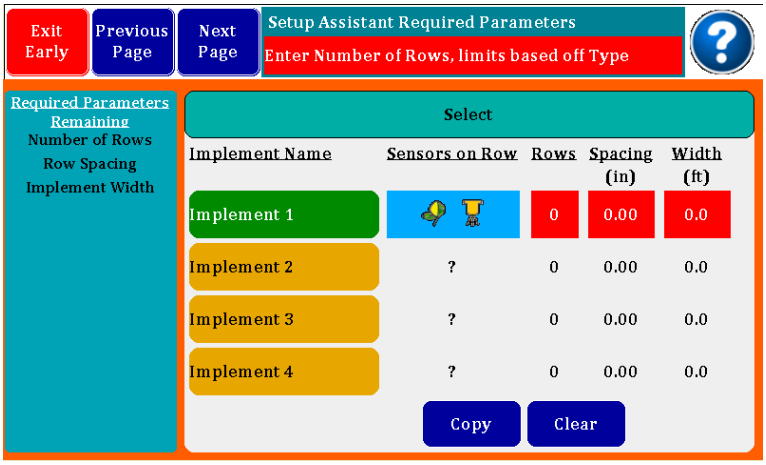
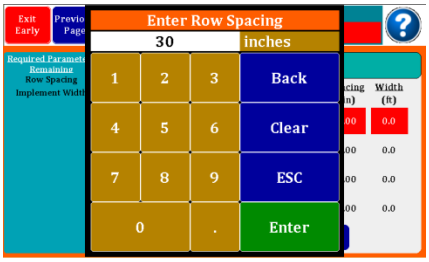
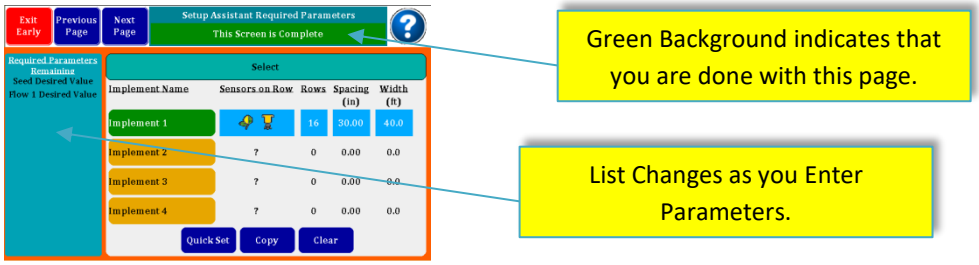


Figure 6 Row, Spacing and Width Setup

By pressing the Red 0 Button under the Rows column a "Enter Row Spacing" Dialog Box will appear.



Press the Spacing and Width Buttons to open up the Numeric Keypad and enter each parameter.



As you enter each Parameter you will see the List of Require Parameters on the Left change.

Press "Next Page" to go to the Display Assignments Page.

2.3.4 Display Assignments

The Display Assignments page is a visual cross reference between the Display Rows and the cable harness Row wires. Only 8 Display Rows can be seen at 1 time, navigation buttons are available to navigate to the next set of 8 Rows.

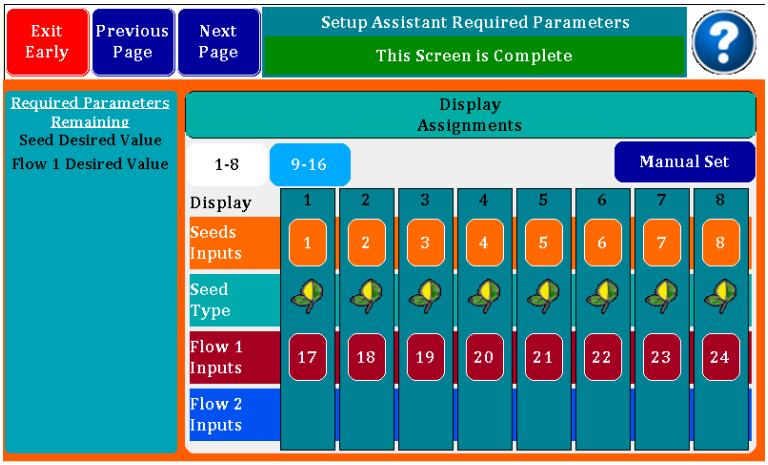


Figure 7 Display Assignments Viewer

The assignments are automatically chosen for you, you can change them to match your implement. If you need to Change the assignments see Manual Row Assignments in section 3.1.3 below.

2.3.5 Section Assignments

If you have a planter or liquid system that is setup with section shutoff's, you can configure the rows to match so the monitor will recognize the shutoffs and not report continuous row failures.

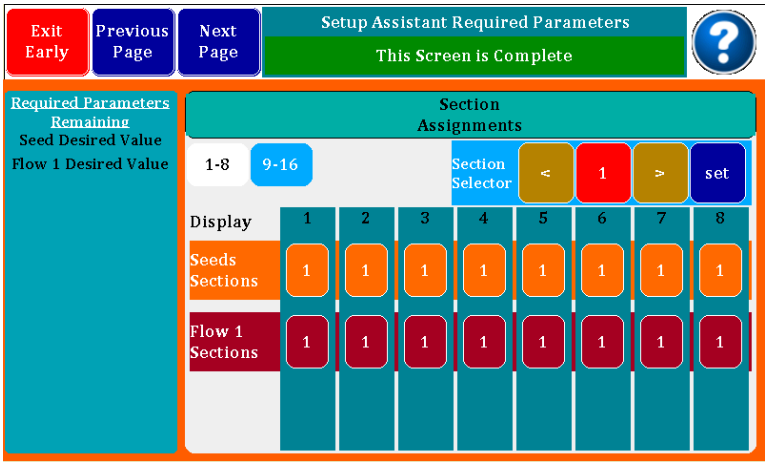


Figure 8 Section Control

By default All Sensors are setup as 1 Section.

If you are not going to use Section Control with your implement, just Press the BLUE "Next Page" button to navigate to Product Sensor page.

2.3.6 Product Sensor "Seeds"

If you had selected Seeds at the start of this Quick Start the following Screen will appear. The Product Sensors Seed screen is where you can set your Desired target rate for your Seeds/Acre. After you enter this rate the default Maximum and Minimum Limits will be calculated with +/- 20%. You may change percentages or enter absolute numbers.

Press and hold Blue entry fields for a pop-up Numeric Keypad.

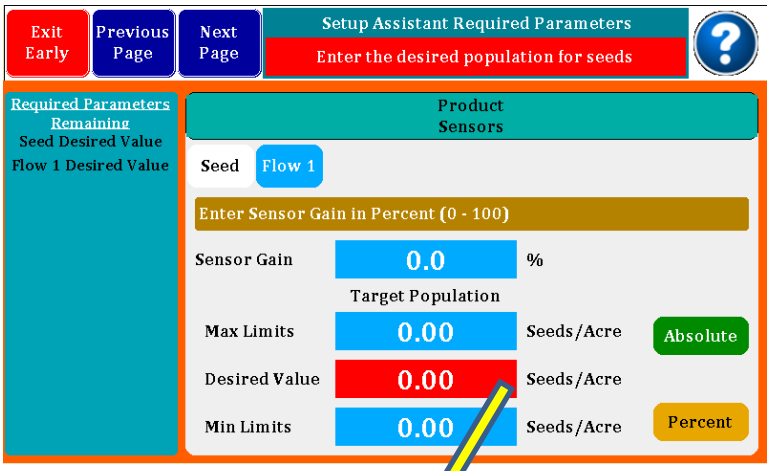
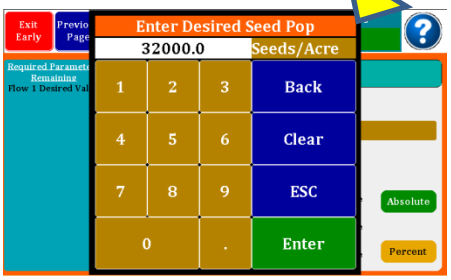
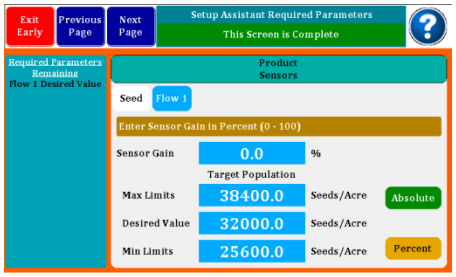


Figure 9 Product Sensor Setup for Seeds

Press the Desired Rate Button



After you enter the Desired Value you can likewise change the calculated Limits. Notice the Require List for our example is now down to only one parameter.



At this point you may also adjust the Sensor Gain parameter. The Sensor Gain is a method to adjust the actual number of seeds being planted to what is being detected by the seed sensor. You can move

population numbers up or down by percentages. Generally used when drilling soybeans to compensate for doubles. Suggested beginning number is an increase of 12% for most drills.

If you configured your monitor with Seeds ONLY, at this point the Exit button would have changed to GREEN and the text would read "Exit Finish". Before you press any buttons go to Section 2.4.1 for further instructions.

If you had configured your monitor with FLOW (as in this Quick Start Example), press "Next Page" to navigate to the next Product Sensor "Flow".

2.3.7 Product Sensor "Flow"

If you had selected 1 or 2 Flows at the beginning of this Quick Start you will need to enter the following.

You must select the flowmeter part number (found on your flowmeters) and then enter the desired GPA along with the limits. The calibration number is auto generated.

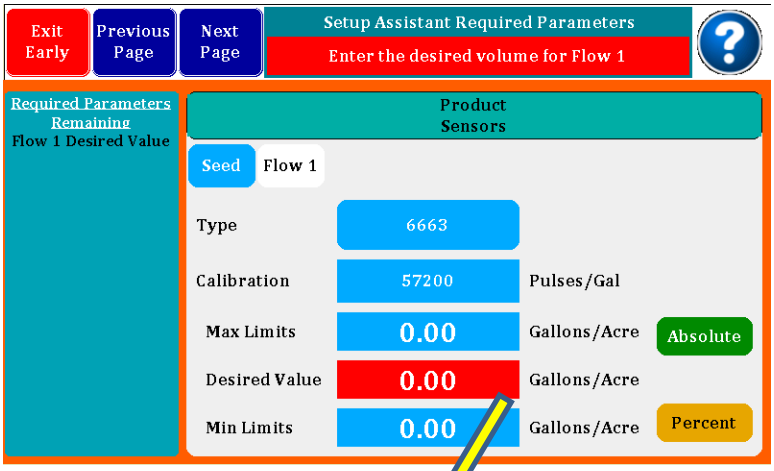
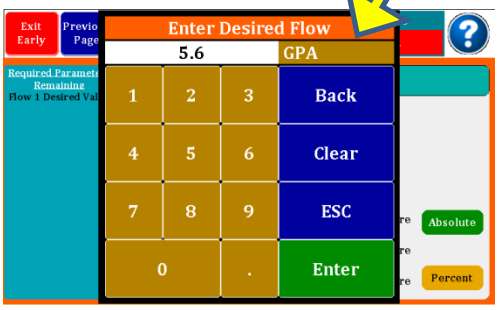
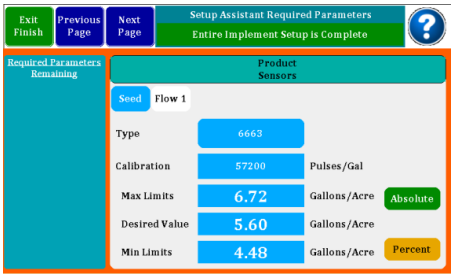


Figure 10 Product Sensor Setup for Flow ½

Press the Desired Rate Button



After you enter the Desired Value you can likewise change the calculated Limits. Notice the Require List for our example is now complete.



If you had selected two Flow inputs at the beginning of this Quick Start, you will need to press "Next Page" again, and enter this same information for Flow 2.

With our example at this point the Exit button would have changed to GREEN and the text would read "Exit Finish". Before you press any buttons go to Section 2.4.1 for further instructions.

2.4 Exiting Quick Setup (Setup Assistant)

2.4.1 Exit Finish

At this point all required elements have been entered correctly, the Exit Button is now Green and reads "Exit Finish".

Your monitor needs a very accurate measure of Speed to provide proper monitoring of Seed population and Flow rate. The monitor defaults the Speed input to External Speed (RADAR IN) and has a default Calibration.

But **before** you go to the field you need to Exit the Setup Assistant by pressing the "Exit Finish" button and then proceed to Sections 3.3.4 & 0 below. These Sections are part of the Advanced Setup Assistant; however you can navigate directly to these Setup Screens after pressing "Exit Finish". Select your Speed Input and then perform a Speed Calibration procedure to assure proper speed readings.

You are now done with the Quick Start.

2.4.2 Exit Early

If you need to leave this Quick Start procedure before you are finished, you can do so by pressing the Exit Button which would be Red if you were exiting early. The monitor will save your present entries and Exit the Setup Assistant; however you will not be able to go to the field until you come back in and finish the Quick Start.

2.4.3 Not Finished ???

This Quick Start is complete; however the Setup Assistant can still navigate to other features of the monitor. The other Features are covered in Section 3.2 below.

3 Optional Setup

In this section we will go back to some options that we passed by in the Quick Start Section above, as some implements require Extra Product Sensor (Section 3.1) configurations.

We will also navigate through setting up Accessory Sensors (Section 3.2) as well as some User Interface Setup (Section 3.3) parameters.

Section 3.1, 3.2 and 3.3 are additional features and are navigated between just like the Quick Start Basic Features in the Setup Assistant.

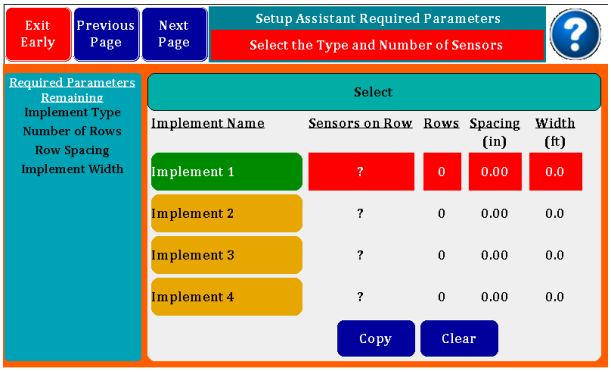
Section 3.4 describes the use of the Setup Screen in NORMAL mode which allows you to navigate directly to the desired parameter using Tab Buttons, instead of Stepping through them in the Setup Assistant Mode.

3.1 Extra Product Sensor Configurations

In this section we will reference back to the Quick Start Section where we could have made different selections and then explain them.

3.1.1 Implement Page Options

In the very first page of the Quick Start Section 2.3 you could have modified additional parameters and exercised other features.



Our Quick Start Example used the Implement 1 configuration. Your monitor can support 4 different Implement configurations. The setup assistant can walk you through setting up anyone of the 4 available.

The Implement names default to Implement 1…4, you can change these names to match the name of your Implement (Corn, Beans, Sprayer 1, Sprayer 2, etc..). Press the Green Implement button for a pop-up Keyboard to enter the desired text.

The Copy button allows you to Copy a configuration from one of the other three configurations. The Clear button can clear all configuration information from the selected Implement.

After you have set the Sensors Type, a "Quick Set" button will appear next to the Copy and Clear Buttons. With this button you can Reset the Default Seed Rows to Harness Row Wires.

3.1.2 Area Monitor Setup

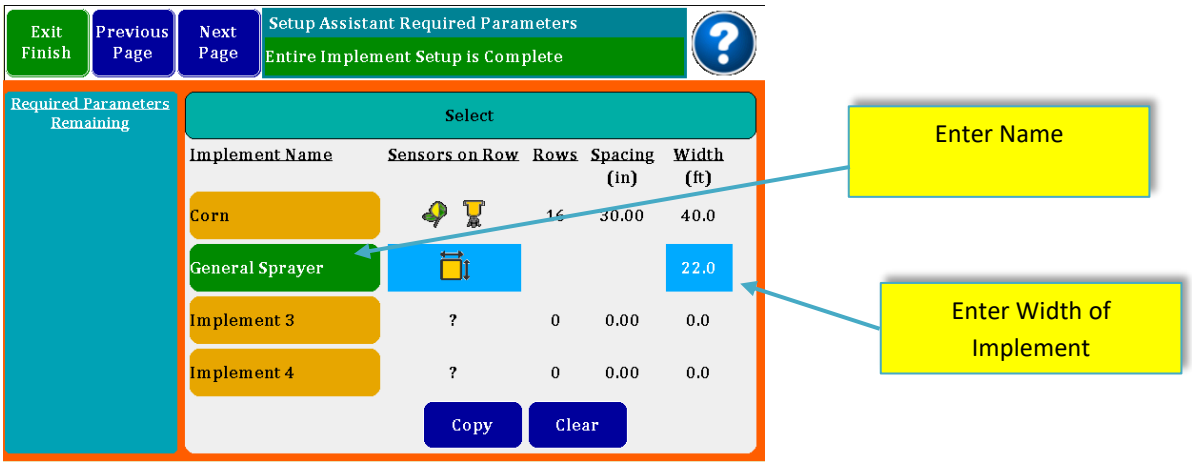
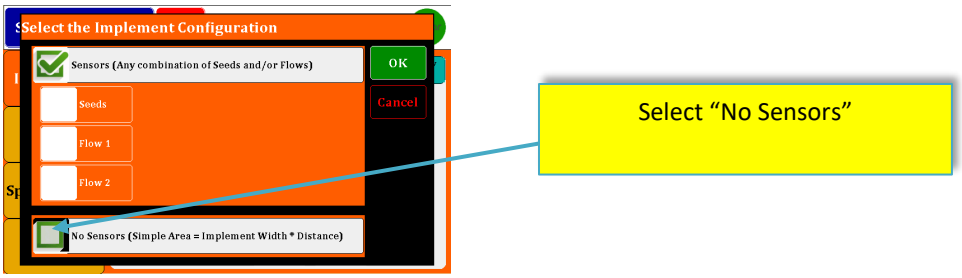


Figure 11 Area Monitor (No Sensors) Setup

In the working Implement in Green called "General Sprayer was configured in the Implement Configuration Dialog, the "No Sensor" Check Box was checked.



3.1.3 Manual Harness Assignment

From the Display Assignments Screen (Section 2.3.4 above) you could have pressed the Manual Set button to pop-up the Manual Display Assignment dialog.

Depending on your Monitor Model you will see differ number of Row inputs. First select a Row button in the middle section of the page. Then on the left side of the page are your Row assignment options. Pressing 1 of the Sensors will assign it to the highlighted Row input in the middle. The monitor will increment to the next Row after each Sensor selection.

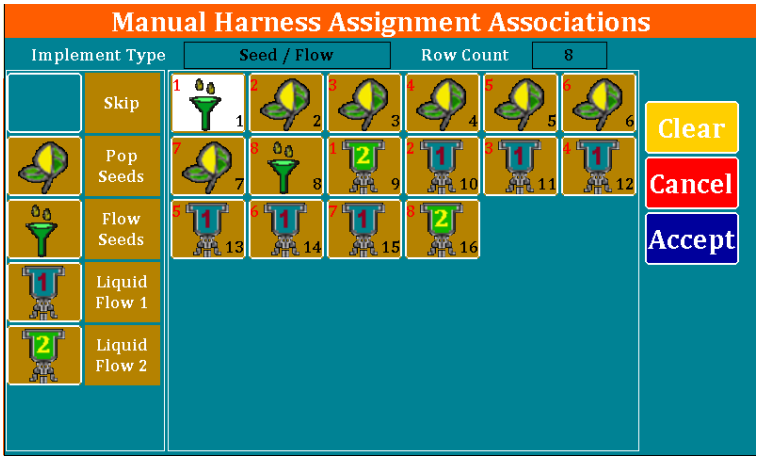


Figure 12 Manual Harness Assignment Dialog

The figure above shows an 8 Row implement with 8 Rows of Seed, and 8 Rows of Flow. The Flow sensors are assigned to two different rates. The funnel "Flow Seeds" is for flow blockage sensors often used on air seeders.

The Black Number in the bottom Right corner of each Row button is the Row Wiring number. The Red Number in the top Left corner is the Display or Implement Row.

Press "Clear" to start over, "Cancel" to Exiting without recording changes, or "Accept" to accept changes and return to the Display Assignment Viewer.

With the setup in Figure 12 above the Display Assignment Viewer would look like the following:

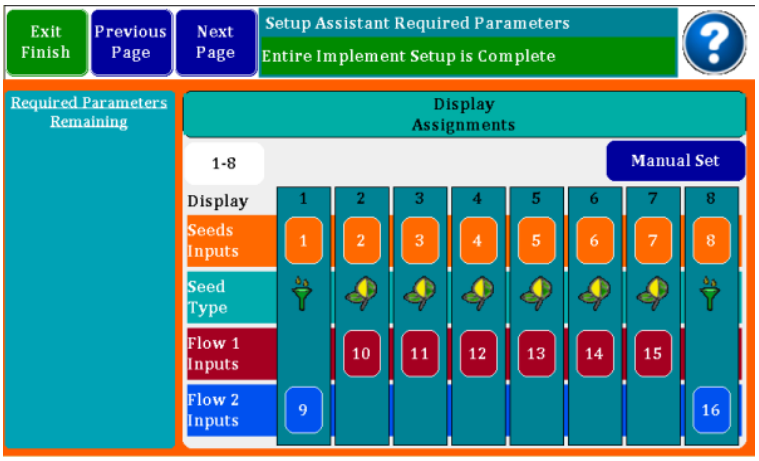


Figure 13 Resulting Display Assignments

3.1.4 Section Control

Refer back to Section 2.3.5 above

Section assignments may be entered in this screen. If you have a planter or liquid system that is setup with section shutoff's, you can configure the rows to match so the monitor will recognize the shutoffs

and not report continuous row failures. Select section number at top, and then touch the row pad to add it to that section.

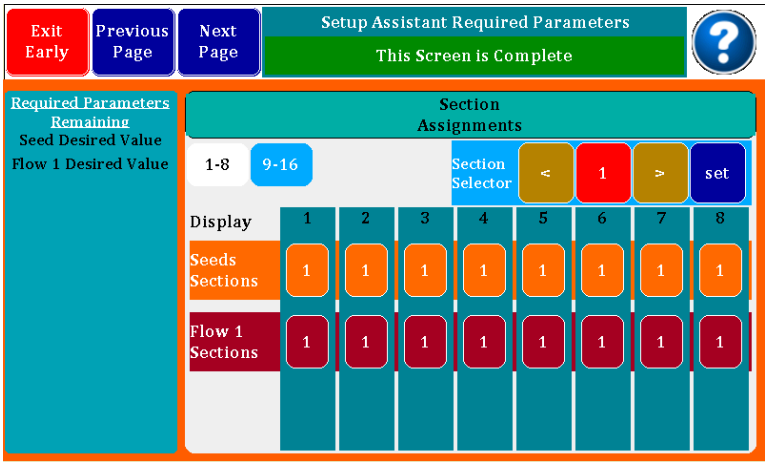


Figure 14 Section Control

Press the "<" and ">" arrows to change the Section Sector Number. Press the Section Sector Number for a few seconds to bring up dialog box to go directly to the Sector Number you desire.

3.2 Accessory Sensors

This section picks up where the Quick Start Section 2 above left off.

If you have RPM, VAC/Pressure, Lift Switch or Hopper Level sensors, you will need to scroll to those setups where you will enter the required information similar to what you have done in seed and flow sensor setup.

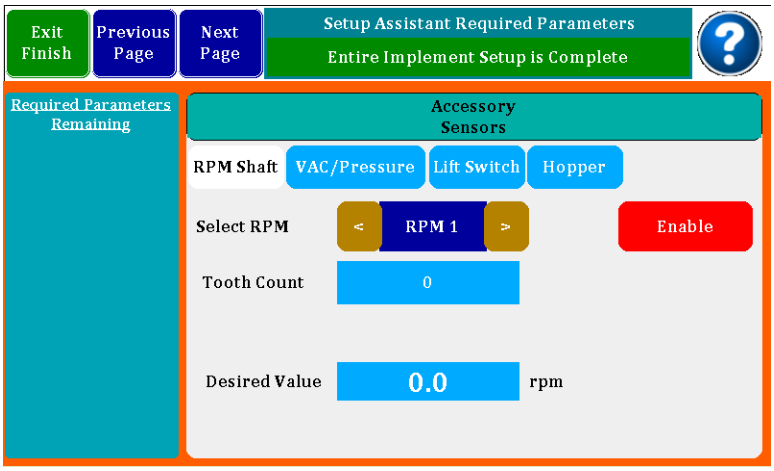


Figure 15 Accessory Sensors

3.2.1 RPM Shaft

In the First Accessory Sensor Screen above you start with the RPM Shaft Sub Page.

You have the ability to setup two RPM sensors. Select the which RPM sensor with the left and right arrow buttons.

Enable the Sensor by pressing the Red "Enable" button.

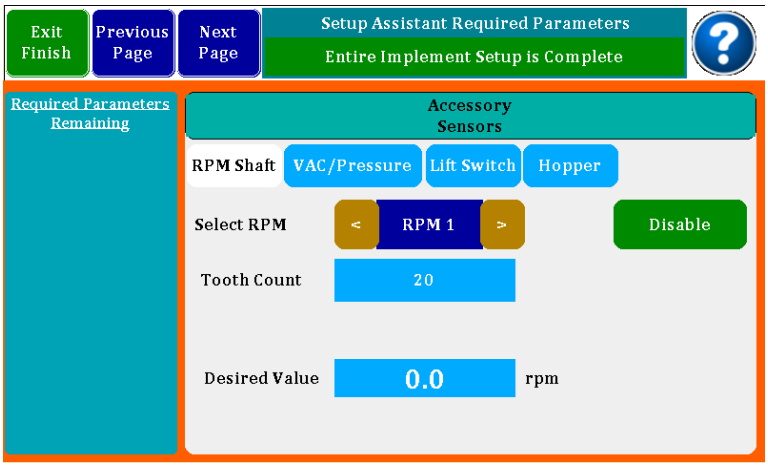


Figure 16 RPM Sensor Setup

Enter the Tooth Count for 1 revolution RPM Wheel, then enter the Desired Value for the RPM Sensor just as you did in the Product Sensors (including Max and Min Limits when they show up).

3.2.2 VAC/Pressure Sensor Setup

VAC/Pressure setup, you may setup 2 sensors as either VAC or Pressure sensors. Depending on your selection the setup screen will modify itself to ask for associated information.

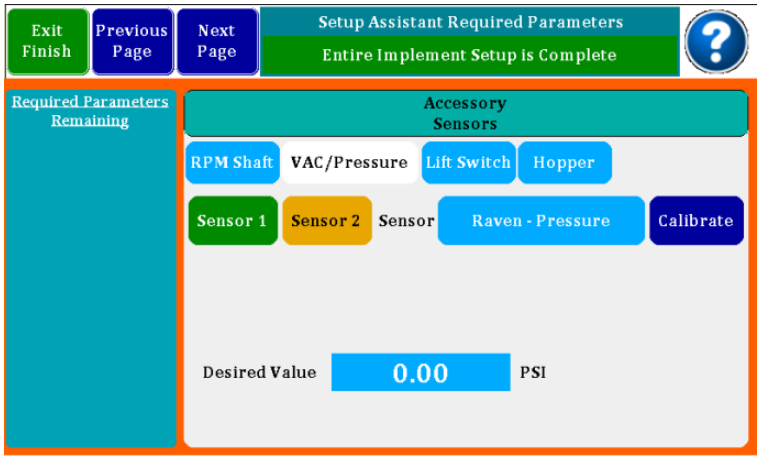


Figure 17 VAC / Pressure Setup Screen

To select the desired Sensor type Press on the Sensor Selection button. This button will provide a selection dialog box as follows. The list includes Off, Raven – Pressure, Dickey John – Pressure, Dickey John – Vacuum and John Deere – Vacuum.

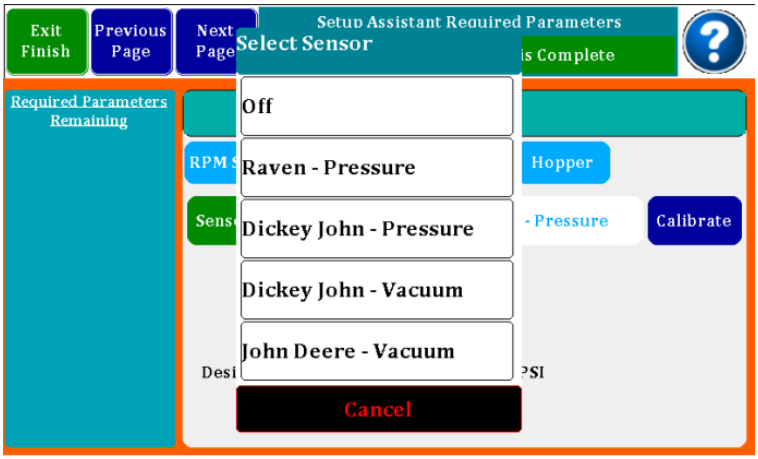
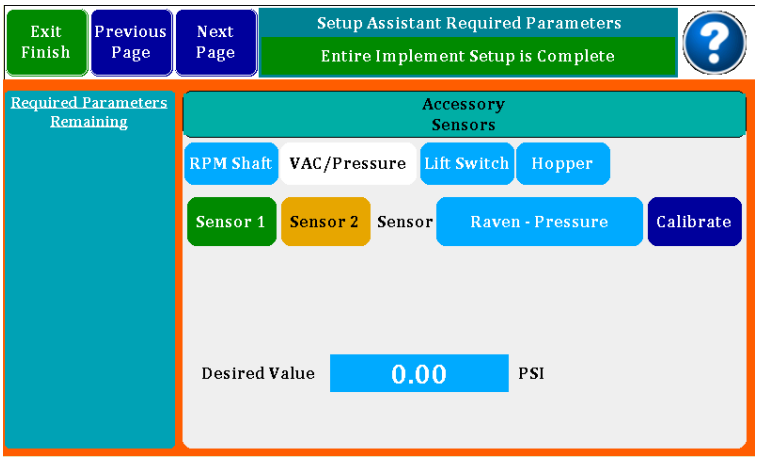


Figure 18 VAC / Pressure Sensor Select

After you Select your Sensor, you will again have to Enter the Desired Values just as you did for the RPM and Product Sensors.



The Raven- Pressure Sensor requires a calibration. You may press the "Calibrate" purple button to calibration your sensor. When you do this the following screen will provide you with more steps.

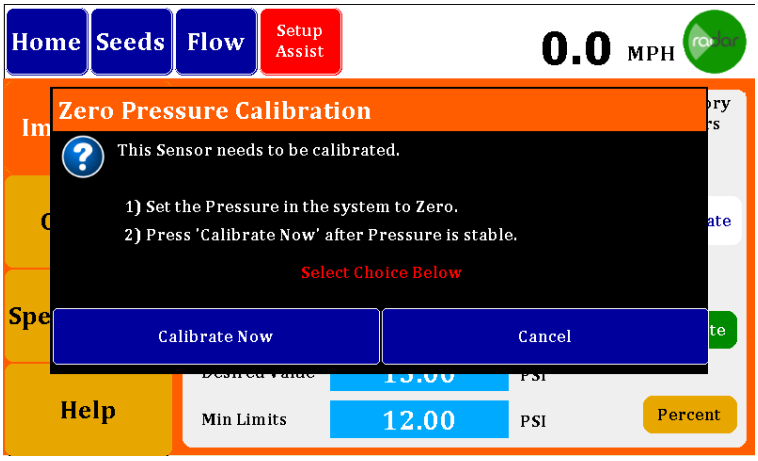


Figure 19 Zero Pressure Calibration Start

If you Press the "Calibrate Now" button the system will show the following screen while it performs the Calibrate function.

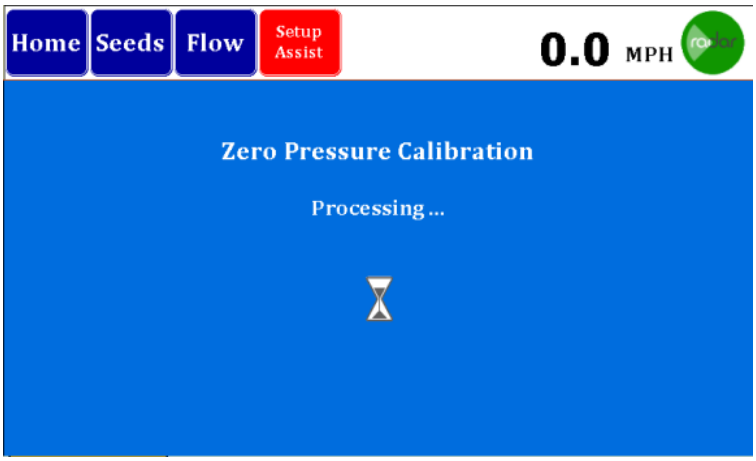


Figure 20 Zero Press Calibration Processing

3.2.3 Lift Switch Configuration

The Lift switch may now be configured to be Normally Open or Normally Closed to accommodate different lift switches.

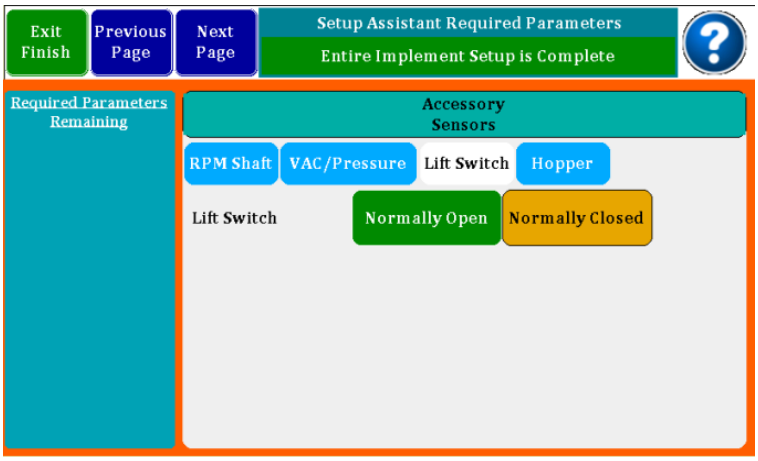


Figure 21 Lift Switch Setup Screen

3.2.4 Hopper Type Sensor Setup

The Hopper Input Type may now be configured as an Active Low or Active High Hopper Sensors.

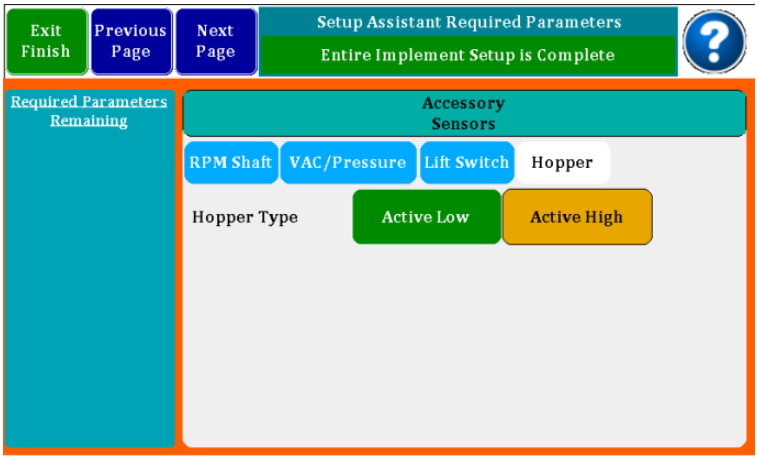


Figure 22 Hopper Setup Screen

3.3 User Interface Setup

3.3.1 Alarm Setup

In this screen you may set the volume of the Alarm or Turn the Sound Off for all. In the Disables tab you can change the Enable state of each accessory sensors.

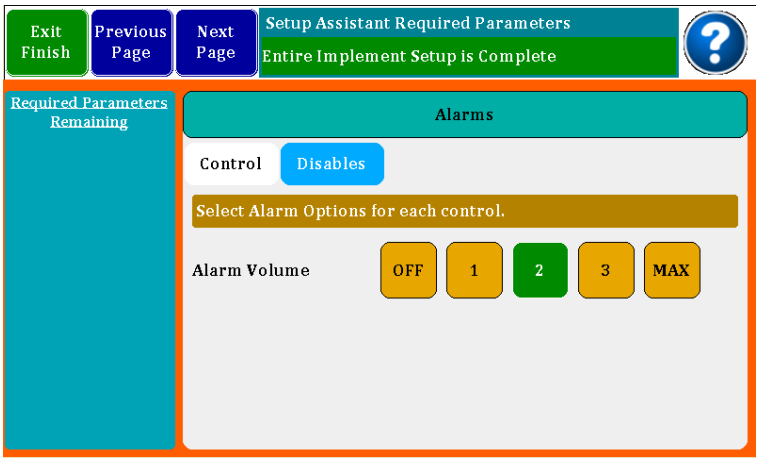


Figure 23 Alarm Setup

Press "Next Page" to navigate to the Display Settings page.

3.3.2 Display Settings

The Display setup is where the screen brightness and Day/Night Mode are set. Conversion units may be set to English or Metric.

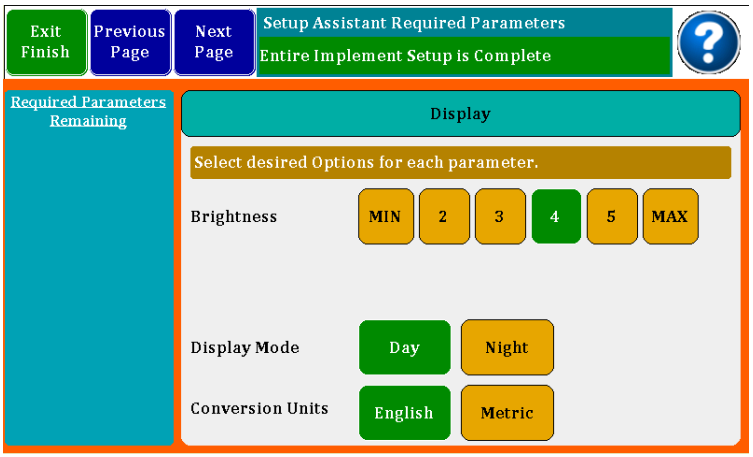


Figure 24 Display Settings

Press "Next Page" to navigate to the Misc. Settings page.

3.3.3 Misc. Settings

Sensitivity is the amount of averaging time used to calculate rates. The longer times may show more accuracy, but changes will come less often. This is normally set to Low or Medium.

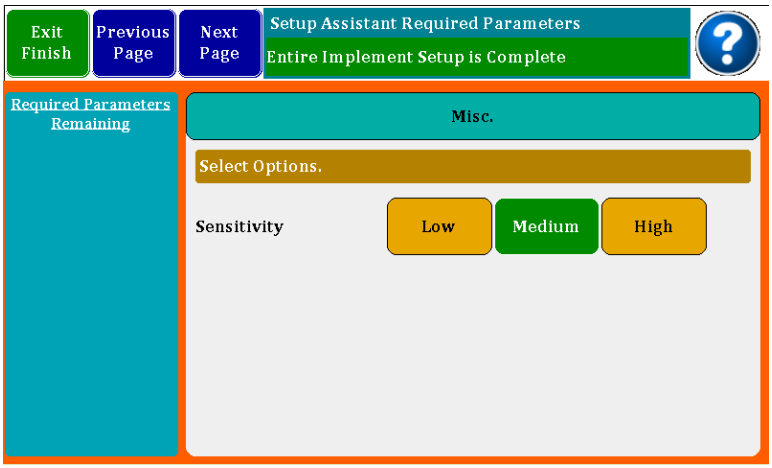


Figure 25 Misc. Settings

Press "Next Page" to navigate to the Speed Setup page.

3.3.4 Speed Setup

The Speed Input screen is where you select what will be your primary source of speed. You can select Manual where you enter a number for the speed you are driving; Radar is used when an external Radar or GPS device is plugged into the 4 pin port on the back of the monitor. The third choice is the Internal GPS when enabled. Speed Input Alarms may be set for over speed.

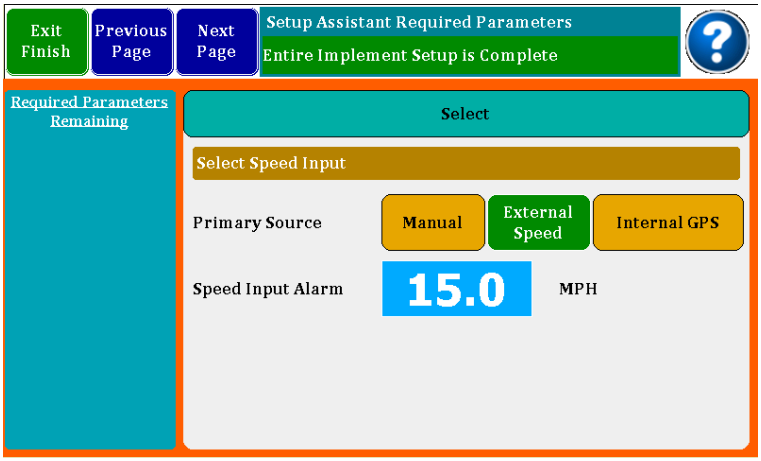


Figure 26 Speed Setup

Press "Next Page" to navigate to the Speed Setup page.

3.3.5 Speed Calibration

When using an external Radar or GPS, you will need to calibrate the device. This is done by driving a 400 foot course. It is suggested that you do 4 runs and the monitor will store and average them for you. Flag your course and as you pass the first flag, press **Start**.

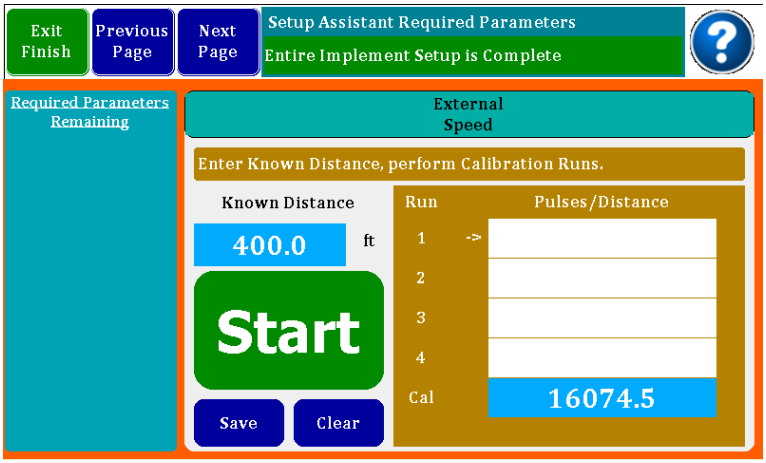


Figure 27 Speed Calibration

When you pass the second flag, press End. A calibration number will appear in the Run # box. Continue to do three more runs to get an accurate number. The monitor will average the numbers and press **Save** to keep the calibration number. Speed derived by this calibration will be quite accurate.

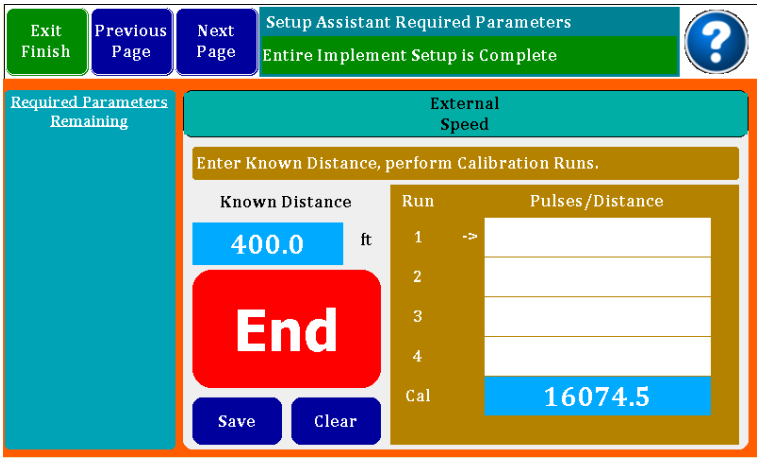


Figure 28 Speed Calibration "End"

Press "Next Page" to navigate to the About and Assistance pages.

3.4 Setup Screen

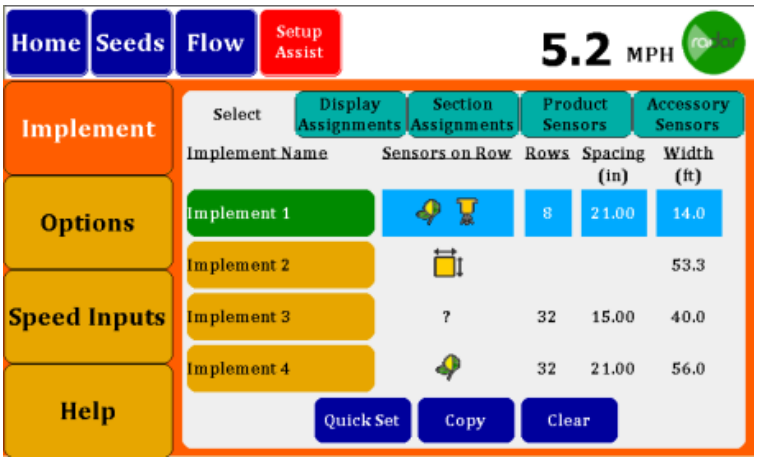


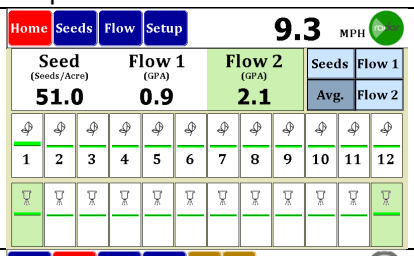
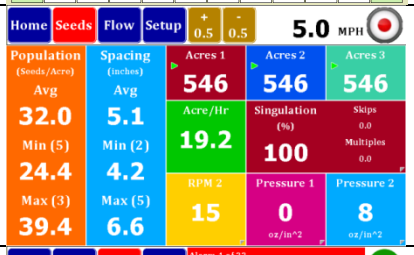
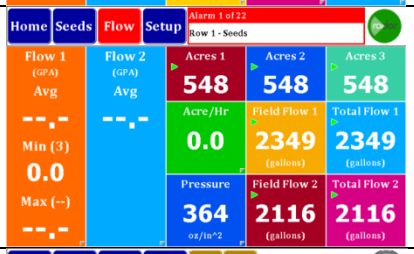
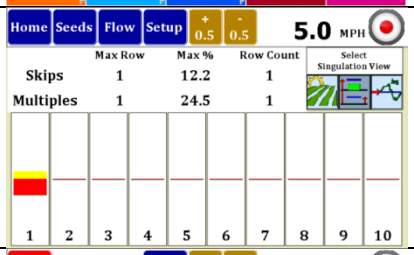
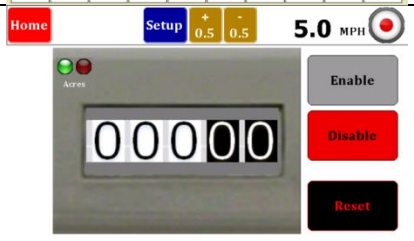
Figure 29 Setup Screen

The Setup Screen can be moded as a step through Assistant just as it has since the start of this manual. You may also navigate directly in Normal mode. All setup attributes are available by selecting the appropriate Vertical and Horizontal tabs.

When in Normal Setup Screen the buttons on the left navigate you to different functional areas. Then within each Functional Area additional horizontal Tab Buttons will appear across the Top allowing you to navigate further in to detailed features.

4 Monitor Operation Screens

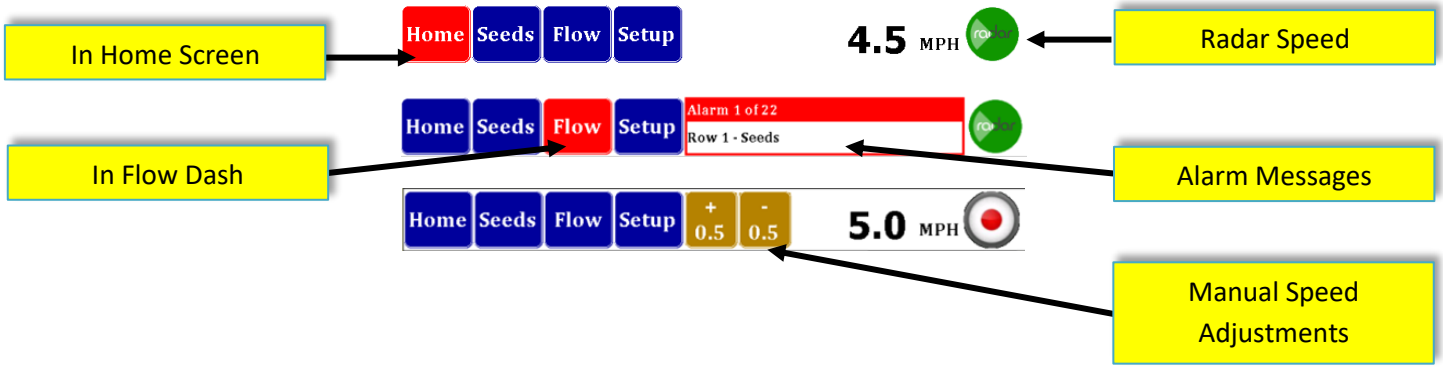
The Monitor has 6 different Operation Screens. Depending on your Implement Setup, some screens may or may not be accessible.

Name	Available	Description	Snap Shot
Home	Any Sensor	The Home screen provides a graphical view of the Row data as well as selectable summary information. Showing Seed and Flow data.	
Seed Dashboard	Seed Sensor	Summary information for seeds as well as other Accessory Sensors. Acre Counters are also available.	
Flow Dashboard	Flow Sensor	Summary information for flow sensors as well as other Accessory Sensors. Acre Counters and Field Counters are also available.	
Singulation	Seed Sensors	The Singulation data is available for all Seed sensors.	
Area Counter	No Sensors	If no Sensors are available the monitor can be turned into a simple Acre counter, using measured distance and a user entered Width of implement.	

4.1 Menu Bar

The Menu Bar provides a way to navigate to all of the Operational Screens, as well as providing status information.

The Menu Bar resides at the Top of the Monitor display and is always visible.



4.1.1 Screen Navigation

All you to navigate to different screens, buttons are display if screen is available. Button names can change indicating alternate features. Selected screen is denoted by the button changing color to Red.

4.1.2 Alarm Message Area

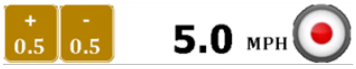
This area shows Alarm messages. If multiple messages are available, the monitor will cycle through them, until alarm goes away or are temporarily suspended.

If Alarm messages are present you may acknowledge All of the present messages by pressing on the message area. The Audible alarm associated with the PRESENT alarms will stop sounding and the message center will be cleared. If new Alarms are set, they will be shown in the message center again. This temporary acknowledgement of the Alarms is cleared after an All Rows Fail or lift switch is activated.

4.1.3 Speed Icon

The Speed Icon on the far right indicates the type of Speed Input you have selected. This selection can change via the Setup Screens or directly by pressing the Icon itself and making a selection.

4.1.4 Manual Speed



If Manual Speed is selected the Icon on the Right will look like this Circle with a Red Dot. Two additional Buttons will be provided, which allows a quick way of adjusting the speed up or down by 0.5 mph. You may also select your speed by pressing the Speed number, a pop-up Numeric Keypad will come up for you to enter your speed.

4.2 Home Screen

The Home Screen provides a Row by Row indication of Product Sensors performance in the Bar Graph Area. The Console Area provides Average summary data, Min / Max or Numeric Present data values.

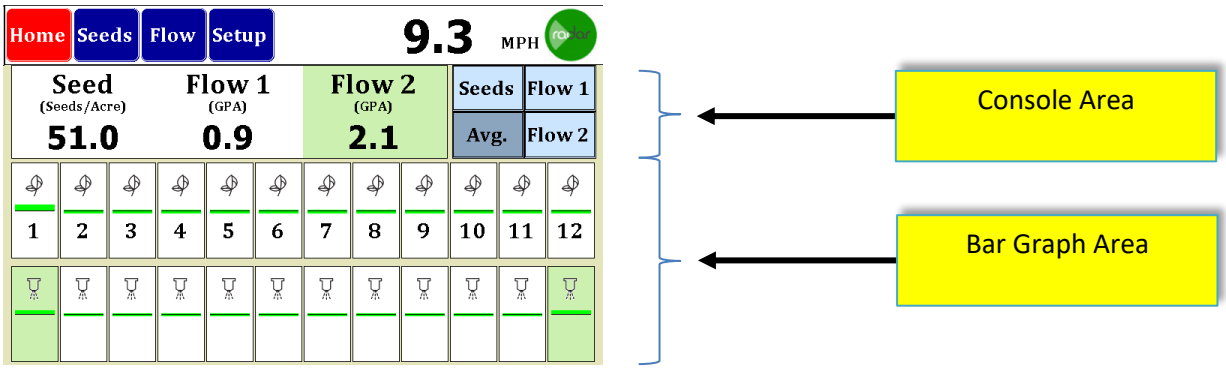


Figure 30 Home Screen Layout

4.2.1 Console Area

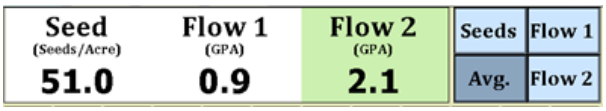


Figure 31 Home Console Area

The Console Area can be moded to provide many pieces of data. The Green Background will always indicate FLOW 2 in this Console as well as the Bar Graph Areas.

If multiple Product Sensors are selected (Seeds\Flow, Flow1\Flow2, etc…) the right side of the console area will contain Sensor Selection buttons.

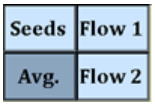


Figure 32 Home Console Sensor Select

By pressing the "Avg." button, the Console will provide Average Data for each Sensor as in Figure 31 Home Console Area above.

By pressing 1 of the other available Product Sensor the Console Area will change to providing specific information on that Product Sensor. The Sensor Selection buttons will also be replaced with Individual Parameter selections buttons, these selections will disappear in time if nothing is selected.

If only 1 Product Sensor is selected for the working Implement, the Individual Parameter Selection Buttons will be continuously displayed.

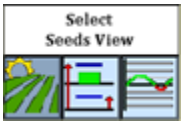
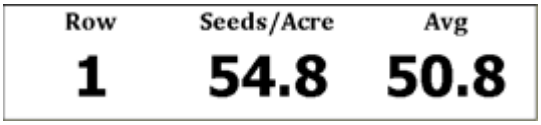


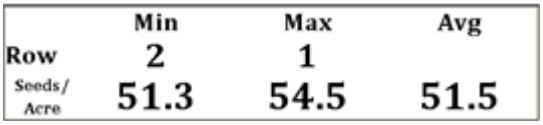
Figure 33 Individual Parameter Selection

Three different Console Area Views are selectable by the Individual Parameter Selection buttons.

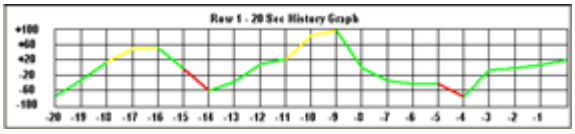
The Row Button  provides details about 1 Product Sensor. You can change the Selected Product Sensor by pressing the desired Bar Graph indicator. You can go directly to this View mode at any time by pressing the Bar Graph indicator.



The Max/Min Button  provides present Min Max and Average for the Selected Product Sensor type. The Max and Min values also provide Display Row number for each value.



The Line Graph Button  provides a Line Graph of the last 20 seconds of the active Product Sensor. The Line Color correlates to the Bar Graph colors which indicate above/below and within the Desired Limits for the Product Sensor.



4.2.2 Bar Graph Area

The Bar Graph Area provides individual indicators of Product Sensor readings. The center vertical line represents the Desired Value for that Product. The Bar Graph will be filled in for readings above and below the Desired Value. Green Bars indicate the Reading is within the Limits. If the Reading goes below the Lower Limit the color will change to RED. If the Reading goes above the Upper Limit the color will change to YELLOW.

Figure 34 Home Bar Graph Area

The Individual Bars contain other identifying and status graphics. The Number represents the Implement Row, if there are multiple Sensors per Row, the Number will be only display on the top Bars.

The Icons indicate the type of Product Sensors (Pop Seed or Flow Seed or Flow or Master Flow). The Green Background is an indication of FLOW 2 readings.

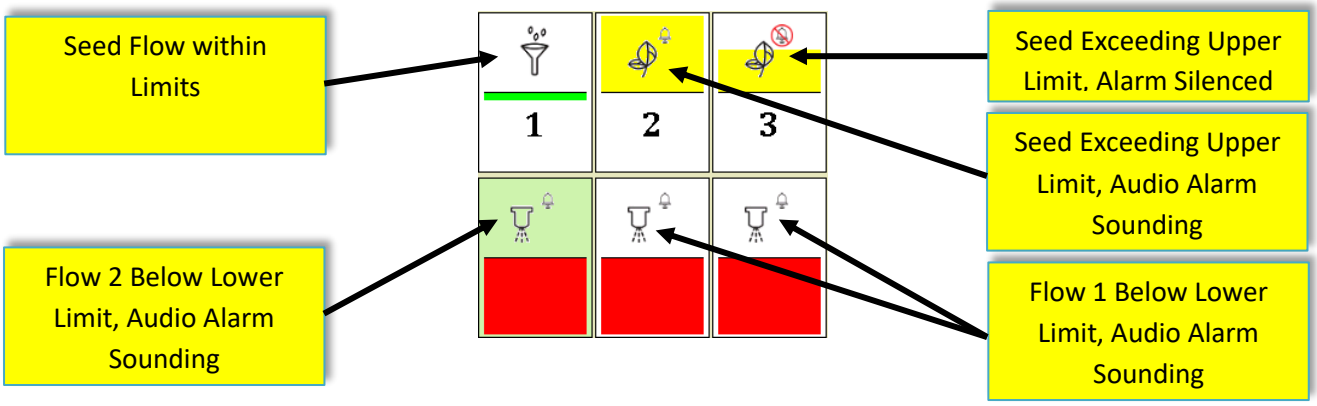


Figure 35 Bar Graph Examples

To Turn OFF the Audible Alarm for an individual Product Sensor Press and Hold a Bar Graph Indicator for 3 seconds, the Alarm indicator will change to an Alarm with a red circle and cross out. Press and Hold again to remove the disable. These disables will be remembered through "All Rows Fail" or "Lift Switch Active" conditions. The two ways to remove the disable is Press and Hold as just described or Turn OFF the monitor.

4.3 Seed Dash Board

The Seed Dash Board provides summary information for seeds as well as other Accessory Sensors. Acre Counters are also available.

The Seed Dash is only available is the selected Implement includes Seed Product Sensors.

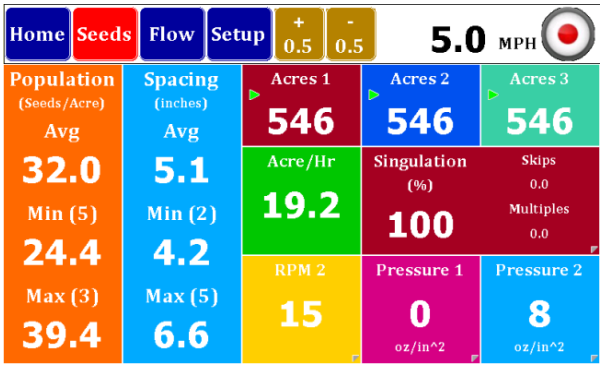


Figure 36 Seed Dash Board

4.3.1 Population and Spacing

The Population provides Average, Min and Max values from instantaneous analysis of all Seed Sensors. The Implement Row is also displayed for the Max and Min values.

The Spacing for the seeds has the same analysis as for the Population values.

4.3.2 Acre Counters

Three independent Acre Counter can be Stop/Run or Cleared, the latest Counter will be save through power cycles of the Monitor. The counters are based of Width of Implement and Distance. The Green Arrow on a Counter indicates that it is in the Run Mode. A Red Square indicates that the Counter is in Stop Mode.

To Change the Mode or Reset a counter, press and hold the counter Tile. After a few seconds two buttons will appear on the Tile. The Left button will allow you to toggle the Mode between Stop and Run. The Right button can be pushed to Reset the counter (note the Reset occurs immediately, no verification requested).

4.3.3 Acre/Hr and Singulation

The Acre/Hr Tile provides an instantaneous indication of Acres per Hour.

The Singulation indications of Skips, Multiples and Singulation always add up to 100%. These values are based on the analysis of ALL Seed Sensors.

To see Singulation per individual Seed Rows, navigate to the Singulation Screen by press and hold of the double wide Tile. See Section 4.5 Singulation Screen below for details.

4.3.4 Accessory Sensor Tiles

The Accessory Sensor Tiles across the bottom left tiles can be assigned per your desires. These Tiles have a peel indicator in the bottom right corner of the Tile, this indicates optional values.

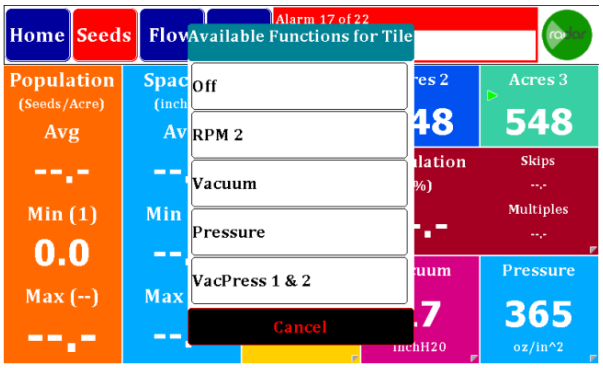


Figure 37 Seed Dash Optional Tiles

By a Press and Hold on these Tiles a Selection Dialog will appear with All Accessory Sensors that you have enabled within the Setup for your active Implement. These selections will be remember through power cycles of the monitor. VacPress 1 & 2 is a selection that would toggle the Tile between the two sensors, changing the Tile every few seconds.

4.4 Flow Dash Board

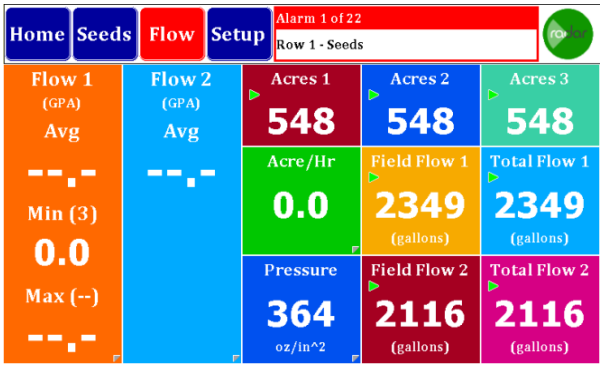


Figure 38 Flow Dash Board

The Flow Dash Screen is similar to the seeds screen. Shown at left is the Flow Rate. It will Show GPA Average, Minimum (Row Number) and Maximum (Row Number). If you have two Flows selected, there will be a second column for Flow 2.

Across the top you will find the acre counters. There are three acre counter memories in the system and they may be started, stopped or reset by holding the button down for three seconds to bring up a Start/Stop and Reset button. Shown above, a triangle shows acres counting, whereas a square indicates counter has stopped.

Center right shows Acre/Hour rate followed by a calculated Field Flow 1 and Total Flow 1. Both of these may be started/stopped or cleared by holding the button down for three seconds.

On the bottom row you will see the current average GPM flow rate (This will toggle between Flow 1 and Flow 2 if you have both) and finally, you have Field Flow 2 and Total Flow 2 which may be started/stopped or cleared by holding the button down for three seconds.

The center lower 2 tiles can be configured with existing Acres/Hr, Flow GPM and the new Pressure or Vac sensor values. Simply press on the Tiles and a dialog box will appear with possible Tile Assignments.

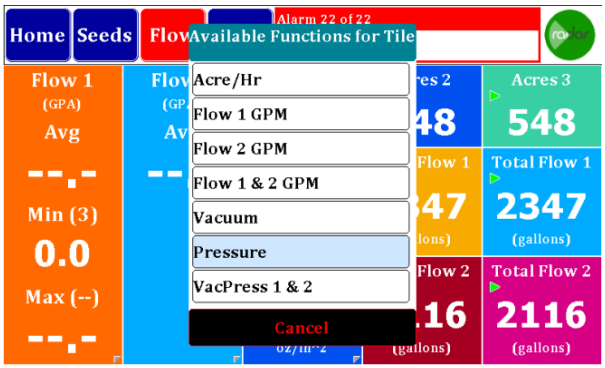


Figure 39 Flow Dash Optional Tiles

4.5 Singulation Screen

The Singulation Screen provides row by row Singulation conditions. To enter this screen navigate to the Seed Dashboard and press on the Singulation cell, you will be taken to the Row Singulation screen.

After entering the screen you will have a view very similar to the Home Screen. The screen has a console or statistics area, a view select area and a graphical area. The view select area lets you chose from 3 different console statistics, Row Select, Max Value, and Overall average. The Row Select shows the Singulation, Skips and Double of the selected row, these values represent a percentage singulation. Press on the Row Graphical area to select which Row to view. The Max Value shows the Row number and Max value in percent of Skips and Multiples. The Row count value is a count of all rows that are exhibiting Skips and Multiples. The Overall Average view contains the values normal scene on the Seed Dashboard screen.

For each row graphical object you can see the present Skips and Multiple percentages. Skips are shown in yellow above the center line and Multiples are shown in Red below the center line. If neither of these colors show for a given Row this would indicate 100 % singulation.

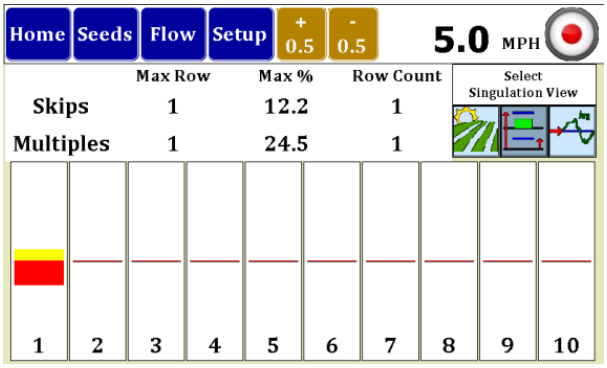


Figure 40 Singulation Screen

The screen shot above shows 12.2% Skips on Row 1 as shown in yellow. The Multiples are at 24.5 and are shown in Red.

4.6 Area Monitor

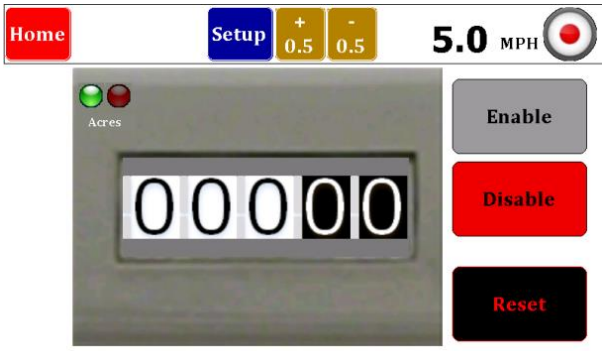


Figure 41 Speed/Area Monitor Screen

Speed/Area Mode provides a very simple screen that calculates the acres covered. This count can be Started or Stopped with the Enable/Disable buttons. You may also reset the Acre count at any time.

Selection and Configuration of this mode is very similar to selection and configuration of other Seed/Flow implements. In the Setup Screen select an Implement then press on the associated Sensors on Row Icon area. This will bring up the new "Select the Implement Configuration" dialog box. In this dialog select the check box at the bottom, the check box text is "No Sensors".

Appendix A **Internal GPS Status**

The Internal GPS status is provided in the ICON located in the upper right corner of the monitor display. This upper right corner area is described more fully in the MPH INDICATOR section on page 19.

The GPS ICON indicates the Signal Strength and GPS Lock Status. The ICON is made up of 5 bars, the left 4 bars indicate the Signal Strength and the tall bar on the far right indicates the GPS Lock Status.

The Signal Strength is a measure of how many Satellites are being tracked by the GPS sensor. The following table explains the 5 possible Signal Strength conditions:

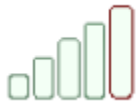
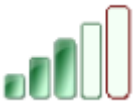
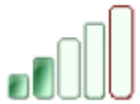
	Zero Satellites		7 to 9 Satellites
	1 to 3 Satellites		10 or more Satellites
	4 to 6 Satellites		

Figure 42 Satellite Signal Strength

The GPS Lock status is indicated by the color of the far right status bar. This status is truly independent of the other 4 Satellite Strength status bars, however there is a correlation between them. To establish a GPS lock the GPS sensor must be tracking several satellites, to establish a GPS WAAS lock the GPS sensor typically requires even more satellites. The following table provides the GPS Lock Status indicators with typical Satellite Strengths:

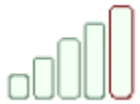
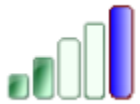
	The far right indicator is blank or clear which means the GPS does not have a lock on any satellites. In this condition the GPS cannot determine the location, therefore Speed cannot be determined.
	The far right indicator is blue which means the GPS has a Lock on the satellites. In this condition the GPS can determine the location, and therefore Speed can be determined.
	The far right indicator is red which means the GPS has a WAAS Lock on the satellites. In this condition the GPS can determine the location, and therefore Speed can be determined. The WAAS lock provides the GPS solution with the highest accuracy.

Figure 43 GPS Lock Status

Appendix B **Flow Meters**

B.1 Flow Meter Installation

A plumbing diagram for a typical system used on a planter for the pop up/side by side fertilizer has been included. Starting with the product tank that is normally mounted on the planter frame each of the components used in the system will be discussed regarding their function and installation.

#1 Leading out of the tank a main ***shutoff valve*** should be in place to cut product flow to the entire system.

#2 The next component on the diagram is a ***filter*** which is critical for keeping foreign material out of the pumping system that would cause plugs or blockages to occur. It is recommended for an application rate of 5 gallons per acre or less to use an 80 mesh filter screen. Application rates higher than 5 gallons per acre can be applied with a 50 mesh screen filter. A finer screen is used at lower application rates to keep the small flow meters from plugging. The filter should be placed before the pump to allow for proper filtering of the fertilizer being applied.

#3 The ***pump*** is the next item in line after the filter. There are many types of pumps that are commonly used for liquid fertilizer application. Piston, squeeze, hydraulic and 12V DC type pumps have all been used with this system. All these pumps work well as long as they are properly sized for the specific application rate that is being applied.

#4 After the pump a ***cleanout port*** is shown that would be used for rinsing out the system after the season is over. It may also be used for rinsing if you are going to be out of the field and will not be using the system for an extended period of time. The cleanout port will also be useful in flushing out the system if blockages should occur due to contamination problems in the fertilizer system. The clean out port consists of a valve and a garden hose adapter for hooking up the rinsing system.

#5 Following the cleanout port is the ***distribution manifold*** followed by the ***individual row flow meters.*** The flow meters can be grouped together after the manifold or distributed on the bar individually closer to each opener.

#6 ***An optional bracket (Part No. 6675)*** is available for purchase that holds up to 8 flow meters. This will help keep track of which flow meter is going to which row plus it helps in making a neat, safe, and organized installation of the flow meters. Each precision flow meter is made with 2 sizes of hose barbs on each end of the flow meter housing. These barbs are ¼" and 3/8" which makes adapting to your planter plumbing system easy.

#7 After the flow meters a ***check valve/orifice plate*** assembly is recommended. A 2 psi check valve works well for most systems. The lines will stay filled with liquid and leakage on the ends will be prevented when the unit is raised. Properly sized orifice plates will make the application rate accurate and consistent from row to row.

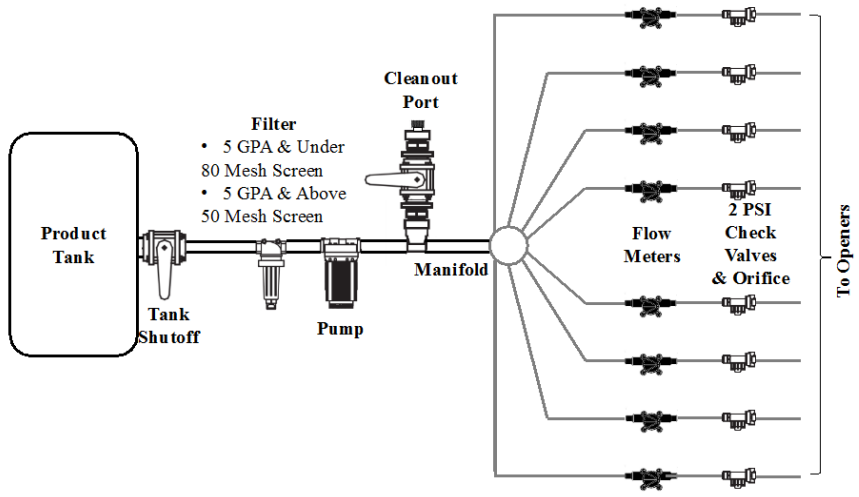
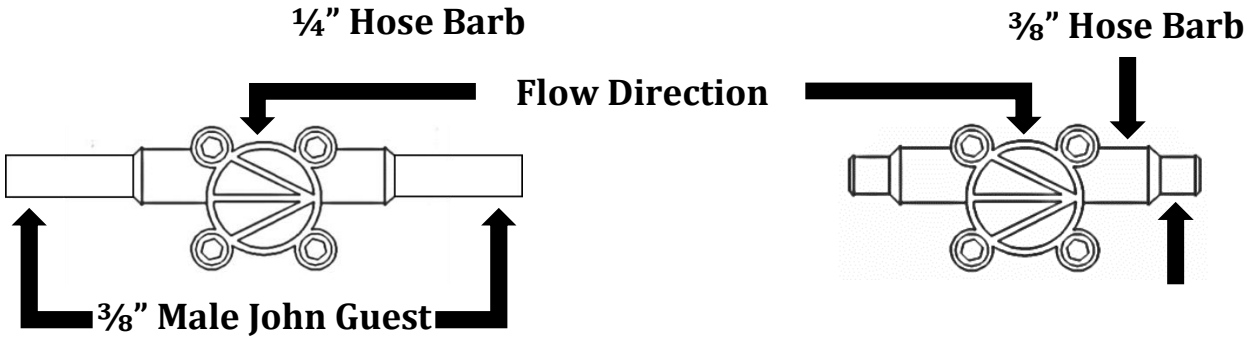


Figure 44 Pluming Diagram

There are some important items to observe when getting ready to install the precision flow meters in the system. On both the inlet and outlet end of the flow meter, there are two different sized hose barbs. The smaller is designed to use ¼" ID hose, and the larger barb closer to the center of the meter is designed to accept 3/8" ID hose. The first step in installing the flow meters is determining which barb will work best to adapt to the size and type of plumbing on the planter/applicator. The flow meters are supplied with two 2" pieces of ¼" tubing plus 2 clamps. The tubing is provided as a way to easily transition to the existing plumbing. If the planter/applicator uses 3/8" hose in the system, you can simply slide it on and clamp it to the flow meter on the larger barb.

Also available are flowmeters designed to use John Guest fittings. They are manufactured with 3/8" push on fittings making any necessary maintenance very quick and easy to do. The same specifications apply to the flowmeters using either type of connections, the Hose Barb or John Guest fittings. To order the correct flowmeters, use the part numbers on page 26 and include a HB or JG after the number, depending on the style that you prefer.

Another important feature of the flow meter is a direction arrow showing how material should flow through the meter. It is made into the housing on the opposite side of where the cable goes into the meter. It is very critical that the flow meters are installed following this direction of flow indicator. Inaccurate or inconsistent readings will occur if they are installed backward.



Please note on the cable close to the harness connector the tag that shows the part number for the flow meter you have. There are 5 different flow meters offered, and they all look the same from the outside. Each precision flow meter has different operating range so it is important that they be chosen correctly for your application. Below is a chart showing the operating specifications of each flow meter.

Part Number	GPM Range	Pulses Per/Gallon	Gal/ Per Acre approx.
6663	.013 - .132	57200	2 - 4
6664	.032 - .400	24500	5 - 15
6667	.053 – 1.189	12550	13 - 20
6665	.08 - 2.65	4350	16 - 70
6668	1.32-3.96	3136	50-120

Table 1 Flow Meter Specifications

The Visu Flo™ METERS can be installed anywhere between the distribution manifold and the Check Valve/orifice assembly. The main things to take into consideration are the safety and ease of access to the flow meters. The flow meter must be installed into each row so the most logical place to mount the meters would be in a grouping close to the output of the manifold. A bracket (P/N 6675) is available to hold 8 flow meters in a 9" space. All the fertilizer lines can be ran neat & orderly from the manifold to the flow meter and from the flow meter to the row. This will also make the wiring harness less complex as the length of wire required to hook the flow meters up will not be very long and all the connections will be in one location close to this grouping.

This is an example of an 8 Row System Using

Hose Barb style flowmeters

On a Bracket PN: 6675

This is an example of a 4 Row System

Using John Guest style flowmeters

With our Manifold and Bracket Kit.

8 Row Manifold Kit PN: 6698-8

4 Row Manifold Kit PN: 6698-4

Figure 45 Flow Manifold

It is also recommend that once you have commenced planting and the lines and the flow meters have been filled with fertilizer that they remain fully charged until finished planting for the season. This will help insure that crusting/plugging does not occur and that the flow meter turbine will remain free once planting begins again. This is the reason we want the check valves installed in the system as this will insure the lines stay fully charged once the pumping stops. If – for example planting is delayed due to rain the check valves will insure that the lines remain fully charged and you will not be required to flush out the system. PLEASE NOTE: One exception to this rule is if you have micro nutrients mixed in with your fertilizer and the planter is going to be setting for more than a couple of days flushing of the system is recommended as the ingredients may settle and may cause problems once planting starts again. Once again if you have made plans for flushing of the system and planting is delayed we would recommend, you go ahead and flush the system to insure no problems will occur on startup.

B.2 Master Flow

This Flow Sensor configuration would replace Nozzle flows Sensors on each Planter Row with 1 Master Flow Sensor for 1 Product for the entire planter. A Master Flow Sensor can be selected for Flow 1 and / or Flow 2. This Master Flow sensor is indicated with an Inline sensor icon as seen in the following image.

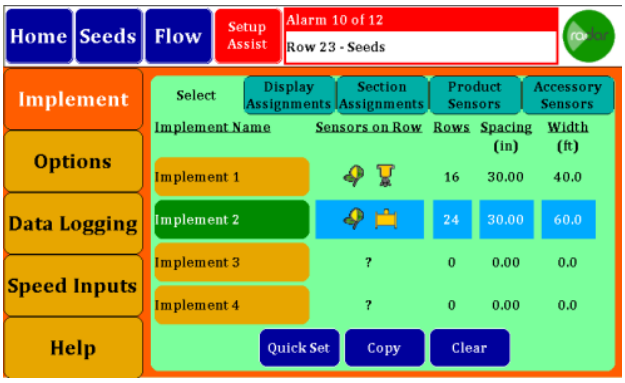


Figure 46 Monitor Implement Type Selection

To accommodate configuring of the Master Flow sensor a Implement Configuration screen was developed. In this screen you can select Flow type for each flow setup. The flow type would be the normal Per Row of the Master Flow sensor.

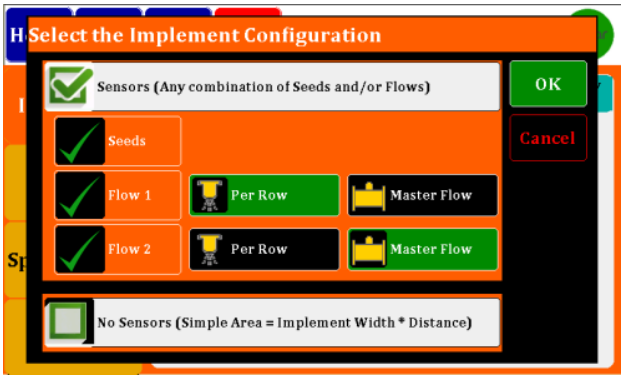


Figure 47 Monitor Implement Configuration

The Master Flow indicator on the Home screen represents the entire product applied to the Implement and therefore will appear differently than normal Row based products. The Display Assignments screen will also show the Master Flow Icon if selected.

Master Flow Meter calibration number is read in pulses per gallon. This calibration number is typically displayed on the flow meter with a tag. Raven flow meters output in pulses per 10 gallon, resulting in the calibration number needing converted Ex: 710/10 = 71 pulses per gallon.

B.3 Post Season Storage for the Visu-Flo™ Flow Meters

Within 2 to 3 days of finishing for the season we **strongly** recommend a total cleansing of the system with water. You will need to clean and rinse the fertilizer residue out of the system adequately so it will not cause issues on start up for the next season. The more thorough job you do now will pay you dividends as the amount of fertilizer left in system will cause potential sources for blockages next time the system is used.

Once you have rinsed the system clean you will need to winterize your system. It is recommended that a good quality RV antifreeze, rated to **– 50,** is utilized so that freezing will not occur and cause major damage and avoidable expense to your system components.

Simply run enough RV Antifreeze through your system to replace the water that was used to rinse your system. Be extra conscientious to FLUSH any area that may trap the water (low spots etc). Make sure you use enough RV Antifreeze to completely fill your system components with the antifreeze.

Appendix C **DM-4600 Console Pinouts**

C.1 30 Pin Console Pinout

Pin #	Description
A1	Row 1 (green)
A2	Row 2 (white)
A3	Row 3 (brown)
B1	Row 4 (blue)
B2	Row 5 (orange)
B3	Row 6 (yellow)
C1	Row 7 (purple)
C2	Row 8 (gray)
C3	Row 9 (pink)
D1	Row 10 (tan)
D2	Row 11 (white/black)
D3	Row 12 (red/black)
E1	Row 13 (green/black)
E2	Row 14 (orange/black)
E3	Row 15 (blue/black)
F1	Row 16 (black/white)
F2	Row 17 (red/white)
F3	Row 18 (green/white)
G1	Row 19 (blue/white)
G2	Row 20 (black/red)
G3	Row 21 (white/red)
H1	Row 22 (orange/red)
H2	Row 23 (blue/red)
H3	Row 24 (red/green)
J1	Vac 1 analog input (purple)
J2	Vac 2 analog input (gray)
J3	No Connection
K1	Lift Switch Signal (green/bk/red)
K2	8 V Sensor Power (red)
K3	8 V sensor Ground (black)

C.2 18 Pin Console Pinout

Pin #	Description
A1	Row 25 (orange/green)
A2	Row 26 (black/wh/red)
A3	Row 27 (green/bk/white)
B1	Row 28 (orange/bk/white)
B2	Row 29 (blue/bk/white)
B3	Row 30 (black/red/green)
C1	Row 31 (white/red/green)
C2	Row 32 (red/black/green)
C3	RPM 1 (brown)
D1	RPM 2 (blue)
D2	VAC 1 frequency input (orange)
D3	VAC 2 frequency input (yellow)
E1	Hopper Level 1 Signal (green)
E2	Hopper Level 2 Signal (white)
E3 - F1	No Connection
F2	8 V Sensor Power (red)
F3	8 V Sensor Power (black)

C.3 4 Pin Power In/ Alarm Out Pinout

Pin #	Description
1	12 VDC IN (red)
2	-12VDC IN (black)
3	Visual Alarm Out (rd/wh)
4	Visual Alarm Return (bk/wh)

C.4 4 Pin Bottom Speed In Pinout (Radar/Speed)

Pin #	Description
1	Ground (black)
2	Signal (green)
3	12 v. Power (red)
4	Sense (white)

Appendix D **DM-4600 Implement Pinouts**

D.1 37 Pin Harness Pinout

Pin #	Description
1	Row 1 (green)
2	Row 2 (white)
3	Row 3 (brown)
4	Row 4 (blue)
5	Row 5 (orange)
6	Row 6 (yellow)
7	Row 7 (purple)
8	Row 8 (gray)
9	Row 9 (pink)
10	Row 10 (tan)
11	Row 11 (white/black)
12	Row 12 (red/black)
13	Row 13 (green/black)
14	Row 14 (orange/black)
15	Row 15 (blue/black)
16	Row 16 (black/white)
17	Row 17 (red/white)
18	Row 18 (green/white)
19	Row 19 (blue/white)
20	Row 20 (black/red)
21	Row 21 (white/red)
22	Row 22 (orange/red)
23	Row 23 (blue/red)
24	8 V Sensor Power (red)
25	8 V Sensor Power (red/black/white)
26	8 V Sensor Ground (black)
27	8 V Sensor Ground (white/black/red)
28	Row 24 (red/green)
29	Row 25 (orange/green)
30	Row 26 (black/wh/red)
31	Row 27 (green/bk/white)
32	Row 28 (orange/bk/white)
33	Row 29 (blue/bk/white)
34	Row 30 (black/red/green)
35	Row 31 (white/red/green)
36	Row 32 (red/black/green)
37	Lift Switch Signal

D.2 10 Pin Accessory Harness Pinout

Pin #	Description
A	Hopper Level 1 (green)
B	Hopper Level 2 (white)
C	RPM 1 (brown)
D	RPM 2 (blue)
E	VAC 1 frequency input (orange)
F	VAC 2 frequency input (yellow)
G	VAC 1 analog input (purple)
H	VAC 2 analog input (gray)
J	8 V Sensor Power (red)
K	8 V Sensor Power (black)

Appendix E **Part Numbers**

E.1 Monitor

Description	Part Number
DM-4600 Console Only	301103
RAM Ball Mount	301107
RAM Arm and Base Kit (Optional)	301108
Visual Alarm (Optional)	301109

E.2 Console Harnesses.

Description	Part Number
Console Power Harness 12'	301104
Cab Harness 12'	301106

E.3 Visu-Flo™ Parts and Accessories

E.3.1 Flowmeters

Description	Part Number
.013 to .132 GPM	6663
.032 to .400 GPM	6664
.053 to 1.189 GPM	6667
.08 to 2.65 GPM	6665
1.32-3.96 GPM	6668

E.3.2 Flowmeter Bracket

Description	Part Number
Bracket for 8 flowmeters	6675

Monosem, Inc.
1001 Blake St.
Edwardsville, KS 66111
Ph. (913) 438-1700
www.monosem-inc.com