HarvestMaster™

BY JUNIPER SYSTEMS

mirus™

Generic Harvest Plugin

USER'S GUIDE

Mirus Generic Harvest Plugin User's Guide

Part Number: 31676-00

Trademarks

Disclaimer

Information is subject to change without notice.

Cautions

CAUTION: This symbol indicates that failure to follow directions could result in damage to equipment or loss of information.

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Contents

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Generic Harvest Plugin

CHAPTER ONE

Introduction

1 Introduction

The Generic Harvest plugin is part of the Mirus Data Collection Software and operates a Generic Harvest System (GHS). The Generic Harvest plugin helps field researchers and agricultural scientists automate data collection for grains, forages, and cotton and interfaces with a wide variety of weigh buckets and measurement devices, such as a standard forage harvester or a two-plot cotton system. Mirus and the Generic Harvest plugin run on a Windows tablet.

1.1 Requirements for Mirus and the Generic Harvest Plugin

- Operating System: Windows® 10 or higher; 32 or 64-bit OS
- Processor Speed: 2.0 GHz Quad Core
- Memory: 8 GB or higher
- Data Storage: 500 MB available disk space
- Display Resolution: 1280 x 800 or higher
- Mirus Version: 4.5.0 or higher

1.2 Download and Install Mirus

After you have purchased a license for Mirus,

1. Go to *https://www.harvestmaster.com/support/article/14646*.
2. Tap the down arrow for Mirus Harvest Software.
3. Select and download the most recent Mirus release.
4. Follow the installation instructions.
5. Go to *http://www.harvestmaster.com/activate* and fill out the form.
6. HarvestMaster will send the unlock code via email.
7. Return to the Mirus activation screen and input the unlock code.

Check *https://www.harvestmaster.com/support/article/14646* annually for updated software.

1.2.1 Install System Script

The Generic Harvest plugin can be configured to work with six system types: double cotton harvester, forage with a belt, forage with a bucket, grain, single cotton harvester, and straw weight. After you install Mirus, run the script(s) associated with your type of system.

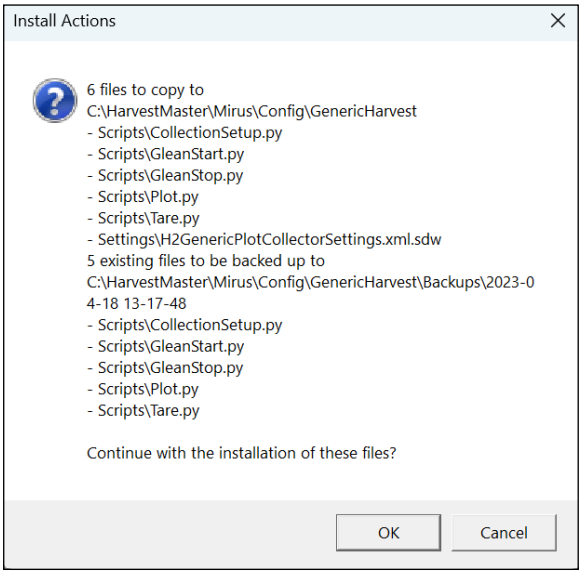
To run the Mirus script installer,

1. Close Mirus if it is open.
2. Open the Script Installer Utility from C:\HarvestMaster\Mirus\Plugins\GenericHarvest\Scripts\ScriptInstaller\ScriptInstaller.exe.

3. Select the appropriate script for your system.

   Note: The scripts for Double Cotton Harvester Attachment and Straw Weight use the Generic Attachment. You must register the Generic Attachment to add this functionality. For more information on the Generic Attachment, see ***10 Appendix B: Generic Attachment*** *on page 110.*

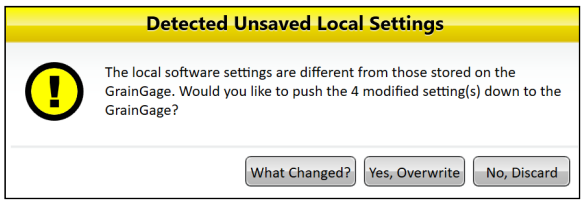
4. Tap the check icon .



The Install Actions message appears.

5. Tap **OK**.

Mirus marks the installed script(s).



6. If the Detect Unsaved Local Settings caution appears, tap **Yes, Overwrite**.
7. Close the Script Installer Utility.

1.3 Prepare the Generic Harvest System

1.3.1 Verify Generic Harvest System Readiness

Verify the GHS is ready for operation by checking the following:

- The Mirus app is installed and activated.
- Windows updates are current.
- Automatic sleep, hibernate, and shutdown are disabled on the tablet.
- The charging cable is connected to the tablet, and the tablet is charging.
- Power (12 VDC) is connected to the Generic Harvest System DSP module and system controller.
- The CAN cable between the GHS and system controller is connected.
- The USB to CAN or serial to CAN cable is connected between the CAN bus and tablet.
- The remote enter button is connected properly and functioning.
- The pressurized air, if used, is turned on and connected to the GHS.

1.3.2 Turn on the Generic Harvest System

To turn on the GHS,

- Start the combine.
- Activate the GHS by pressing the red button on the system controller.
- Open Mirus.

Note: HarvestMaster recommends verifying the weight calibrations (in Diagnostics) each morning using a known weight. (See **5.3 Use the Weight Diagnostics on page 44**.*)*

mirus™

Generic Harvest Plugin

CHAPTER TWO

Set Up Mirus

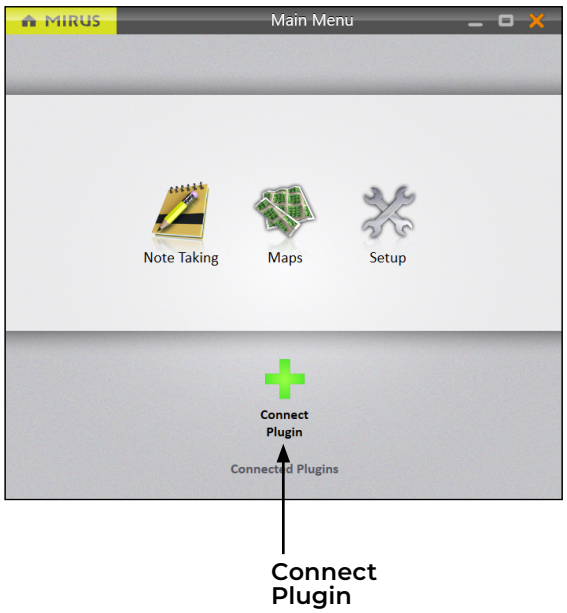
2 Set Up Mirus

2.1 Open Mirus

Open Mirus on your tablet computer.

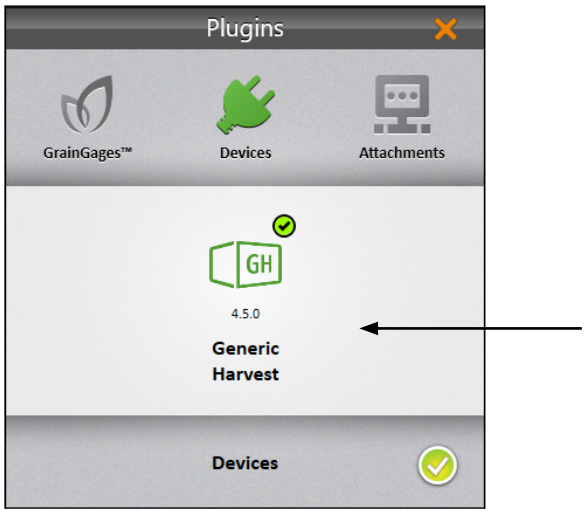
Mirus opens the Main Menu screen. Return to the Main Menu by tapping the home icon .

2.1.1 Add the Generic Harvest Plugin to Mirus

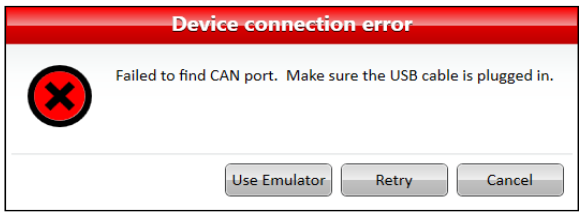


From the Mirus Main Menu screen,

1. Tap **Connect Plugin**.



2. Tap **Devices**.
3. Tap **Generic Harvest**.
4. Tap the check icon .



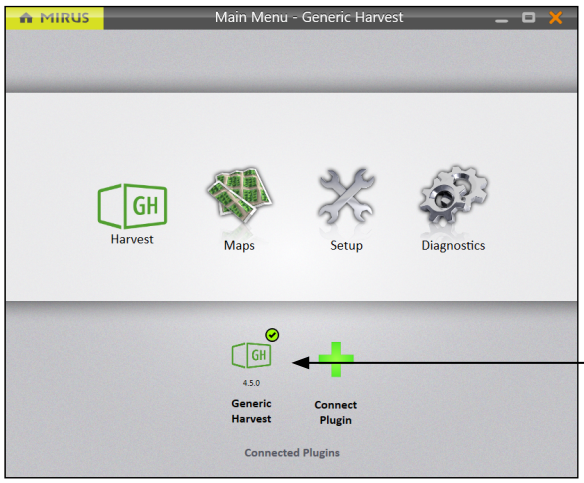
If Mirus is unable to detect the GHS, the software may display a device connection error.

- Check the power source to all modules. Ensure that a green LED is illuminated on each module.

Or

- Tap **Use Emulator** to proceed without connecting to the GHS. Emulator Mode is not recommended for setting up the GHS.

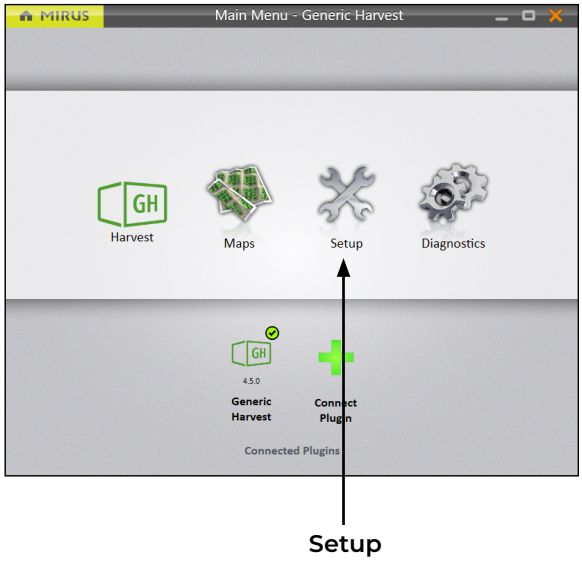
For additional troubleshooting, see **9.3.3 Can't Connect to GHS on page 107**.



Mirus displays the Generic Harvest icon on the Main Menu screen.

2.2 Set Mirus Preferences

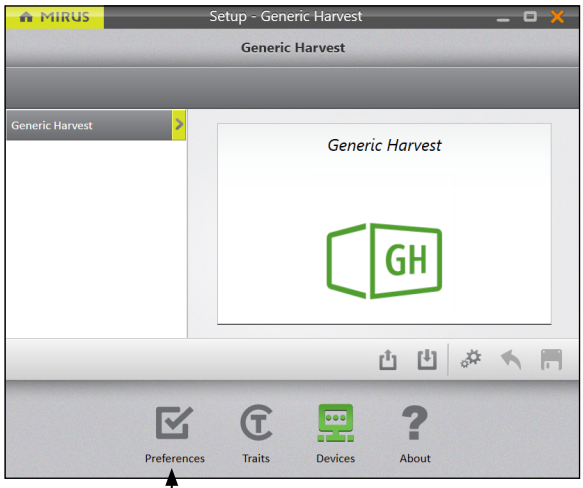
2.2.1 Open the Preferences Screen



From the Main Menu screen,

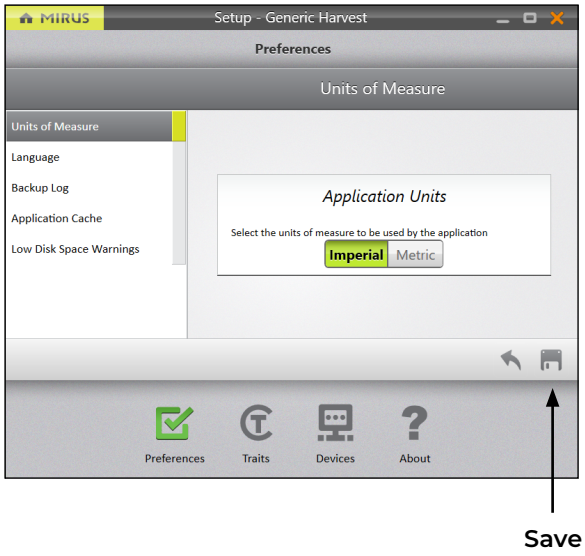
1. Tap **Setup**.

   Mirus opens the Setup screen.



2. Tap **Preferences**.

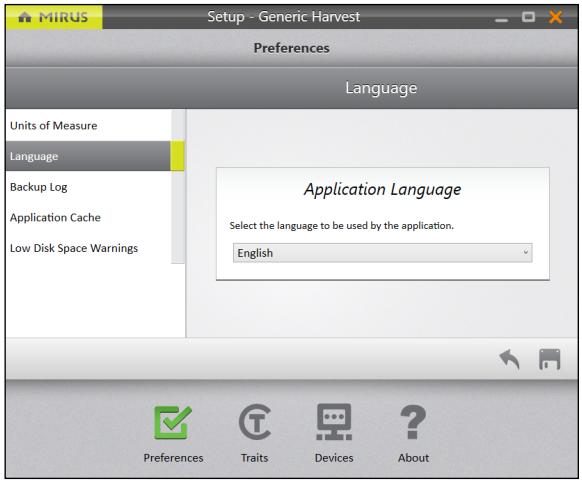
2.2.2 Set Preferred Units of Measure



From the Setup > Preferences screen,

1. Tap **Units of Measure**.
2. Select your preferred units of measure.
3. Tap **Save**.

2.2.3 Set the Preferred Language

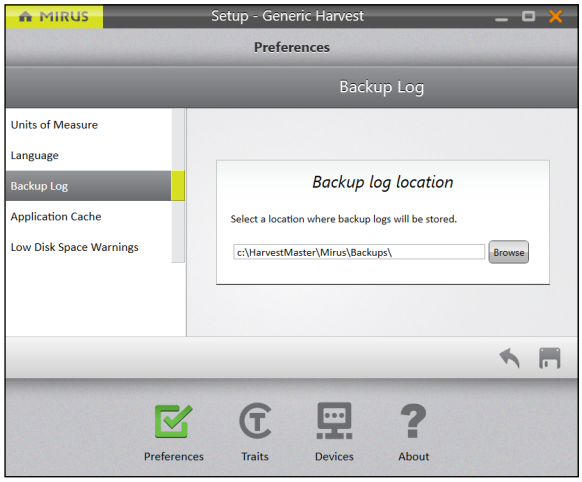


From the Setup > Preferences screen,

1. Select **Language**.
2. Select your preferred language.
3. Tap **Save**.

Note: Some languages may not be currently available in Mirus version 4.5.0.

2.2.4 Set the Preferred Backup Log Location

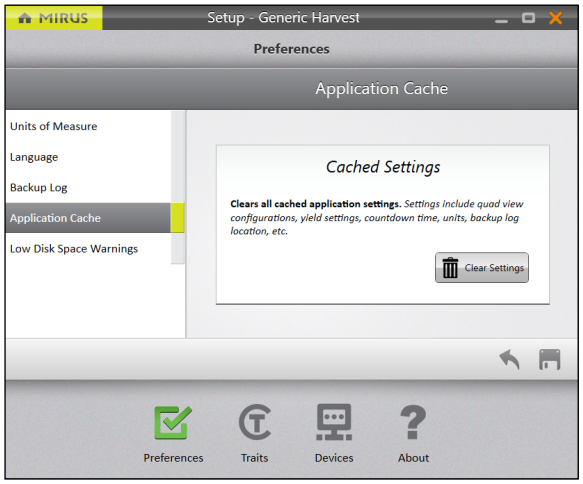


From the Setup > Preferences screen,

1. Tap **Backup Log**.
2. Enter your preferred file path for the Mirus backup log.
3. Record the location.
4. Tap **Save**.

Note: HarvestMaster recommends using the default backup log location. Moving your backup log location to cloud storage causes problems if you have an unstable data connection in the field.

2.2.5 Clear Cached Settings



Mirus allows you to clear all cached settings, including configurations, yield settings, countdown time, backup log location, and so on.

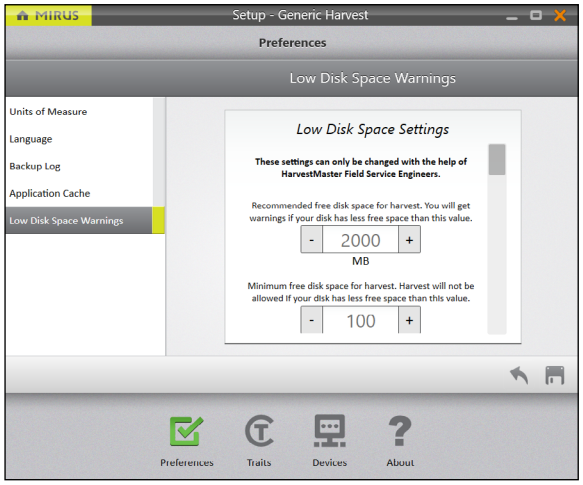
CAUTION: This cannot be undone! Clearing the cache will set the application settings to default values and restart Mirus. This should only be done in consultation with a HarvestMaster Field Service Engineer.

From the Setup > Preferences screen,

1. Tap **Application Cache**.
2. Tap **Clear Settings**.

2.2.6 Set Low Disk Space Warnings

Note: HarvestMaster recommends using the default disk space settings.

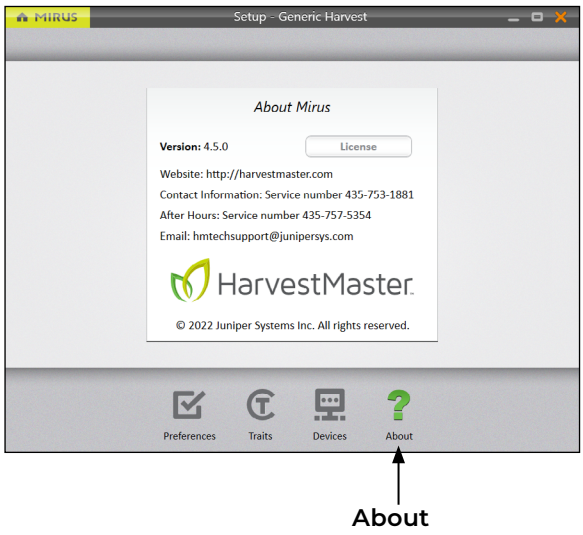


From the Setup > Preferences screen,

1. Tap **Low Disk Space Warnings**.
2. Set the amount of available disk space that will trigger a warning.
3. Set the minimum amount of disk space to allow harvest.
4. Tap **Save**.

Generally, Mirus (and additional plugins) use around 900 MB of disk space. However, additional space used by Mirus depends on the size of your map, the amount of data collected, and the quantity of maps created.

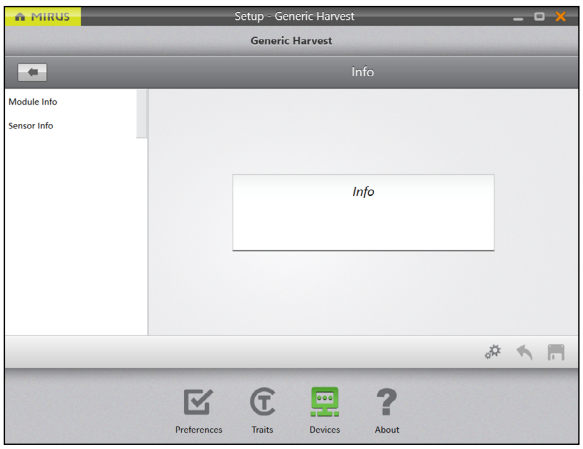
2.3 View Information About Mirus



This option can be viewed on the Setup > About screen.

This screen shows information about Mirus, including the version number, license information, website, and contact information.

2.4 View Information about the Generic Harvest System



To view information about the GHS,

1. Open the Setup > Generic Harvest screen.
2. Tap **Info**.

From the Info screen, view specifications for each connected component, such as the module serial numbers, type of sensor, and load cell coefficients.

2.5 Define System Settings

To define the system settings for the GHS,

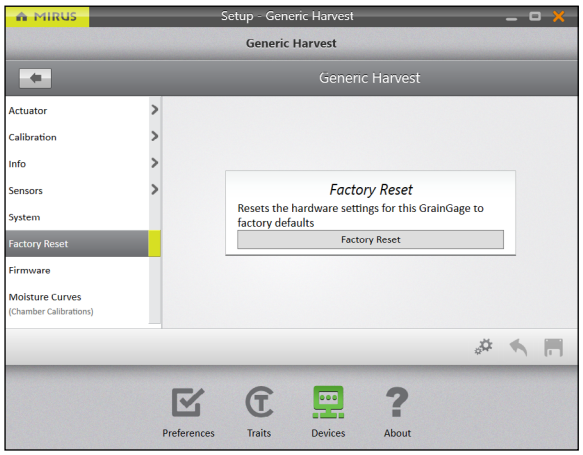
1. Open the Setup > Generic Harvest screen.
2. Tap **System**.

Mirus opens the System screen where you can define system settings for the GHS.

Generic Harvest System Settings

Item	Default Value	Description
Auto-Tare Weight	No	Enables or disables the taring (or setting to zero) of the load cells after each plot. Set to Yes if you want Mirus to tare the load cells after each plot and plan to empty the bucket or belt at another time.
GrainGage Type	Generic Harvest	Designates the type of GrainGage connected to Mirus.
Isolation Gate Mode	Normally open	Controls the initial state of the isolation gate.
Debug Streaming Enabled	Yes	Enables or disables the debug streaming messages for the DSP module. HarvestMaster recommends setting to Yes.

2.6 Reset to Factory Settings



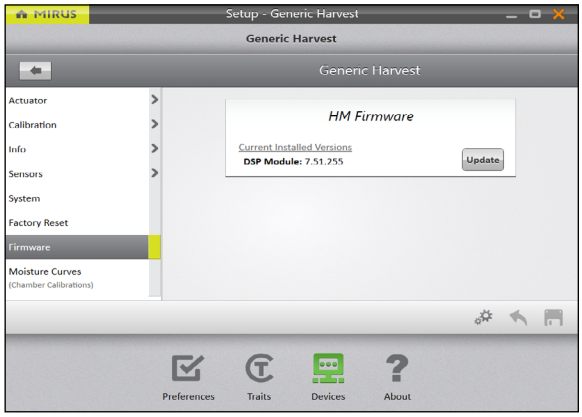
You can reset the Generic Harvest plugin to factory settings from the Factory Reset screen. If you add the Generic Attachment, you reset its factory settings separately. (See **10.7 Reset Generic Attachment to Factory Settings on page 123**.)

To reset the Generic Harvest plugin,

1. Open the Setup > Generic Harvest screen.
2. Tap **Factory Reset**.

CAUTION: This action cannot be undone! Resetting to factory defaults clears all your settings, including actuator timers and weight calibrations. This should only be done in consultation with a HarvestMaster Field Service Engineer.

2.7 Update Firmware



This option can be found on the Setup > Generic Harvest > Firmware screen.

The purpose of this screen is to help HarvestMaster Field Service Engineers during troubleshooting procedures. When you install or update Mirus, the program checks for the latest firmware and updates it automatically.

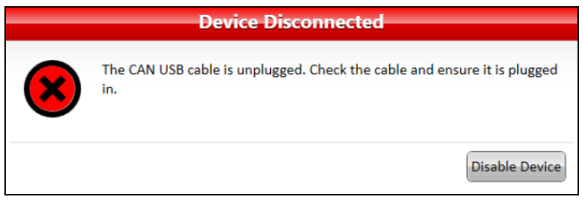
2.8 Understand User Alerts

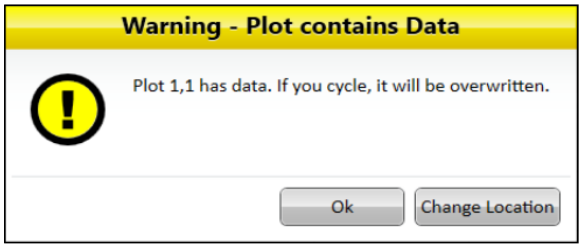
Mirus uses three categories of user messages, distinguishable by the icon and color used with the message.

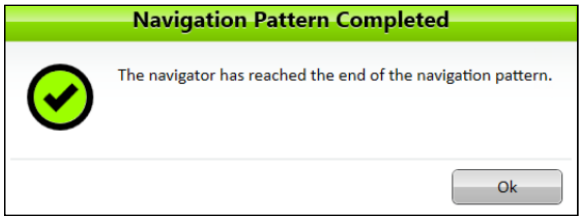
Mirus Alerts

Icon	Category	Description
	Error	An error message describes a problem that prevents the user or the GHS from completing a task. The problem could cause erroneous measurements, data corruption, data loss, or some other system malfunction.

Mirus Alerts		
Icon	**Category**	**Description**
	Warning	A warning message provides cautionary information.
	Confirmation	A confirmation message provides status information about the changing nature of an activity. These messages affirm that the GHS is operating as expected.

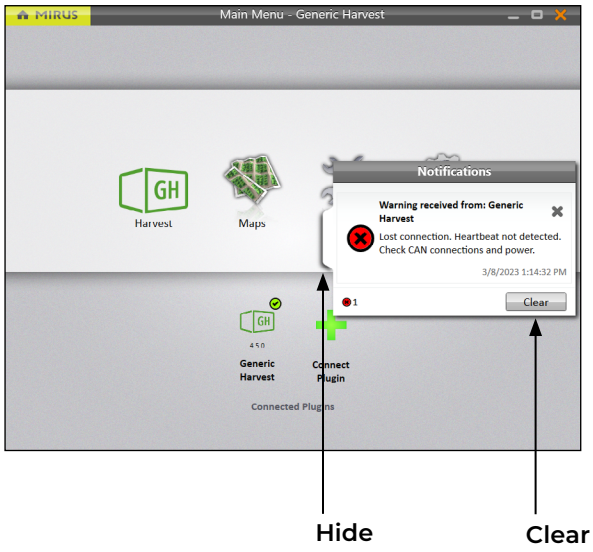






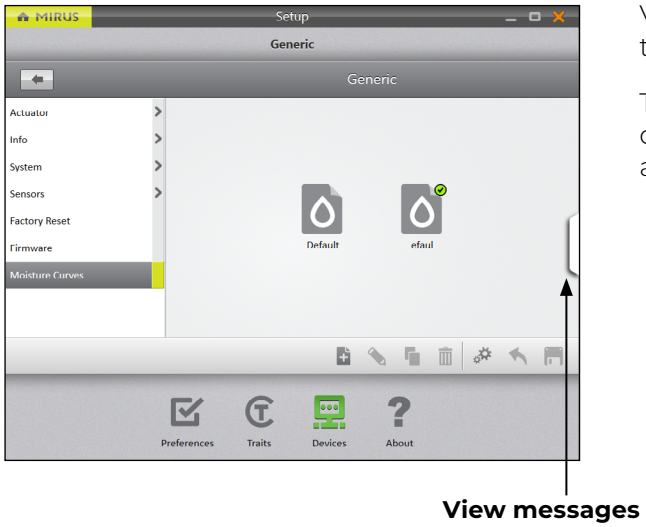
Messages requiring action appear in a dialog box. Tap the button to acknowledge the message or choose an option. The images on the left display examples of these messages.

Other messages appear as notifications that pop out from the right side of the window.



Use one of the following methods to close the message.

- Tap the white tab to hide the message.
- Tap the X or **Clear** to close the message.
- Do nothing and Mirus will automatically hide the message.



View hidden messages by tapping the notifications tab on the right side of the window.

This tab is only visible if you have messages, and the tab disappears when you have no messages or have cleared all your messages. You cannot restore cleared messages.

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Generic Harvest Plugin

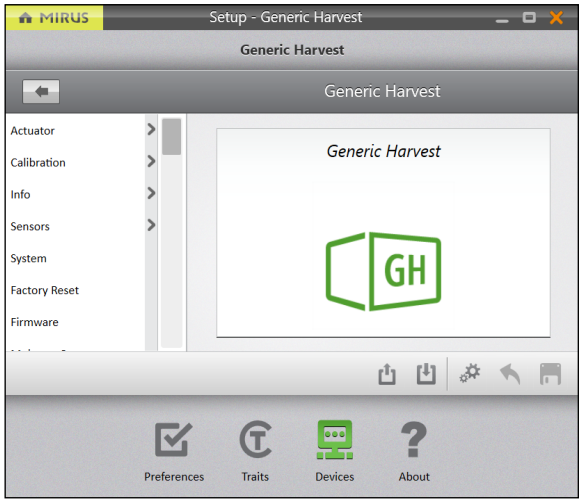
CHAPTER THREE

Control Actuators

3 Control Actuators

The Generic Harvest System can be set up for many types of crops and harvest equipment. The default settings and names of the actuators change depending on the installed system script.

3.1 Open the Actuator Screen



To open the Actuator screen,

1. Open the Setup > Generic Harvest screen.
2. Tap **Actuator**.

Mirus opens the Actuator screen on which you can configure settings for each actuator used by the GHS.

The following table describes the settings on the Actuator screen and shows the default values for DSP actuators not predefined by the installed system script.

Actuator Settings			
Setup Parameter	**Default Value**	**Min/Max Value**	**Action**
Actuator Type	None		Select the type of actuator: • Pneumatic • Reverse pneumatic • Dual • Electromechanical Set the actuator type to None if the DSP actuator is unused. (For more information on the types of actuators, see **3.1.1 Types of Actuators on page 27**.)
Close Transition Time	200 msec	0/20000 msec	Enter the amount of time it takes the actuator to close the gate.
DSP Actuator Close State Name	Close		Change the close state name of this actuator.
DSP Actuator Name	DSP Actuator		Change the name of this actuator.
DSP Actuator Open State Name	Open		Change the open state name of this actuator.
Limit Switch on Close	No		Set to No to disable the limit switch when the gate closes. Set to Yes to enable the limit switch when the gate closes.
Limit Switch on Open	No		Set to No to disable the limit switch when the gate opens. Set to Yes to enable the limit switch when the gate opens.
Open State Time	0 msec	0/30000 msec	Enter the amount of time the bucket door remains open before beginning the close process.
Open Transition Time	200 msec	0/20000 msec	Enter the amount of time it takes the actuator to open the top gate.

Note: The default values are based on generalized harvest conditions. They may not reflect the optimum settings for the harvest conditions for your particular climate, field, or crop. Changing the default values requires experience. Please contact a HarvestMaster Field Service Engineer when adjusting these settings. See **9.4 Contact a HarvestMaster Field Service Engineer on page 108**.

3.1.1 Types of Actuators

The GHS can support four types of actuators. The following table describes the types of actuators and how they function.

Auxiliary Actuator Controls					
Setup Parameter		**Action**	**Pin 1**	**Pin 2**	**Description**
Pneumatic		Open	12 V	Ground	Drives solenoid with 12 V continuously while actuated but uses 0 V when not actuated.
		Close	0 V	Ground	
Reverse pneumatic		Open	0 V	Ground	Works in reverse to a pneumatic actuator. For example, if pneumatic opens a door, reverse pneumatic will close the door.
		Close	12 V	Ground	
Dual	Actuator 1	Open	0 V	n/a	Allows the pins to be controlled independently but be tied to a common ground. With a dual actuator, you can control two actuators from one actuator port
		Close	12 V	n/a	
	Actuator 2	Open	n/a	0 V	
		Close	n/a	12 V	
Electro-mechanical		Open	12 V for transition time	Ground	Drives the pin with 12 V for the transition time and then uses 0 V when the transition time expires. Runs forward and backward.
		Close	Ground	12 V for transition time	

3.1.2 Default Settings for Double Cotton Harvester

The script for Double Cotton Harvester installs default settings for DSP actuator 1 named Weigh Basket and DSP 4 named Air Diverter, as shown in the following table.

DSP Actuator 1 Named Weigh Basket	
Setup Parameter	**Default Value**
Actuator Type	Dual
Close Transition Time	600 msec

DSP Actuator 1 Named Weigh Basket	
Setup Parameter	**Default Value**
DSP Actuator 1 Close State Name	Close
DSP Actuator 1 Name	Weigh Basket
DSP Actuator 1 Open State Name	Open
Limit Switch on Close	No
Limit Switch on Open	No
Open State Time	800 msec
Open Transition Time	600 msec

DSP Actuator 4 Named Air Diverter	
Setup Parameter	**Default Value**
Actuator Type	Dual
Close Transition Time	200 msec
DSP Actuator 4 Close State Name	Close
DSP Actuator 4 Name	Air Diverter
DSP Actuator 4 Open State Name	Open
Limit Switch on Close	No
Limit Switch on Open	No
Open State Time	0 msec

DSP Actuator 4 Named Air Diverter	
Setup Parameter	**Default Value**
Open Transition Time	200 msec

3.1.3 Default Settings for Forage Belt

The script for Forage Belt installs default settings for DSP actuator 2 named Belt, as shown in the following table.

DSP Actuator 2 Named Belt	
Setup Parameter	**Default Value**
Actuator Type	Electromechanical
Close Transition Time	600 msec
DSP Actuator 2 Close State Name	Stop
DSP Actuator 2 Name	Belt
DSP Actuator 2 Open State Name	Run
Limit Switch on Close	No
Limit Switch on Open	No
Open State Time	400 msec
Open Transition Time	2000 msec

3.1.4 Default Settings for Forage Bucket

The script for Forage Bucket installs default settings for DSP actuator 2 named Bucket, as shown in the following table.

DSP Actuator 2 Named Bucket	
Setup Parameter	**Default Value**
Actuator Type	Electromechanical
Close Transition Time	1000 msec
DSP Actuator 2 Close State Name	Close
DSP Actuator 2 Name	Bucket
DSP Actuator 2 Open State Name	Open
Limit Switch on Close	No
Limit Switch on Open	No
Open State Time	600 msec
Open Transition Time	1000 msec

3.1.5 Default Settings for Generic Grain

The script for Generic Grain installs default settings for DSP actuator 2 named Weigh Bucket and DSP actuator 4 named Isolation, as shown in the following tables.

DSP Actuator 2 Named Weigh Bucket	
Setup Parameter	**Default Value**
Actuator Type	Dual
Close Transition Time	600 msec
DSP Actuator 2 Close State Name	Close

DSP Actuator 2 Named Weigh Bucket	
Setup Parameter	**Default Value**
DSP Actuator 2 Name	Weigh Bucket
DSP Actuator 2 Open State Name	Open
Limit Switch on Close	No
Limit Switch on Open	No
Open State Time	800 msec
Open Transition Time	600 msec

DSP Actuator 4 Named Isolation	
Setup Parameter	**Default Value**
Actuator Type	Dual
Close Transition Time	200 msec
DSP Actuator 4 Close State Name	Close
DSP Actuator 4 Name	Isolation
DSP Actuator 4 Open State Name	Open
Limit Switch on Close	No
Limit Switch on Open	No
Open State Time	0 msec
Open Transition Time	200 msec

3.1.6 Default Settings for Single Cotton Harvester

The script for Single Cotton Harvester installs default settings for DSP actuator 1 named Weigh Basket and DSP actuator 4 named Air Diverter, as shown in the following tables.

DSP Actuator 1 Named Weigh Basket	
Setup Parameter	**Default Value**
Actuator Type	Dual
Close Transition Time	600 msec
DSP Actuator 1 Close State Name	Close
DSP Actuator 1 Name	Weigh Basket
DSP Actuator 1 Open State Name	Open
Limit Switch on Close	No
Limit Switch on Open	No
Open State Time	800 msec
Open Transition Time	600 msec

DSP Actuator 4 Named Air Diverter	
Setup Parameter	**Default Value**
Actuator Type	Dual
Close Transition Time	200 msec
DSP Actuator 4 Close State Name	Close
DSP Actuator 4 Name	Air Diverter
DSP Actuator 4 Open State Name	Open
Limit Switch on Close	No

DSP Actuator 4 Named Air Diverter	
Setup Parameter	**Default Value**
Limit Switch on Open	No
Open State Time	0 msec
Open Transition Time	200 msec

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Generic Harvest Plugin

CHAPTER FOUR

Set Up Sensors and Traits

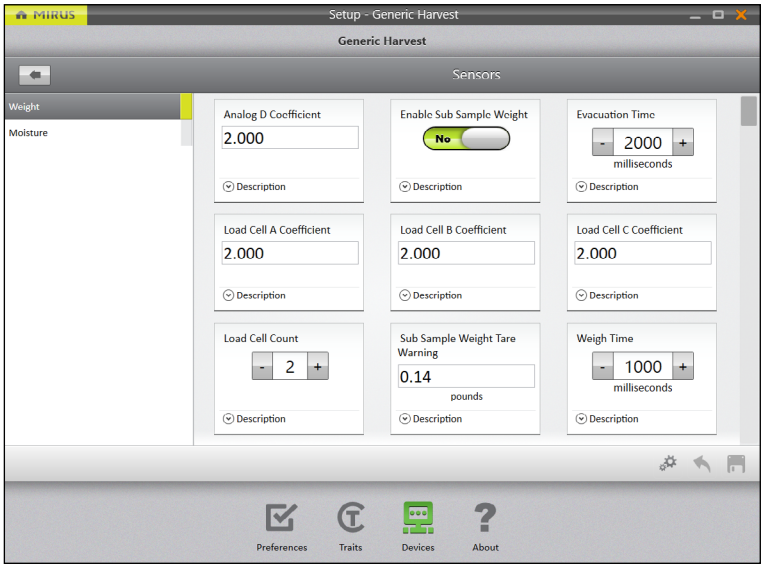
4 Set Up Sensors and Traits

4.1 Set Up Weight Sensors

To set up the weight sensors,

1. Open the Setup > Generic Harvest > Sensors screen.
2. Tap **Weight**.

   Mirus opens the Weight Sensors screen on which you can configure weigh bucket settings.



Weight Sensors Settings

Setup Parameter	Default Value	Action
Enable Sub Sample Weight	No	Set the value to Yes if you want the GHS to capture a sub-sample weight from load cell C. The sub-sample weight is included in the weight total.
Evacuation Time	2000 msec	Set the amount of time it takes for the harvested product to leave the bucket.
Load Cell A, B, C, & Analog D Coefficients	2.000	Enter the calibrated weight for each active load cell on your system. See **4.2 Calibrate the Weight Load Cells on page 36**.
Load Cell Count	3*	Specify the number of load cells being used. In a typical forage applications, the GHS uses three load cells. *The default load cell count for grain is 1.

Weight Sensors Settings		
Setup Parameter	**Default Value**	**Action**
Sub Sample Weight Tare Warning	.5 lb	Set the threshold above which a tare warning is generated after the sub-sample chamber evacuation.
Weigh Time	2000 msec	Enter the period over which weight readings are averaged. A shorter weigh time will shorten cycle times but may reduce the accuracy of the measurement.
Weight Tare Warning	.500 lb	Enter the threshold above which a tare warning is generated after weigh bucket evacuation.

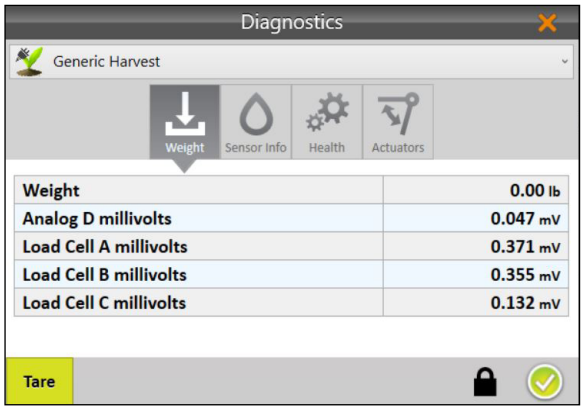
Note: Preconfigured values are default values based on generalized harvest conditions. They may not reflect the optimum settings for the harvest conditions for your particular climate, field, or crop. Changing the default values requires experience. Please contact a HarvestMaster Field Service Engineer when adjusting these settings. See **9.4 Contact a HarvestMaster Field Service Engineer on page 108**.

4.2 Calibrate the Weight Load Cells

When you calibrate the weight load cells, you convert millivolt readings from the load cells into pounds or kilograms. The steps you follow depend on whether you have identical load cells. See **4.2.1 Calibrate Unmatched Load Cells on page 36** or **4.2.2 Calibrate Matched Load Cells on page 37**.

4.2.1 Calibrate Unmatched Load Cells

If your load cells are different sizes, calibrate the load cells separately.



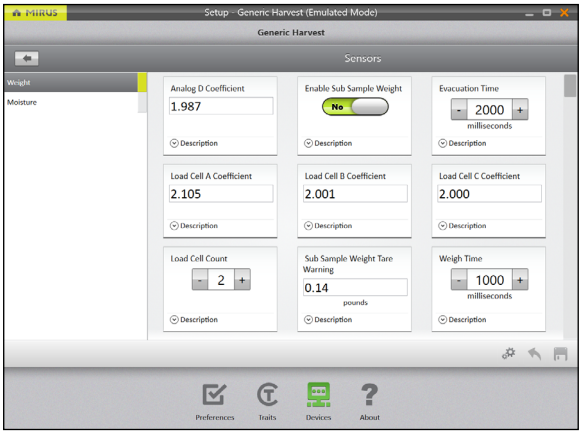
To calibrate the weight for one load cell,

1. Tap **Diagnostics** from the Main Menu screen. The Diagnostics screen opens.
2. Tap **Tare**.
3. Place a known weight directly over one load cell.

   Note: Preferably all the weight is measured by only this load cell.
4. Write down the measured weight as shown in Weight.

5. Calculate the load cell coefficient, using the formula:

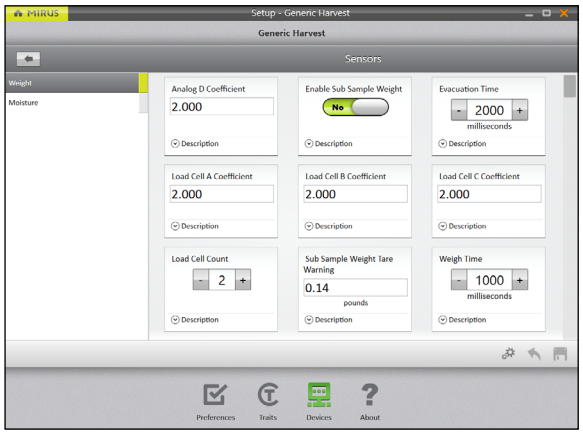
load cell coefficient = actual weight / measured weight (current coefficient)



6. Open Setup > Generic Harvest > Sensors > Weight screen.
7. Enter the load cell coefficient in the corresponding Load Cell Coefficient box.
8. Tap **Save**.
9. Repeat this process for each load cell.

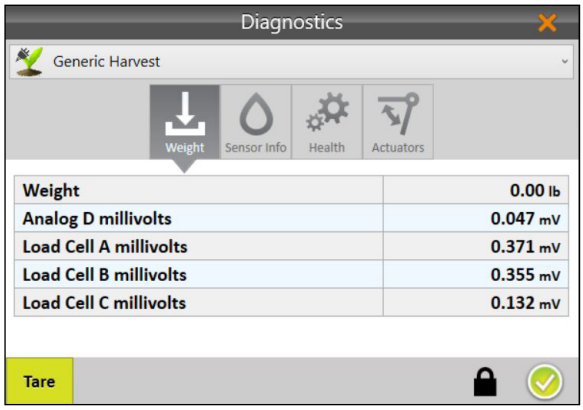
4.2.2 Calibrate Matched Load Cells

If you have multiple load cells that are of the same size, calculate the load cell calibration one time and use it for all the identical load cells.



To calculate the load cell coefficients for the matched load cells,

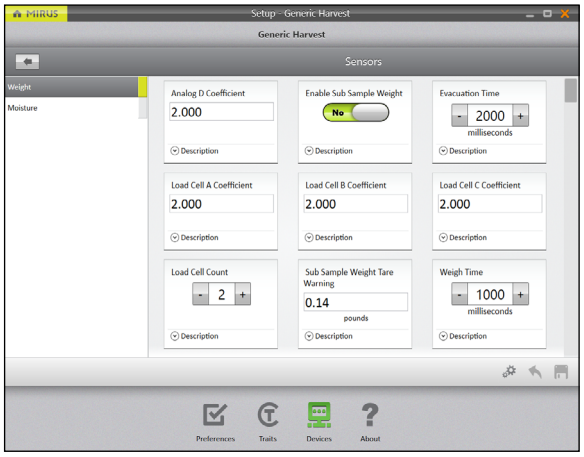
1. From the Setup > Generic Harvest > Sensors screen, tap **Weight**.
2. Make sure the load cells have the same load cell coefficient.
3. Tap **Save** if you change any values.
4. Return to the Main Menu screen and tap **Diagnostics**.



5. Tap **Tare** if the weight is greater than zero.
6. Place a known weight in the center of the weigh bucket.
7. Write down the weight shown on the Diagnostics screen.

8. Calculate the load cell coefficient, using the following formula.

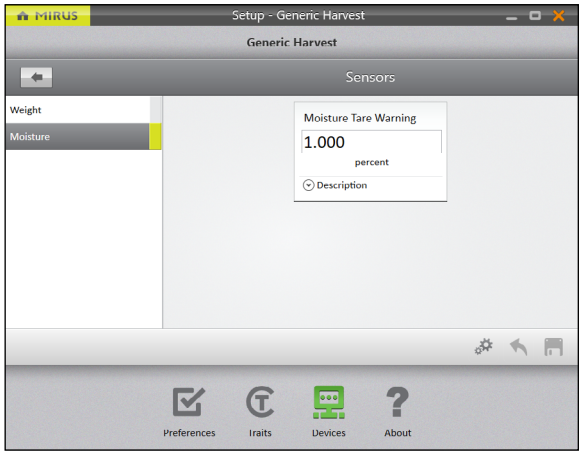
load cell coefficient = actual weight / measured weight (current coefficient)



9. From the Setup > Generic Harvest > Sensors > Weight screen, enter the calculated load cell coefficient in all the Load Cell Coefficient boxes.
10. Tap **Save**.

4.3 Set the Moisture Tare Warning

Note: This option is only available if you have installed an EM moisture sensor.



To set the moisture tare warning,

1. Open the Setup > Generic Harvest > Sensors screen.
2. Tap **Moisture**.

   Mirus opens the Moisture Sensors screen.

Moisture Sensor Settings

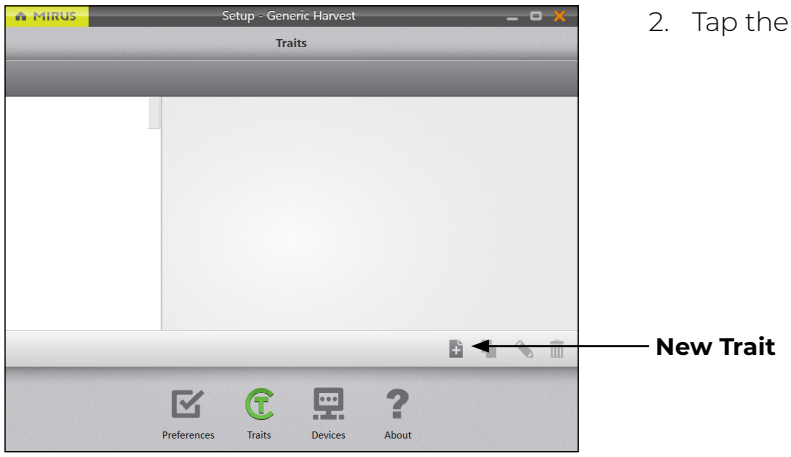
Setup Parameter	Default Value	Description
Moisture Tare Warning	1.000%	A tare warning is generated above this threshold when the chamber is empty.

4.4 Define Measurable Traits

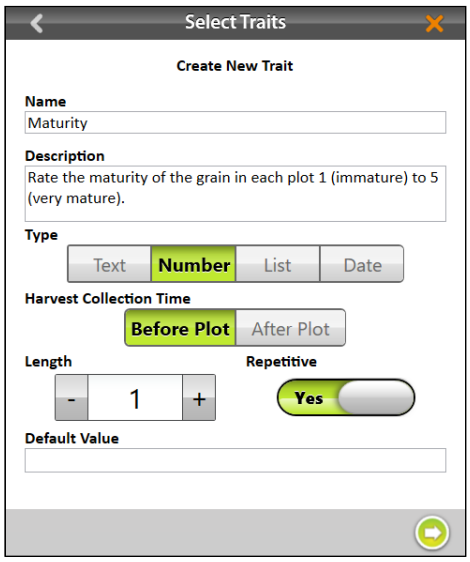
You can visually inspect your plots and record measurable traits in Mirus.

To define a trait,

1. Open the Setup > Traits screen.



2. Tap the new icon .



3. Enter a **Name** and **Description** (if desired) for the new trait.
4. Select the **Type** of data to be recorded.
5. Select when you want Mirus to prompt the operator to record the trait: **Before Plot** or **After Plot**.
6. Specify the **Length** or number of characters allowed in the record field.
7. Set whether the trait is **Repetitive**.
8. Enter the **Default Value** (if desired).
9. Tap the next arrow to save the trait.

The following table describes the settings on the Select Traits screen.

Trait Settings	
Item	**Description**
Name	Names the trait.
Description	Describes the type of data to be recorded.
Type	Defines the type of data to be recorded: • **Text**: Allows the user to enter text. You can set a character limit (Length) and/or a Default Value for a quick selection in the field. • **Number**: Allows the user to enter a number, such as a score, relative to an individual plot. You can set a character limit (Length) and/or a Default Value for quick selection. • **List**: Allows the user to select from a list of values. You can define the items in the list by entering values in Default Value. To add multiple values, tap the plus icon + on the right side of the window. This feature functions best when the list contains no more than five different trait values. • **Date**: Allows the user to enter a date. The Default Value is the current date, but you may select a different date.
Harvest Collection Time	Determines whether the trait data will be collected before or after the plot is harvested.
Length	Sets the number of characters the user can enter before Mirus automatically moves to the next trait.

Trait Settings	
Item	**Description**
Repetitive	Designates whether the trait is repetitive (or collected multiple times on different days). For example, if you examine your crop for disease three times a year, the disease trait is repetitive.
Default Value	Sets the most common or expected value(s) for this trait. Mirus populates the field with this value, and the user can press Enter to accept the value. If the desired entry is different than the default value, the user can enter the new value and press Enter. Mirus moves to the next trait when the maximum character length is met.

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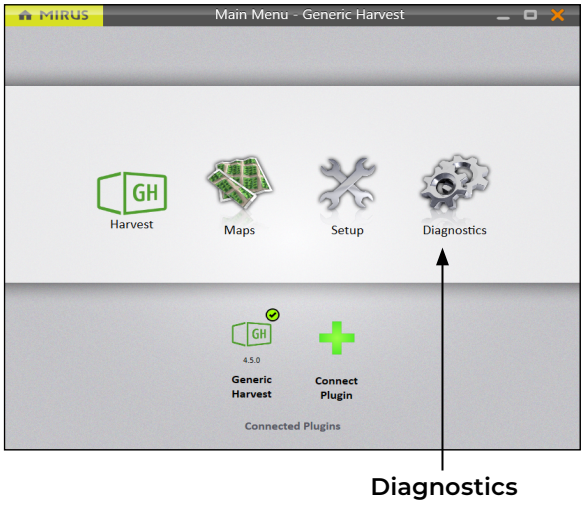
CHAPTER FIVE

Use Mirus Diagnostics

5 Use Mirus Diagnostics

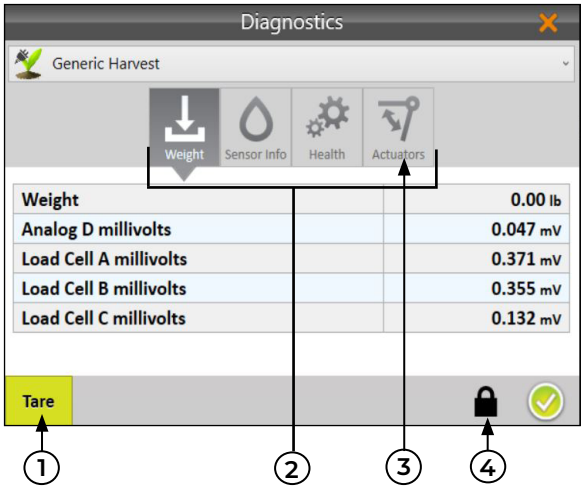
5.1 Open Diagnostics



To open Diagnostics,

1. From the Main Menu screen, tap **Diagnostics**.

   Mirus opens the Diagnostics screen.



From the Diagnostics screen, Mirus:

1. Allows the user to tare all load cells and the moisture sensor in the GHS.
2. Provides additional information and functionality on each tab (detailed below).
3. Allows the user to open and close the actuators.
4. Provides additional information for each screen (primarily for HarvestMaster Field Service Engineers).

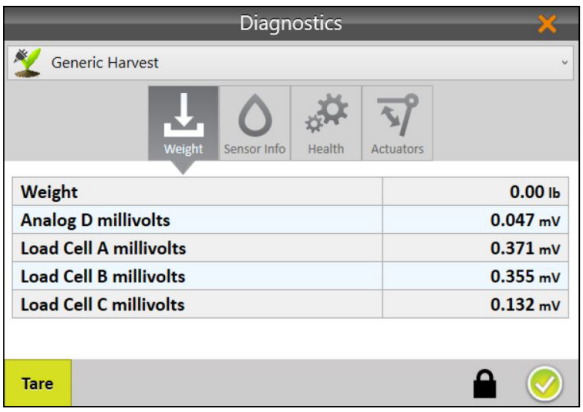
*Note: Tapping **Tare** sets to zero all sensors (load cells and moisture). Mirus does not allow taring of individual sensors.*

Access each diagnostics category using the icon panel across the top of the Diagnostics screen.

All the tabs on the Diagnostics screen have the **Tare** button, as explained in the following table.

Diagnostics Tare	
Item	**Description**
Tare button	Sets all load cells and the moisture sensor (if installed) to zero. Before tapping **Tare**, make sure the GHS is clear of harvested crop or debris. After you tap **Tare**, Mirus • Opens the gates and clears the GHS. • Closes the gates. • Uses the average sensor reading to establish the zero weight readings for the empty weigh bucket and test chamber. • Resets the moisture reading to zero (if the moisture sensor is installed).

5.2 Tare the Generic Harvest System

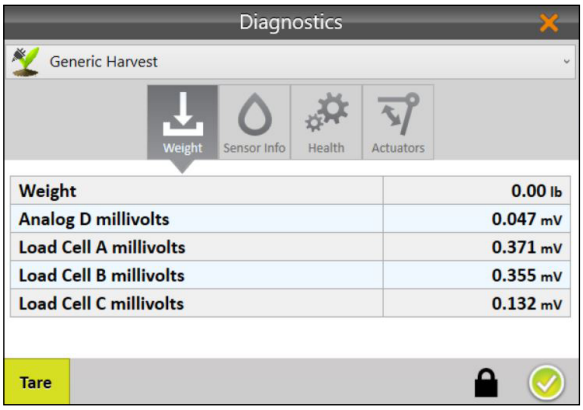


To tare the GHS,

1. Make sure the GHS is clear of harvested crop or debris.
2. In Mirus, open Diagnostics and tap **Tare**.
3. After the tare is complete, tap the check icon to exit Diagnostics.

Note: Taring should be the last thing you do before you start to harvest. For improved data quality, do not tare within a field trial.

5.3 Use the Weight Diagnostics

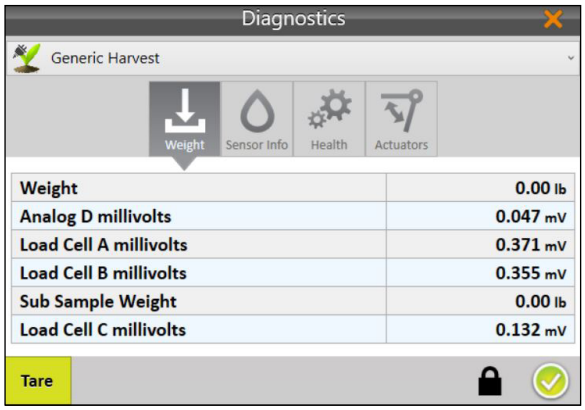


On the Weight Diagnostics screen, live values and other data are shown for the load cells.

Weight Diagnostics	
Item	**Description**
Weight	Shows the weight of the contents in the weigh bucket. To change the units of measure, see **2.2.2 Set Preferred Units of Measure** on page 16.
Load cells A, B, C, & Analog D, millivolts	Measures plot weight, shown in mV. If the sub-sample weight is enabled, then load cell C shows the sub-sample weight.

5.3.1 Check the Weigh Bucket Calibration

Weigh bucket calibration is stable and rarely changes or loses accuracy. However, because the consequences of poor calibration can be devastating to your research data, HarvestMaster recommends checking the weigh bucket calibration yearly before the harvest season begins and daily before harvesting. You can quickly check the weight calibration from the Diagnostics screen.



To check the weight calibration,

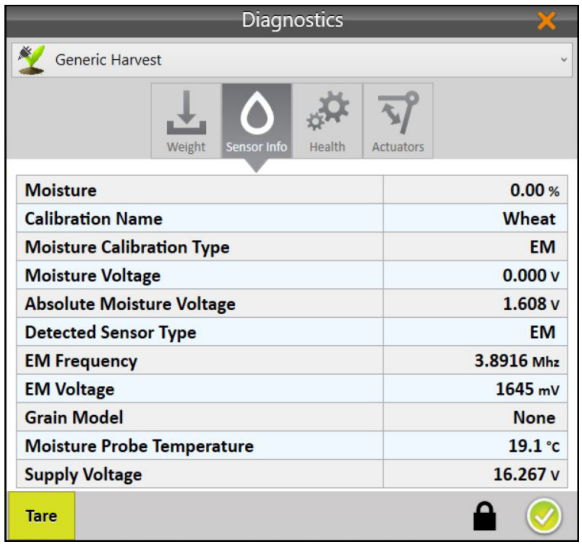
1. Place a calibration weight in the center of the weigh bucket.
2. In Mirus, open Diagnostics.
3. Check the weight. The weight reading should be close to the value stamped on the calibration weight.

   Note: If the weight reading is outside of an acceptable margin of error for your system, perform a new weight calibration. (See **4.2 Calibrate the Weight Load Cells on page 36**.*) If the weight readings continue to be off, you may have a bad load cell or something interfering with the bucket weight.*

4. Tap the check icon to close Diagnostics.

5.4 Use Sensor Info Diagnostics

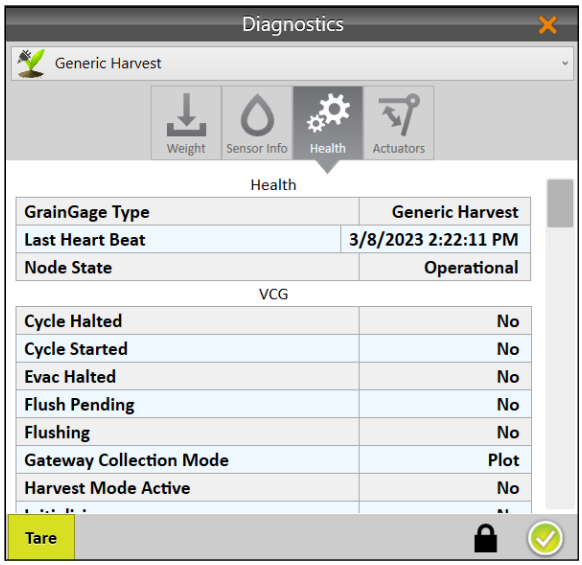
If you have installed an EM moisture sensor, the Sensor Info tab on the Diagnostics screen displays live values and other data for the sensor.



EM Sensor Diagnostics	
Item	**Description**
Moisture	Displays the moisture measurement for the harvested crop.
Calibration Name	Displays the name of the applied moisture curve. It is typical to have a moisture curve for each type of grain being harvested, such as corn, wheat and soybeans.
Moisture Calibration Type	Displays the calibration type.
Moisture Voltage	Displays a relative voltage reading, based on the EM sensor reading and empty chamber voltage. This voltage is part of the moisture curve calculations. The value can be used to tune or generate a new EM moisture curve.
Absolute Moisture Voltage	Displays the raw moisture sensor reading without any offset applied from a moisture curve. This is primarily used for maintenance and troubleshooting.
Detected Sensor Type	Displays the sensor being used by the GHS.
EM Frequency	Displays a basic measure used for calculating moisture. This value is typically between 3.5 and 4.1 mHz for an empty chamber.
EM Voltage	Displays a basic measure used for calculating moisture. This value is typically between 1.5 and 2.0 V for an empty chamber.

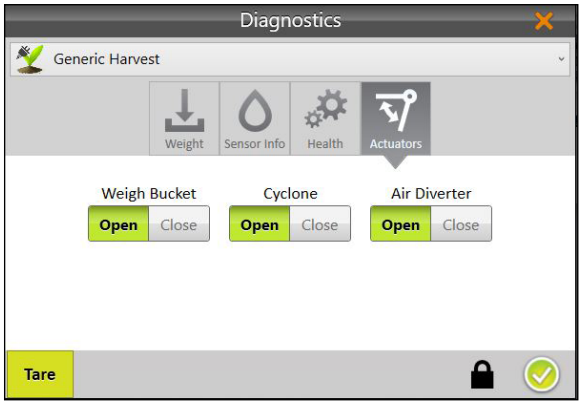
EM Sensor Diagnostics	
Item	**Description**
Grain Model	This is not applicable to GHS.
Moisture Probe Temperature	Displays the temperature (in degree Celsius) measured by the moisture probe. The temperature measurement is used to apply a correction in calculating grain moisture.
Supply Voltage	Displays the amount of supply voltage the moisture sensor is receiving. This value is typically between 11 and 14 V.

5.5 Use Health Diagnostics



The Health tab on the Diagnostics screen is used by HarvestMaster Field Service Engineers.

5.6 Use Actuator Diagnostics



Use the Actuators tab on the Diagnostics screen to manually test the actuators controlling all gates connected to the GHS. For more information about actuators, see **3 Control Actuators on page 25**.

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CHAPTER SIX

Calibrate the Moisture Curve

6 Calibrate the Moisture Curve

If you have installed an EM moisture sensor, you need to calibrate the moisture curve before harvesting. Curve calibrations align the GHS moisture reading with a bench top lab sensor.

For better accuracy, the practices in this guide are designed to streamline the calibration process and teach users how to create moisture curves.

6.1 Prepare Samples

Preparing your samples is a critical step in creating and maintaining an effective moisture curve.

Step 1: Plan ahead for calibration. Creating an accurate moisture curve requires using samples with a range of moisture percentages. Collecting enough samples to calibrate properly requires some advanced planning. HarvestMaster recommends two separate strategies: planting varieties that will be available for harvest before test plots are ready or harvesting border plots early and drying them to varying moistures.

Step 2: Imitate harvest conditions. When calibrating, HarvestMaster recommends that you imitate harvest conditions as close as possible. This means the sample has enough time to equilibrate to ambient outdoor temperature before calibrating. The sample should be cycled through the hopper or cyclone to reduce packing differences.

HarvestMaster recommends cycling samples three to five times each in both a bench top sensor and the GHS and then averaging the moisture readings. When possible, samples should be tested in the lab and in the GHS within an one-hour span.

Step 3: Collect and prepare samples. Create a moisture curve that is representative of the moisture range that will be encountered during harvest. The more samples available during calibration, the more accurate the curve will be. HarvestMaster recommends:

- Three or more seed samples that are at least 6 lb (2.7 kg) each.
- At least a 3% moisture range from lowest moisture to highest moisture.
- At least two or three samples within a 10% range. More samples are better.

CAUTION: Do not re-wet grain samples. If you need to adjust the moisture content, take a natural sample and dry it down.

Step 4: Adjust for a high moisture corn harvest. If you have high moisture samples, HarvestMaster recommends initially calibrating with samples below 26% to set the curve and then manually calibrating the curve above 26% for the high moisture samples. A split curve will generate better data than an average curve.

Step 5: Annually check and tune moisture curves. Checking and tuning moisture curves each season will give you the best data quality.

6.2 Moisture Calibration Overview

To begin the calibration, start with the driest sample and move to the wettest. Each sample should be cycled at least three times.

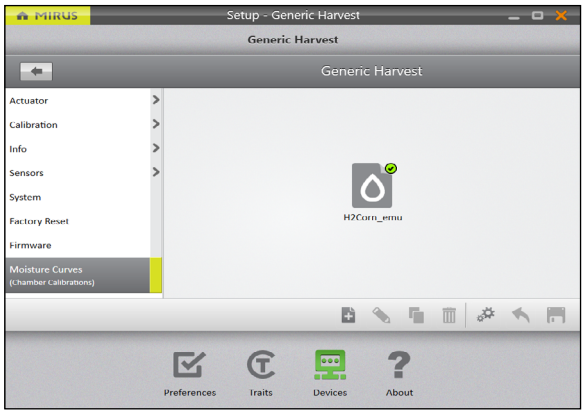
Calibration Steps		
	Cycle	**Moisture**
1.	Sample A	Driest sample
2.	Cycle Sample A two more times.	
3.	Sample B	Next sample going from driest to wettest.
4.	Cycle Sample B two more times.	
5.	Sample C	Wettest sample
6.	Cycle Sample C two more times.	

Note: This table reflects the minimum number of cycles needed to create a moisture curve. To improve your moisture curve, cycle several more moisture samples.

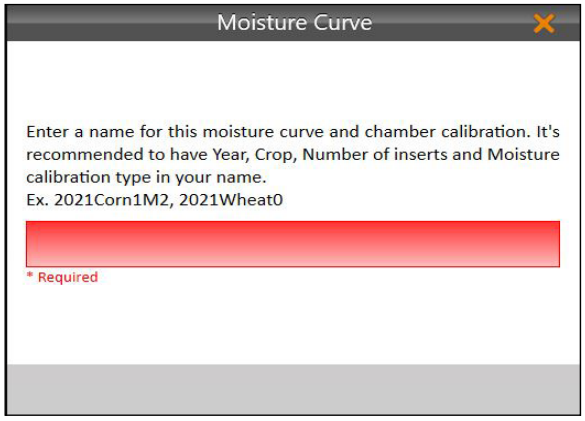
6.3 Create a New Moisture Curve

To create a new moisture curve in Mirus,

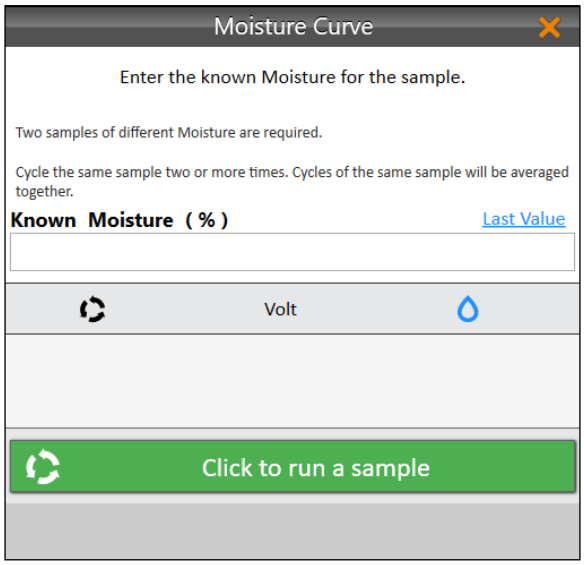
1. If the samples have been in air conditioning or cold storage, acclimate them by spreading them out on a clean surface in the shop overnight. **Do not** leave them in the sun to warm up.
2. Test the ambient samples in a bench top sensor by cycling sub-samples from each larger sample three to five times, and then average the moisture readings. This is the Known Moisture.
3. Within the hour, take the samples to the GHS. If you are calibrating outside, make sure the samples stay in the shade.
4. Open Mirus.
5. Open the Setup > Generic Harvest screen.



6. Tap **Moisture Curves**.
7. Tap the new icon .



8. Enter a name for the moisture curve.
9. Tap the next arrow .



10. Enter the known moisture percentage for your driest sample.
11. Pour your driest sample into the GHS weigh bucket.
12. Tap **Click to run a sample**.

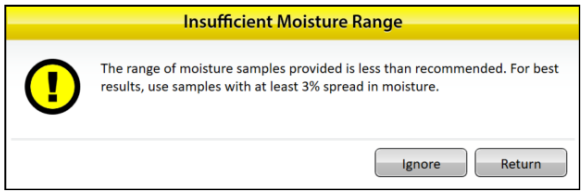
    The GHS cycles the sample, and Mirus displays the voltage and moisture percentage.
13. Collect the same sample and pour it into the GHS again.
14. Tap **Last Value** to automatically populate the Known Moisture with the same value as the previous sample.

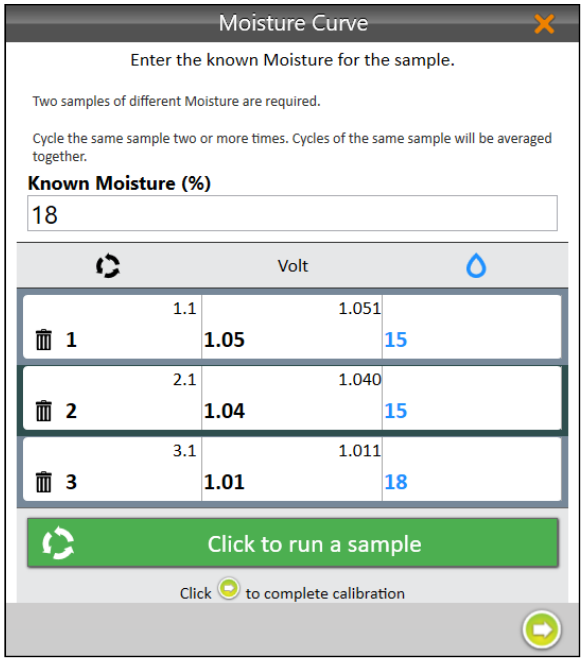
    Repeat steps 10–14 until all the samples have been cycled through the GHS.

    Note: HarvestMaster recommends using three to four samples and cycling them three times each.

    If the moisture content of your samples does not cover a range of at least 3%, Mirus displays an Insufficient Moisture Range warning.

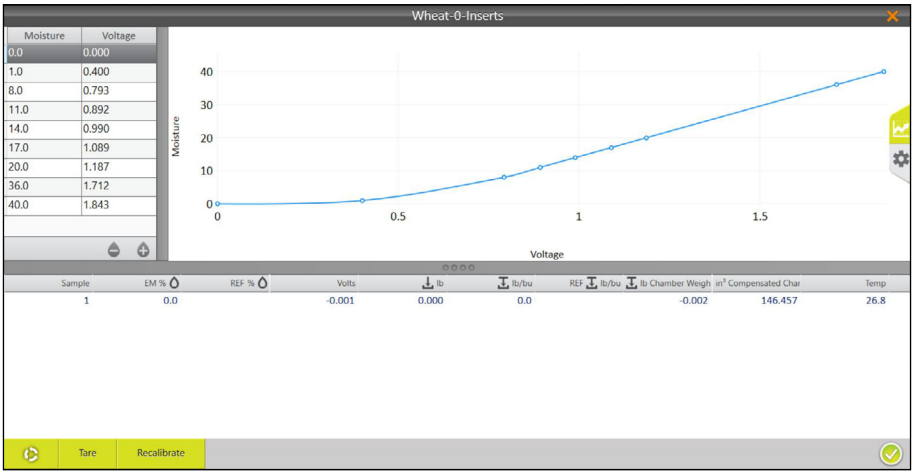
    - Tap **Ignore** to continue with the current samples.
    - Tap **Return** to add more samples with a variety of moisture percentages.





15. Tap the next arrow to complete the calibration.
16. Tap the check icon.

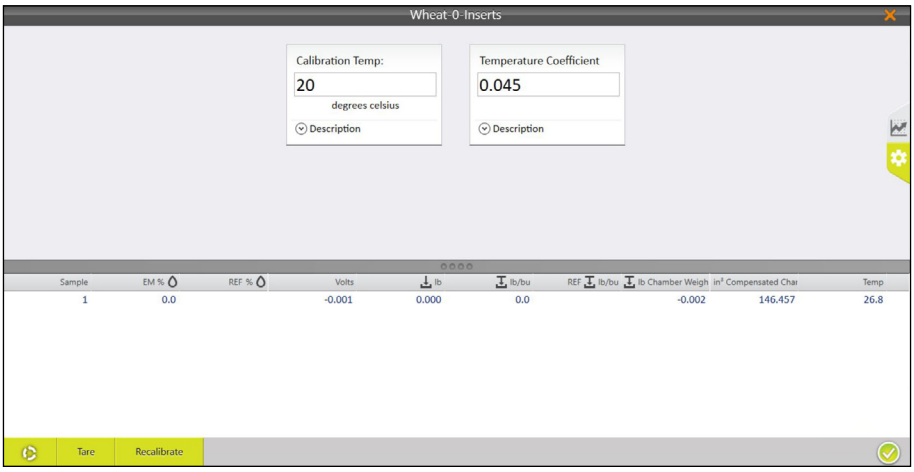
Mirus displays the moisture curve and voltages graphically.



17. Tap the check icon to save the new moisture curve.

    If desired, first tap the gear icon on the right for more information about this moisture curve.

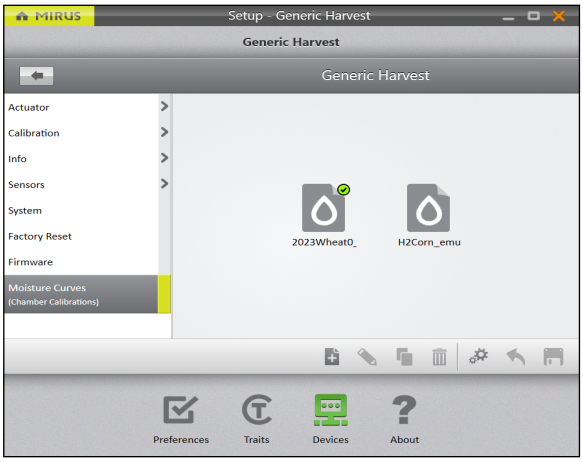
    Note: Adjust the calibration temperature and temperature coefficient as instructed by a HarvestMaster Field Service Engineer.



6.4 Test and Tune a Moisture Curve

HarvestMaster recommends testing the new moisture curve against other samples to confirm the moisture values.

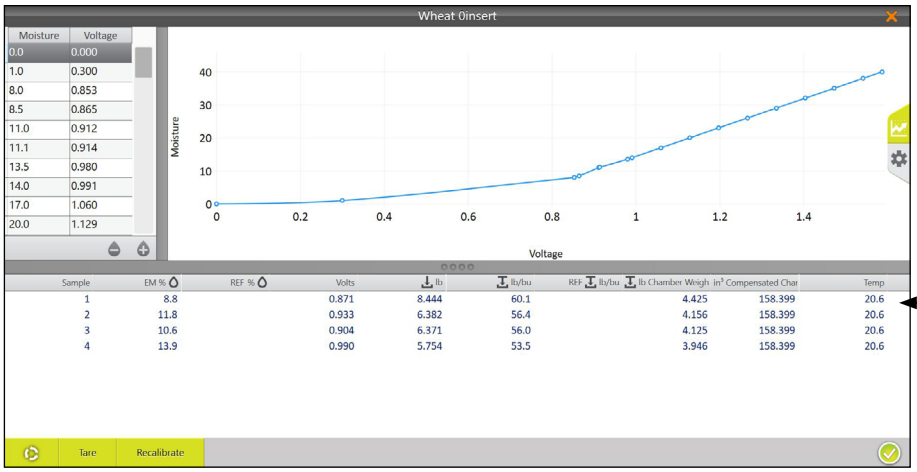
1. Test the samples with a bench top lab moisture meter by cycling sub-samples from the larger sample three to five times and averaging the moisture readings. The averages are the Known Moisture.
2. Within the hour, take the samples out to the GHS. If you are calibrating outside, make sure the samples stay in the shade.



3. Open Mirus.
4. Open the Setup > Generic Harvest > Moisture Curves screen.
5. Select the moisture curve you want to test.
6. Tap the edit icon .

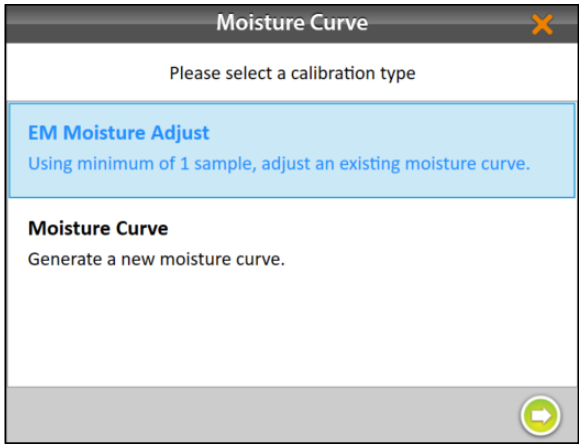
7. Pour the sample into the hopper (to simulate harvest). Release the isolation gate so that the sample drops into the GHS uniformly.
8. Tap the **Cycle** button .

   Mirus displays the moisture, voltage, bucket weight, and temperature of the sample.



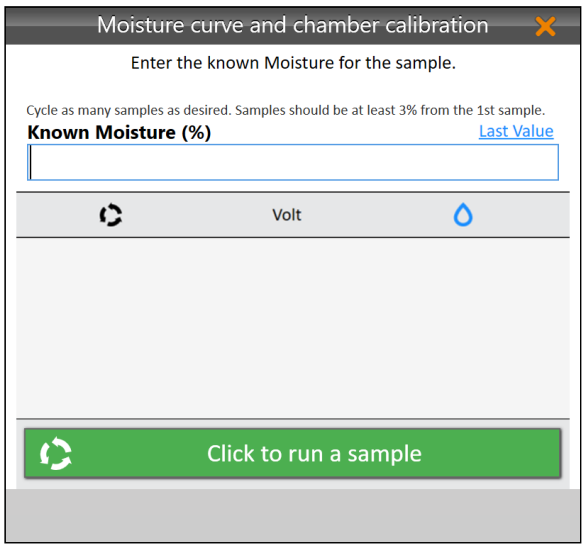
9. Cycle the sample through the GHS (repeat steps 7 and 8) two more times. This allows you to average the moisture readings for the sample.
10. If the moisture curve needs to be tuned to match the sample, tap **Recalibrate**.

    The Recalibrate feature adjusts the moisture curve to match the new harvest sample. The slope of the curve is not changed. The entire curve shifts to match the new sample. Fine tuning of a curve is often done later in the season as additional moisture samples are available.

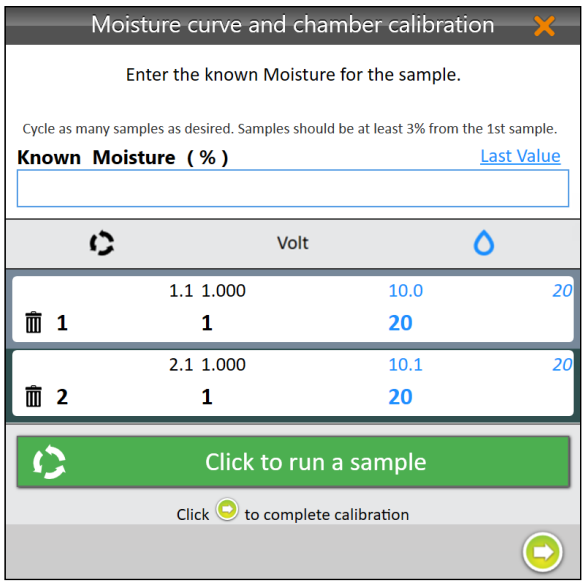


11. Select **EM Moisture Adjust** and tap the next arrow .

    Note: Multiple samples can be used to adjust an existing moisture curve.



12. Pour the sample into the hopper (to simulate harvest). Ensure the isolation gate is open so the grain drops into the GHS.
13. Enter the Known Moisture percentage.
14. Tap **Click to run a sample**.



15. Repeat steps 12–14 with the same sample at least two more times.

    Note: The Last Value button populates the Known Moisture field with the previous percentage when the same sample is run multiple times.

16. Tap the next arrow to complete the recalibration.

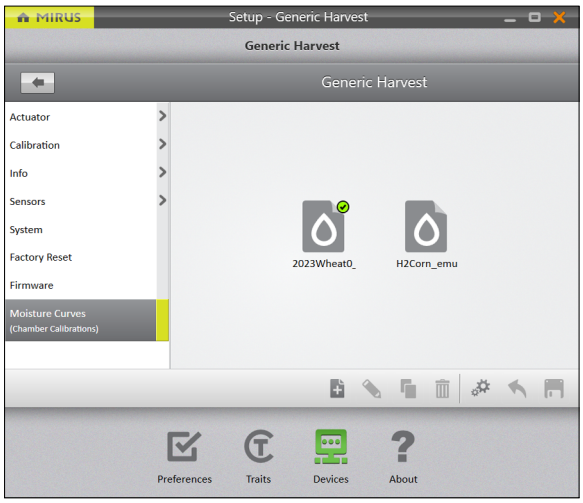
    Mirus displays the adjusted moisture curve with its moisture percentages and voltages.

6.5 Manually Adjust the Moisture Curve

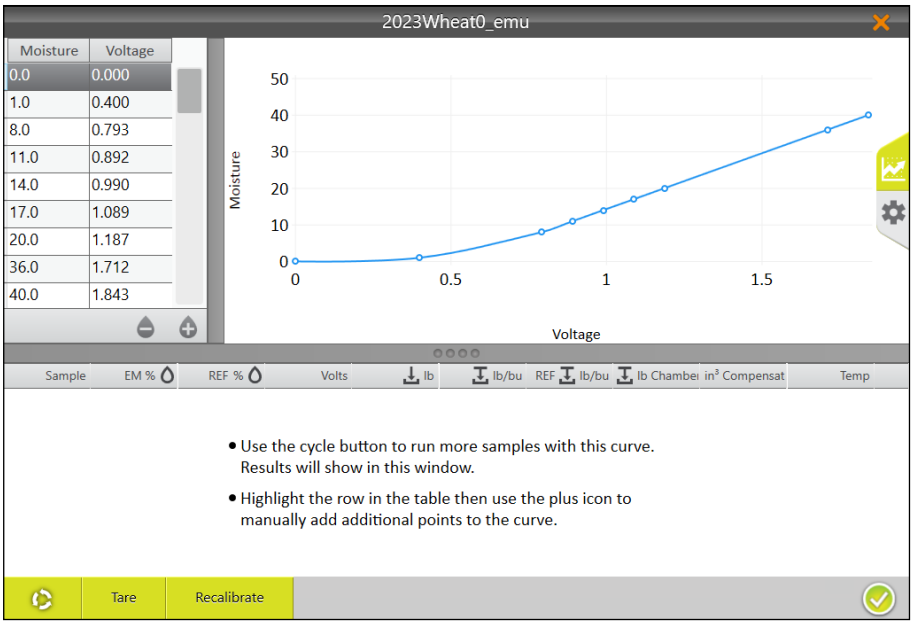
If desired, you can manually adjust a moisture curve using one or more samples.

Manually adjusting the curve should be done by more experienced users. If you are unfamiliar with moisture curves, call a HarvestMaster Field Service Engineer to walk you through the adjustment. See **9.4 Contact a HarvestMaster Field Service Engineer on page 108**.

1. Test the samples in a bench top sensor by cycling sub-samples from each larger sample three to five times and averaging the moisture readings. This is the Known Moisture.
2. Within the hour, take the samples out to the GHS. If you are calibrating outside, make sure the samples stay in the shade.



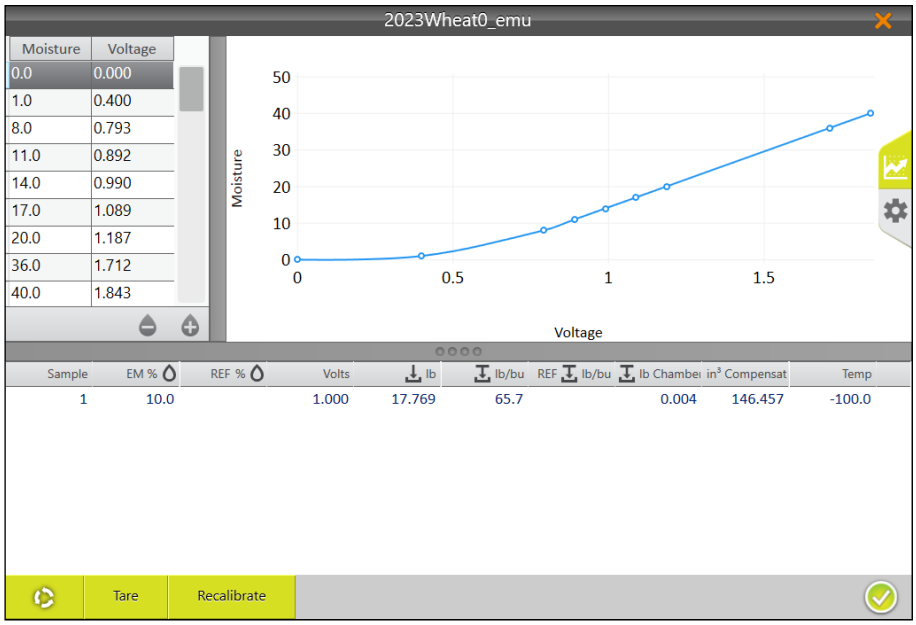
3. Open Mirus.
4. Open the Setup > Generic Harvest > Moisture Curves screen.
5. Select the moisture curve that you want to test.
6. Tap the edit icon .



7. Pour the sample into the hopper (to simulate harvest). Release the isolation gate so that the grain drops into the GHS uniformly.

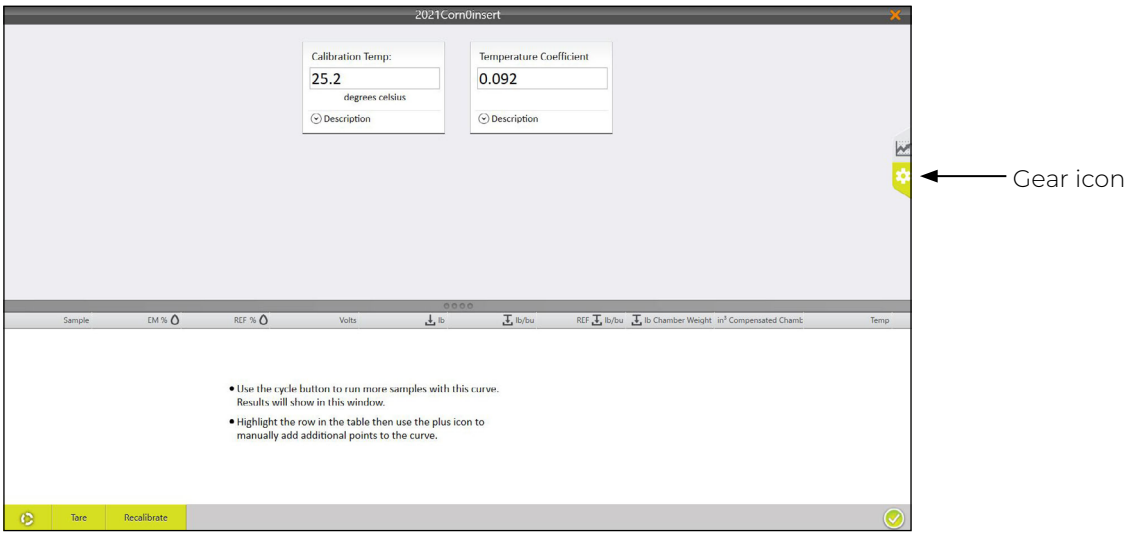
8. Tap the **Cycle** button .

   Mirus displays the moisture, voltage, bucket weight, and temperature of the sample.



If desired, tap on the gear icon on the right for more information about the moisture curve.

Note: Only adjust these settings as instructed by a HarvestMaster Field Service Engineer.



9. Cycle the same sample through the GHS (repeat steps 7 and 8) two more times.
10. Repeat steps 7–9 for all prepared samples. Each sample should be cycled three to five times.
11. Calculate the moisture percentage offsets.

    The offset is the difference between a bench top sensor's moisture measurement and the GHS's moisture measurement.

    For example, Sample One has the following moisture measurements:

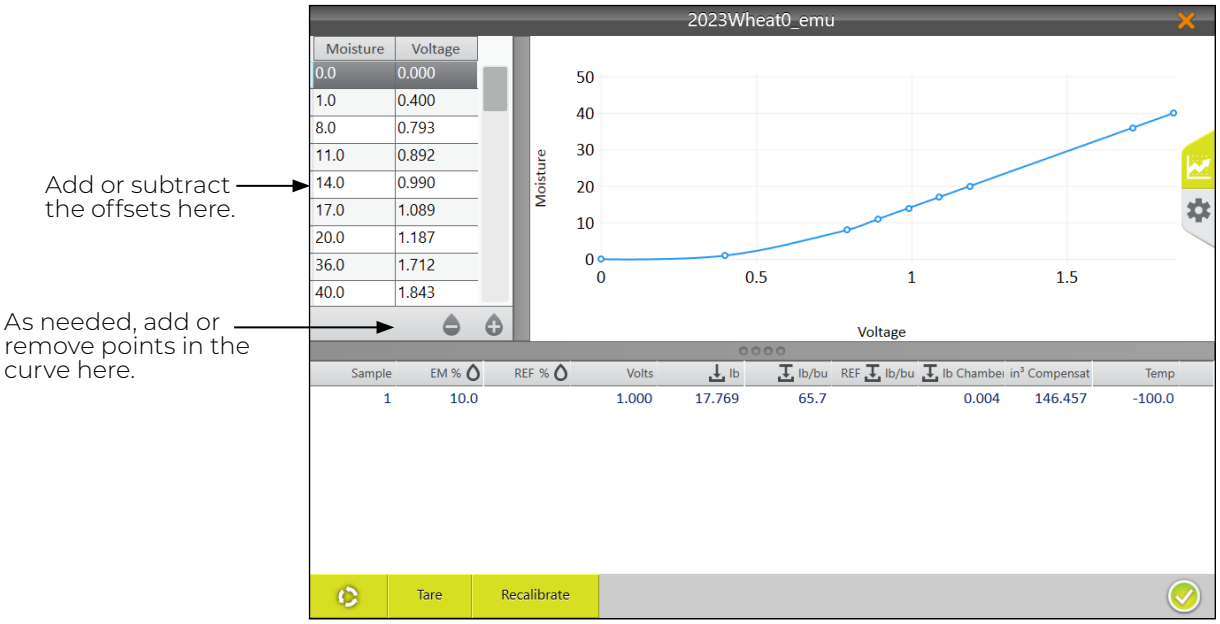
    - Bench top sensor: 18%
    - GHS: 16.8%

    The offset would be 18% – 16.8% = +1.2%

12. Average the sample offsets.

    For example, if your GHS reads 1% low on average, then increase all moisture points by 1%.

13. Add the average offset to each moisture point with exception of the 0 and 1 moisture points (never adjust 0 or 1). Subtract for a negative average offset. Do not adjust voltages.



The following tables illustrate this type of adjustment.

Original Curve	
Moisture	Voltage
0.0	0.000
1.0	0.400
8.0	0.793
11.0	0.892
14.0	0.990
17.0	1.089
20.0	1.187
36.0	1.713
40.0	1.845

Adjusted Curve	
Moisture	Voltage
0.0	0.000
1.0	0.400
9.0	0.793
12.0	0.892
15.0	0.990
18.0	1.089
21.0	1.187
37.0	1.713
41.0	1.845

6.6 Adjust the Curve Using Excel

HarvestMaster provides a spreadsheet for creating a two-point calibration online. You can be download it from here: *www.harvestmaster.com/data/files/mirus/EM2 Sample Curves 2018.xlsx*. Follow the instructions in the spreadsheet for creating the curve.

6.7 Adjust the Curve for High Moisture Corn

When calibrating with high moisture corn samples, some moisture curves do not follow a linear voltage relationship. HarvestMaster recommends manually adjusting the upper half of moisture curves with samples above 26%.

mirus™

Generic Harvest Plugin

CHAPTER SEVEN

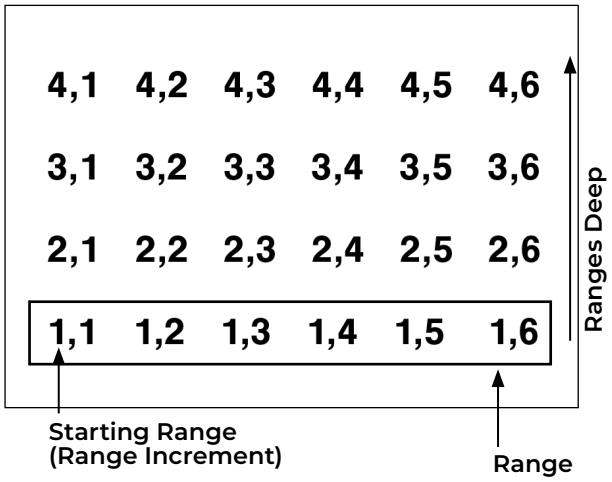
Create and Use Field Maps

7 Create and Use Field Maps

7.1 Create a New Field Map

This section explains how to create Range Row maps and Standard Plot ID maps. Mirus also offers an option for a Four Row map. A Four Row map is a special Range Row map that is generally used with split combines.

7.1.1 Create a Range Row Field Map



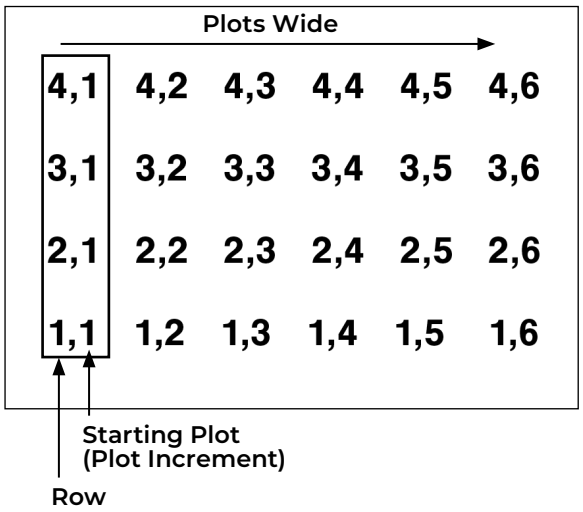
In a Range Row field map,

- **Range** indicates a horizontal group of plots.
- **Ranges deep** indicates the number of ranges within a given field.
- **Range increment** is the numeric interval between ranges. This will usually be 1.

Range numbering begins with the bottom left corner of a field and proceeds upward.

In the example to the left,

- The starting range is 1.
- The range increment is 1.
- The field is four ranges deep.

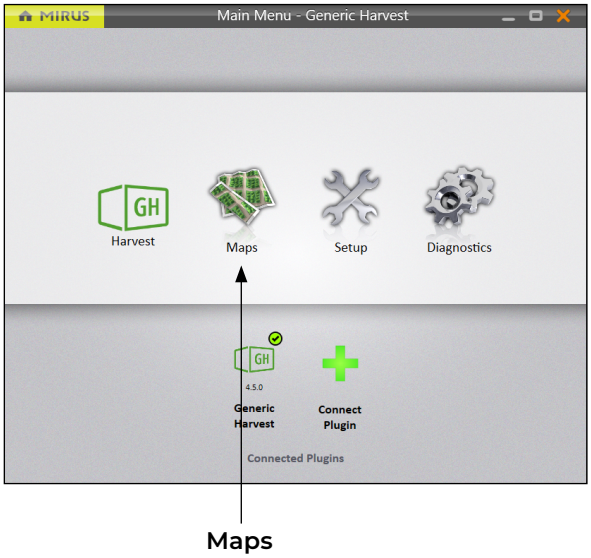


- **Row** indicates a vertical group of plots.
- **Plots wide** indicates the number of plots within a given range.
- **Plot increment** is the numeric interval between plots. This will usually be 1.

Plot numbering begins in the bottom left corner of a field and proceeds right.

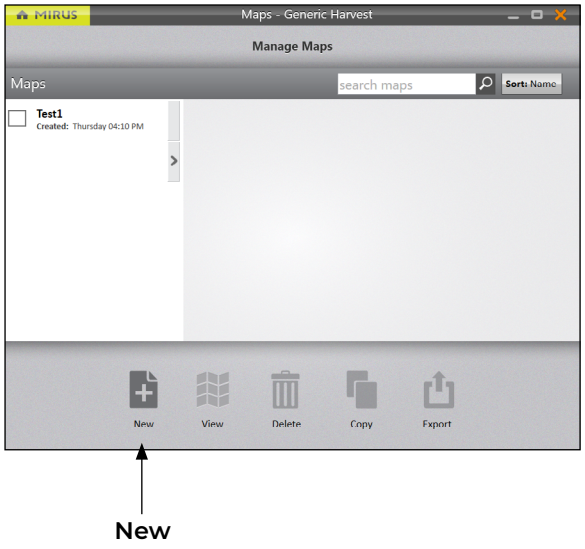
In the example to the left,

- The starting plot is 1.
- The plot increment is 1.
- The field map is six rows (plots) wide.

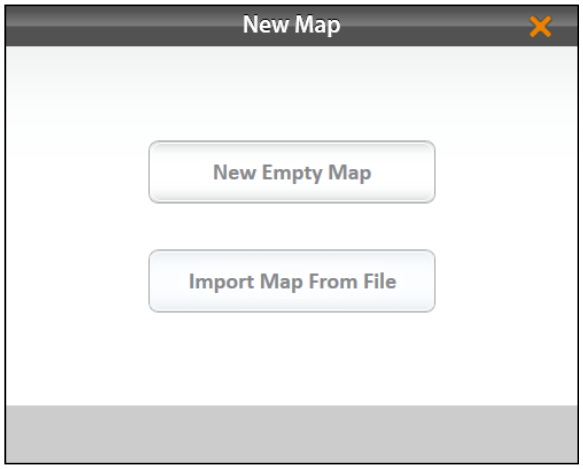


To create a Range Row map,

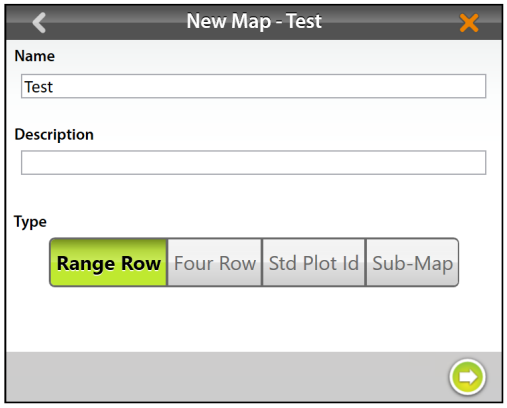
1. From the Main Menu screen, tap **Maps** .



2. Tap **New**.

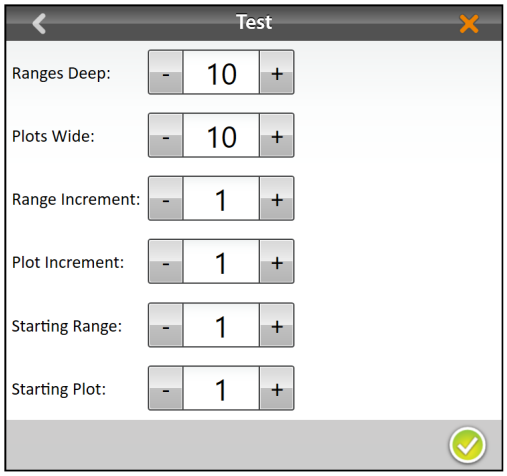


3. Tap **New Empty Map**.

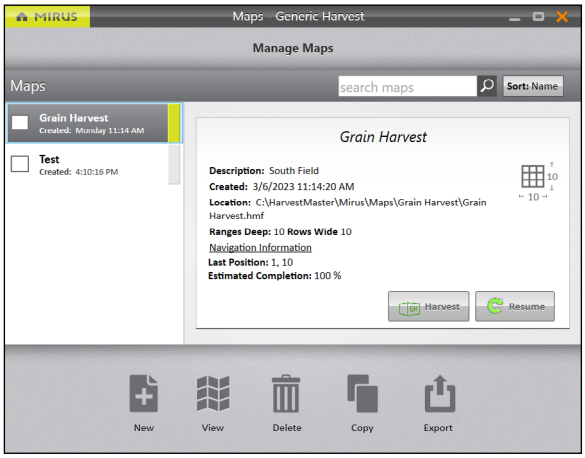


4. Enter a name and description for the map.
5. Tap **Range Row**.
6. Tap the next arrow.

Note: The Name field will only accept basic letters and numbers. Do not use emojis or the following special characters: > < : " \ ? | / *



7. Set the following:
   - Ranges deep
   - Plots wide
   - Range increment
   - Plot increment
   - Starting range
   - Starting plot
8. Tap the check icon to save the map.



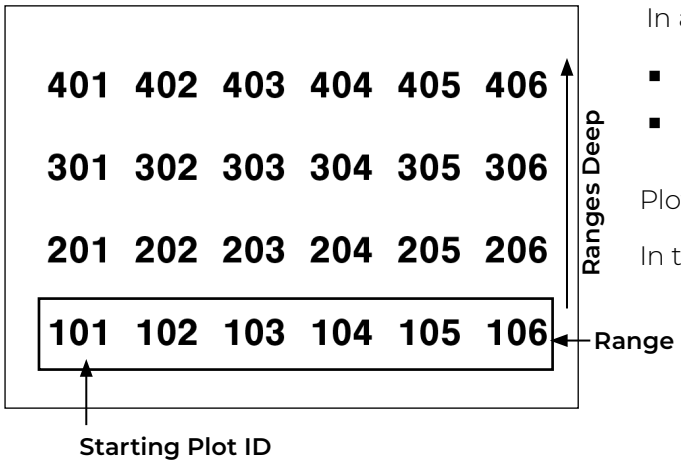
Mirus displays a description of the map on the Manage Maps screen. From this screen, you can do the following with your maps:

- Create new
- View
- Delete
- Copy
- Export

You also have the option to begin a harvest.

7.1.2 Create a Standard Plot ID Map

A Standard Plot ID map gives a unique ID number to each individual plot. The number of Ranges and Rows can reach up to 999. However, the display number can reach up to five digits, depending on how you choose to number the plots.



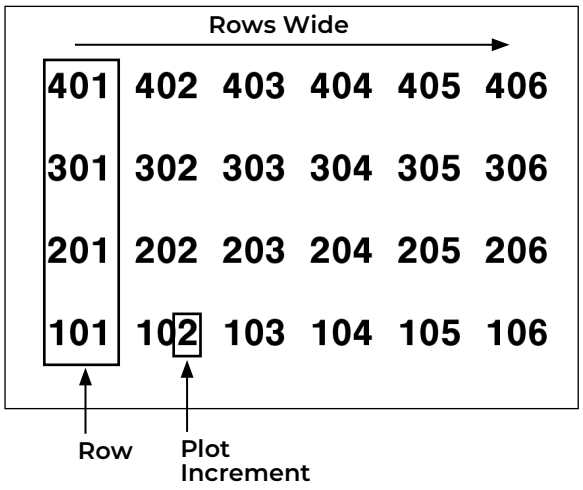
In a Standard Plot ID map,

- **Range** indicates a horizontal group of plots.
- **Ranges deep** indicates the number of ranges within a given field.

Plot numbering begins in the bottom left corner of a field.

In the example to the left,

- The starting plot is 101.
- The field map is four ranges deep.



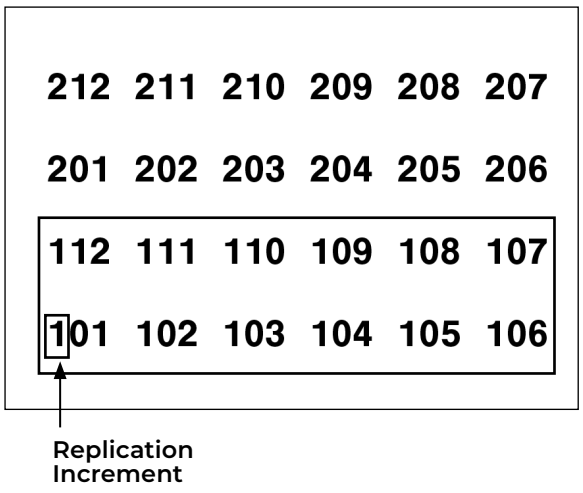
- **Row** indicates a vertical group of plots.
- **Rows wide** indicates the number of rows within a given field.

Note: One plot wide is equal to one row even if you have multiple crop rows in a plot.

- **Plot increment** is the numeric interval between plots. This will usually be 1.

In the example to the left,

- The plot increment is 1.
- The field map is six rows (plots) wide.

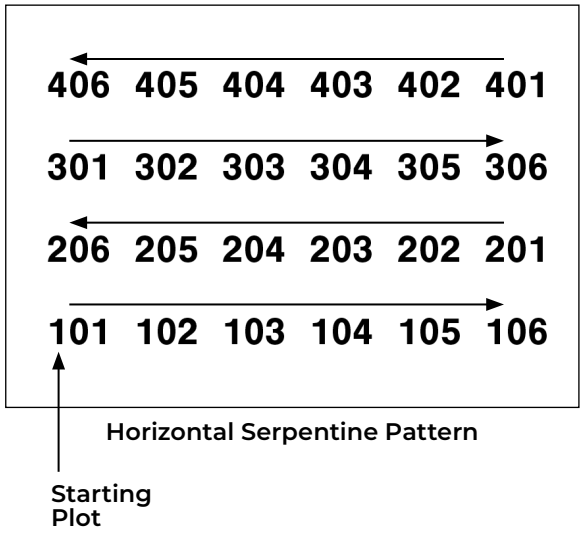


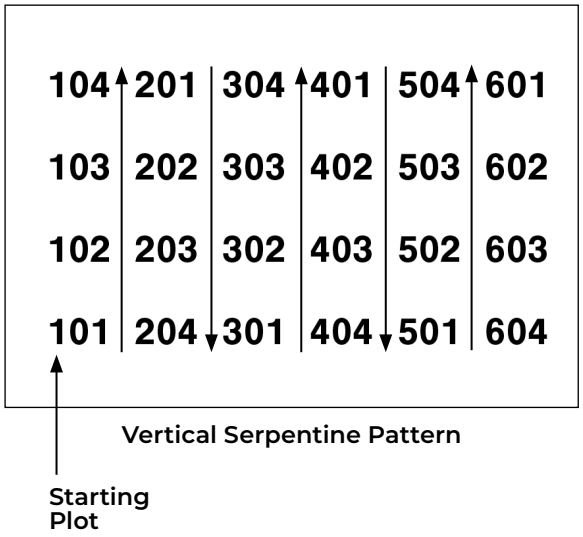
- **Reps** (or Replication) usually indicates the same horizontal group of plots in a particular range as in the above examples. However, in some cases a replication will extend beyond a range (left).
- **Plots per replication** indicates the number of plots in each replication.
- **Replication increment** is the numeric interval between the first plots in each replication (for example, 100 or 1000).

In the example to the left,

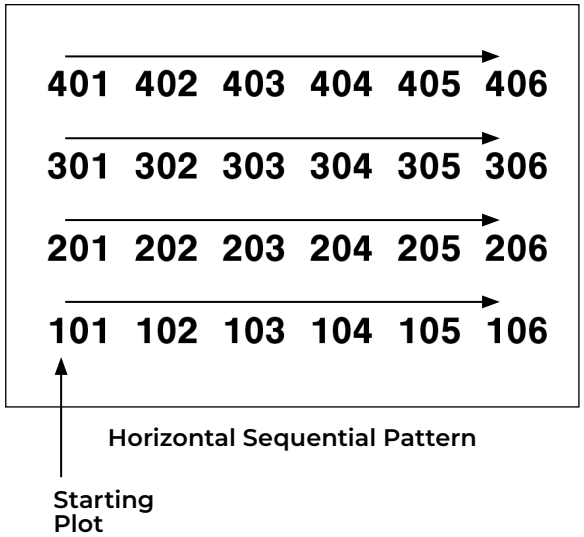
- The replication increment is 100.
- The field map is six rows (plots) wide.
- The plots per replication is 12.

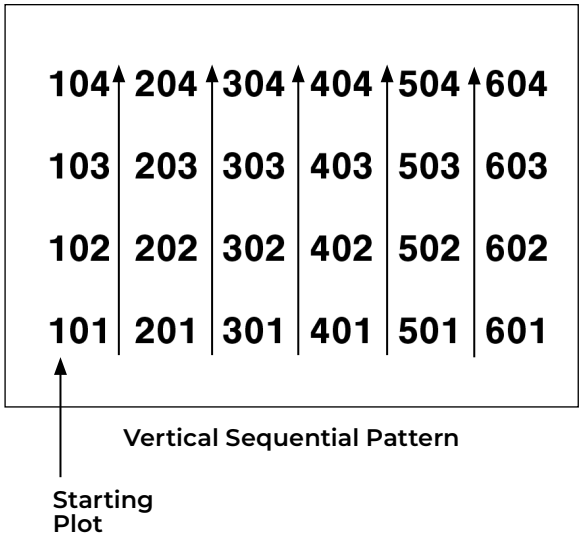
- **Pattern** indicates the layout sequence for the plot increments.
  - **Serpentine pattern** numbers the plots in a back and forth pattern across the field. The back and forth pattern can be either horizontal or vertical.





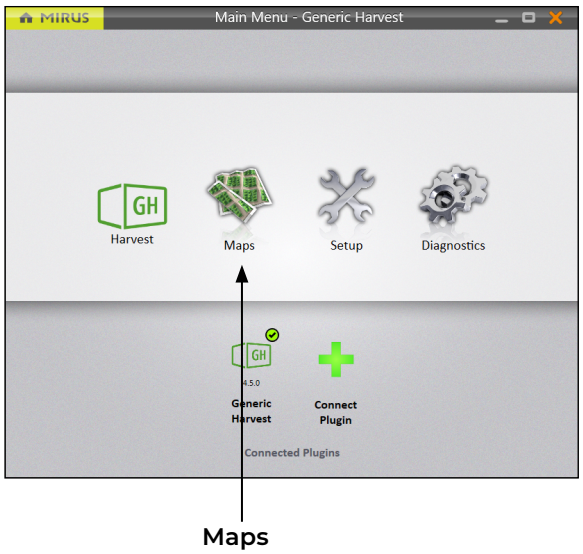
  - **Sequential pattern** numbers the plots in parallel columns. The columns can be ranges (horizontal) or rows (vertical).





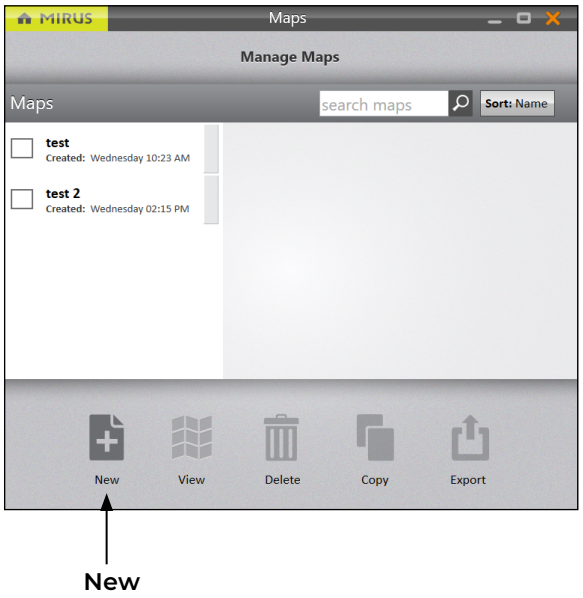
- **Direction** indicates the direction in which plot increments increase.

Note: To collect the correct data, the map pattern and direction should follow the planted pattern. This may not correspond with your harvest pattern.

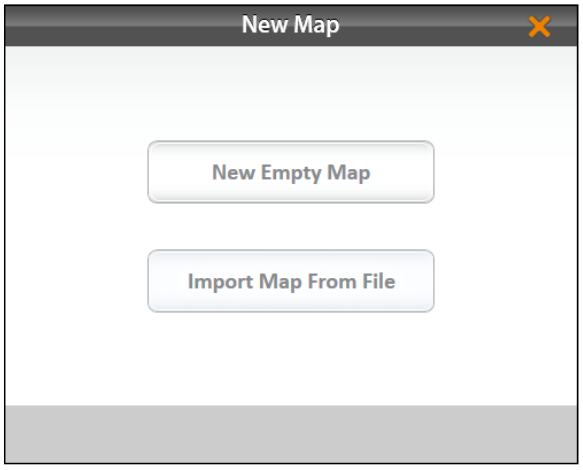


To create a Standard Plot ID map,

1. From the Main Menu screen, tap **Maps** .



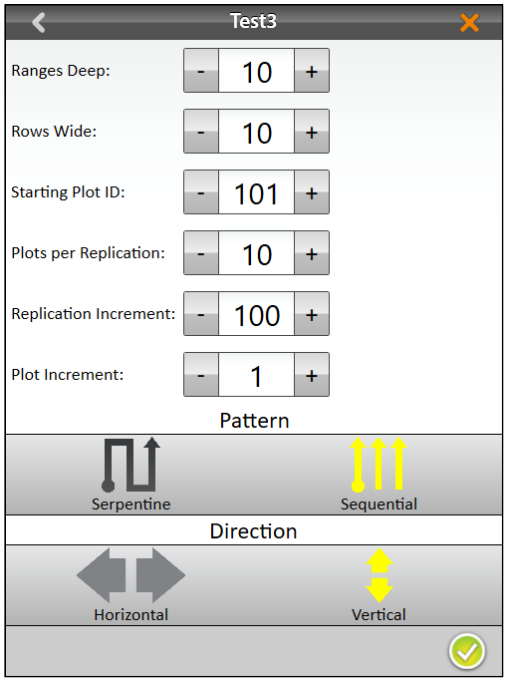
2. Tap **New**.



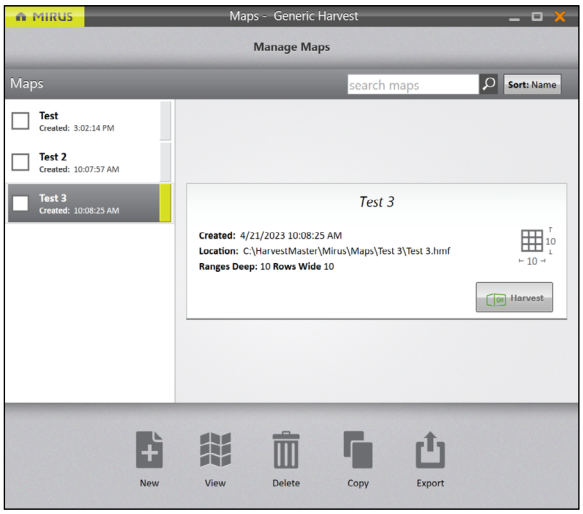
3. Tap **New Empty Map**.

4. Enter a name and description for the map.
5. Tap **Standard Plot ID**.
6. Tap the next arrow .

Note: The Name field will only accept basic letters and numbers. Do not use emojis or the following special characters: > < : " \ ? | / *



7. Set the following:
   - Ranges deep
   - Rows wide
   - Starting plot ID
   - Plots per replication
   - Replication increment
   - Plot increment
   - Pattern
   - Direction
8. Tap the check icon to save the map.

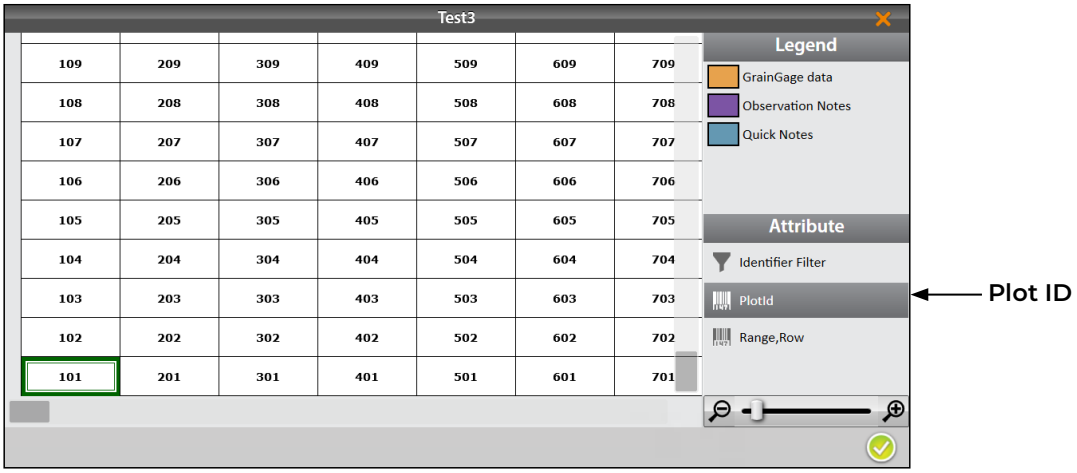


Mirus displays a description of the map on the Manage Maps screen. From this screen, you can do the following with your maps:

- Create new
- View
- Delete
- Copy
- Export

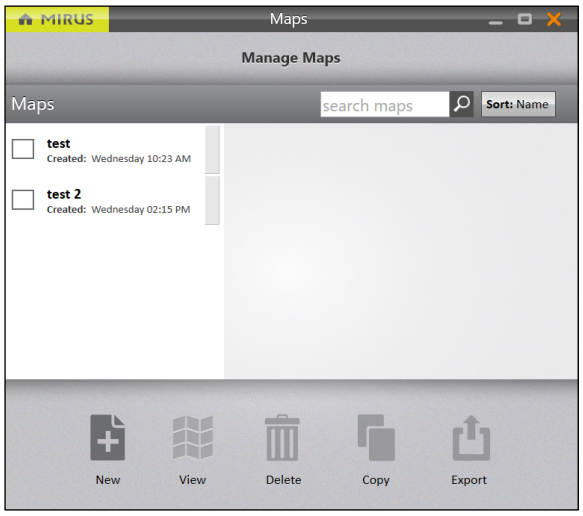
You also have the option to begin a harvest.

Note: In Map View, Mirus initially displays Standard Plot ID maps as Range Row maps. To display the plot IDs, tap **Plot ID** *under Attribute.*



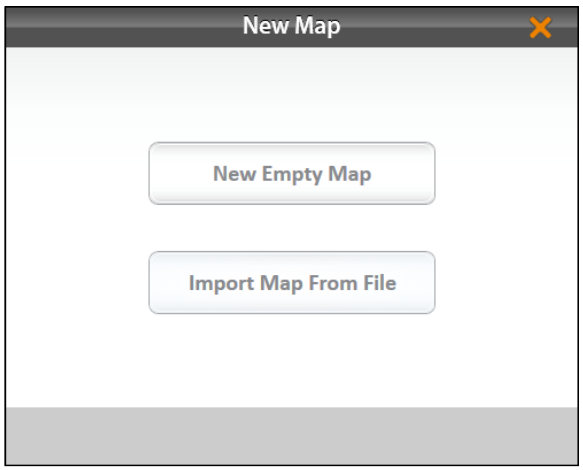
7.1.3 Create a Sub-Map

Mirus allows the creation of sub-maps, which are smaller divisions of the larger field maps.

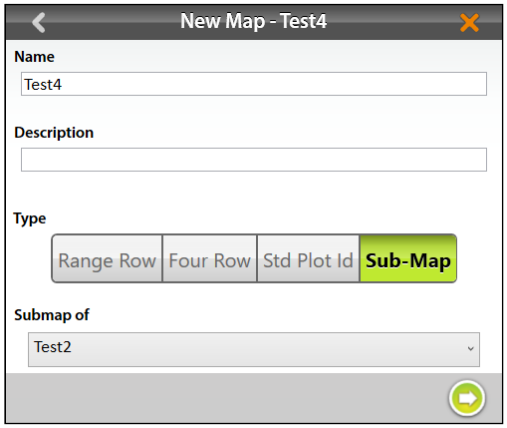


To create a sub-map,

1. From the Manage Maps screen, tap **New**.

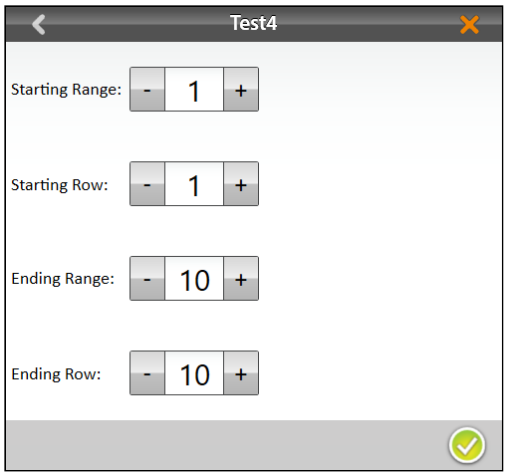


2. Tap **New Empty Map**.

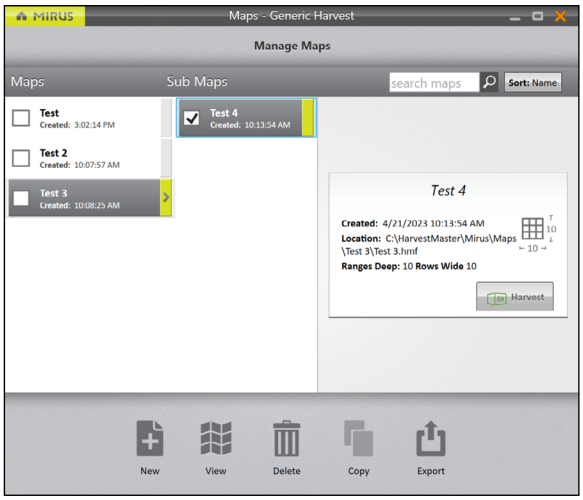


3. Enter a name and description for the map.
4. Tap **Sub-Map**.
5. Select the map of which this will be a sub-map.
6. Tap the next arrow .

Note: The Name field will only accept basic letters and numbers. Do not use emojis or the following special characters: > < : " \ ? | / *



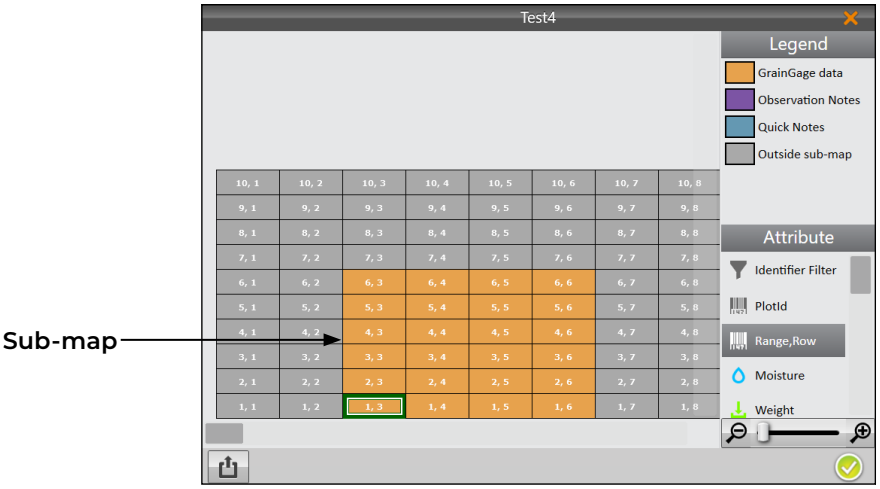
7. The plot and range increments are the same as the larger field map. Set the following:
   - Starting range
   - Starting row
   - Ending range
   - Ending row
8. Tap the check icon to save the map.



The sub-map is linked to the main map of which it is part on the Manage Maps screen.

To view the sub-map,

1. Select the sub-map.
2. Tap **View** .



7.2 Import a Map

In Mirus you can easily import maps created in Microsoft Excel or research programs such as PRISM® and AGROBASE®. The imported field map information includes Range, Row, Rep, Pass, Pedigree, or other IDs. This can be done in Range Row and Two-Dimensional (2D) formats. This section explains how to import Range Row and 2D maps.

7.2.1 Import a Range Row Map

Range row maps need to be in CSV format in order to be imported. The following is an importable range row map file:

	A	B	C	D	E
1	PLTID	Range	Row	Study	
2	Border	1	1	Border	
3	1001	1	2	45	
4	1002	1	3	67	
5	1003	1	4	45	
6	1004	1	5	34	
7	Border	1	6	Border	
8	Border	2	1	Border	
9	2001	2	2	67	
10	2002	2	3	56	
11	2003	2	4	87	
12	2004	2	5	12	
13	Border	2	6	Border	
14	Border	3	1	Border	
15	3001	3	2	76	
16	3002	3	3	98	
17	3003	3	4	96	
18	3004	3	5	23	
19	Border	3	6	Border	
20					

Imp

Display Settings

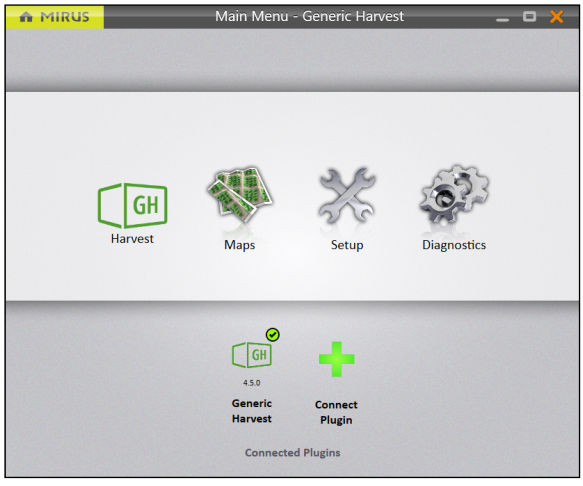
Header row must include columns for range and row. Additional columns are optional.

If you will be harvesting border plots, do not forget to include them in your map.

The main benefit of importing maps is that you can include more data and identifiers (in addition to range and row) for each plot.

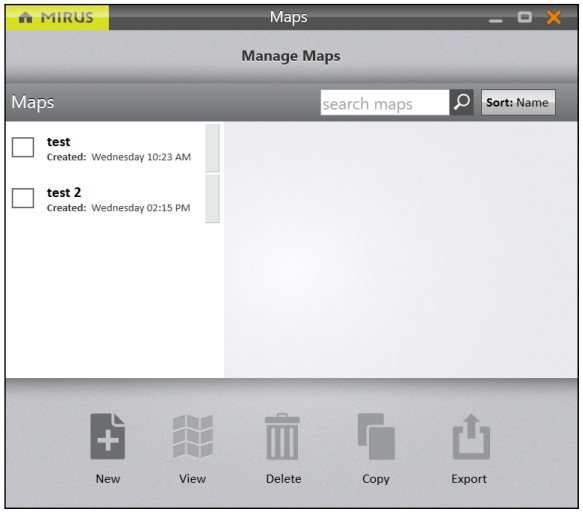
Note: The range row map is in list format, and the range and row columns are entirely numeric. The column names are unimportant. During the import process, Mirus allows you to select which of the entirely numeric columns are Range and Row.

Note: Only basic letters and numbers are accepted in the spreadsheet. Do not use emojis or the following special characters: > < : " \ ? | / *

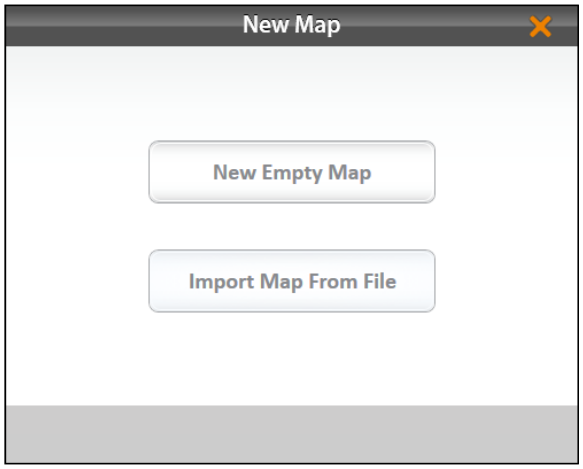


To import a Range Row map,

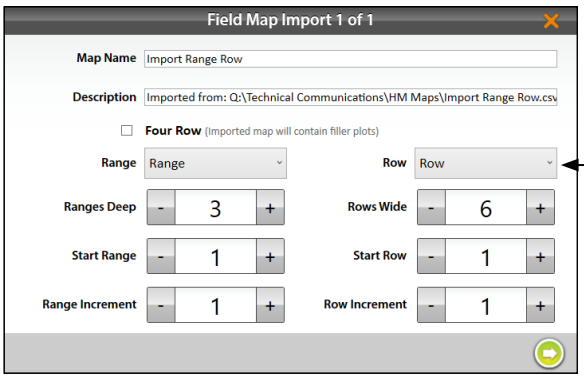
1. On the Main Menu screen, tap **Maps** .



2. Tap **New**.



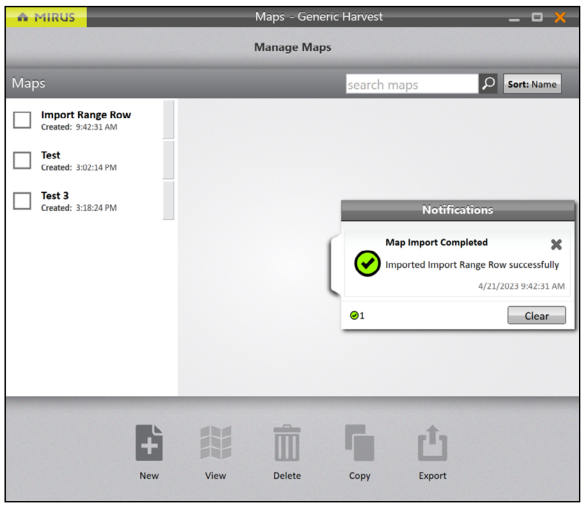
3. Tap **Import Map from File**.
4. Navigate to and select the desired file.



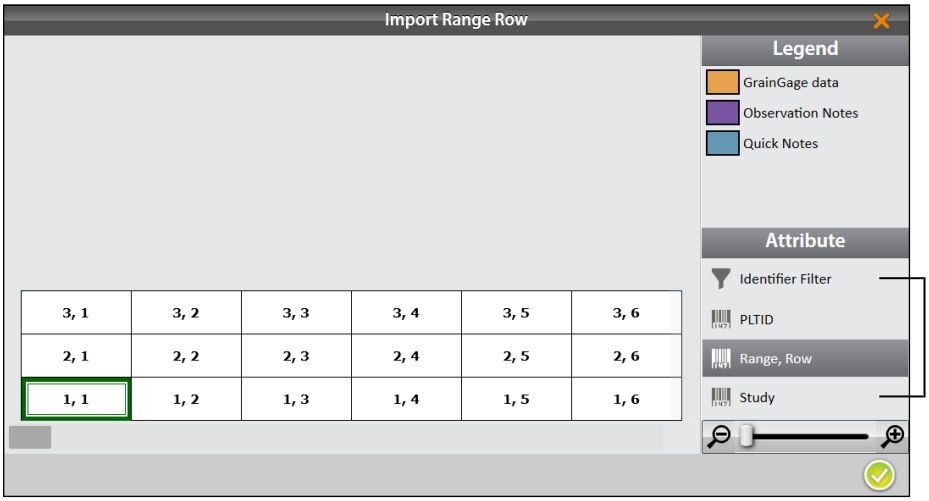
5. Check the values displayed by Mirus and make sure they reflect the map you are importing. If necessary, change the columns designated as Range and Row.

Tap the dropdown menus to display other options for the Range and Row columns.

6. Tap the next arrow .



Mirus notifies you that the map has been imported successfully.

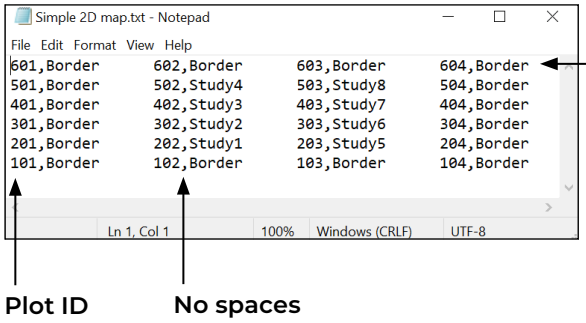


Mirus imports the additional attributes. Select to change view.

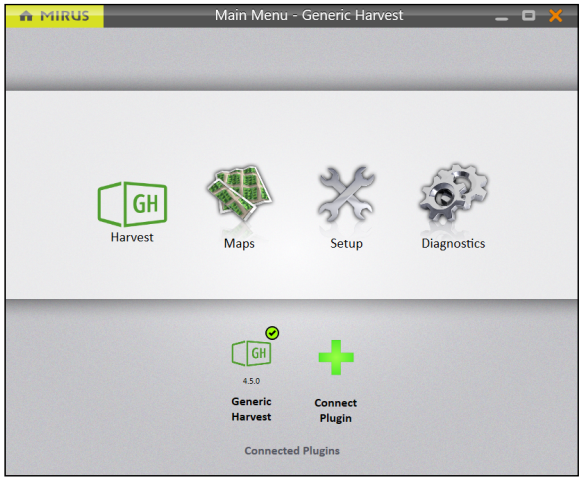
7.2.2 Import a Two-Dimensional (2D) Map

Two-dimensional (2D) maps have the same layout as the field. Plot IDs in a 2D map allow any plot name in any order to be used on the map. This type of map must be created with a spreadsheet or text editor and saved as a tab delimited file or TXT file. Do not use any headings or spaces when creating a 2D map. Plot IDs may not contain any symbols.

Two-dimensional maps need to be in TXT format in order to be imported. The following is an importable 2D map file.

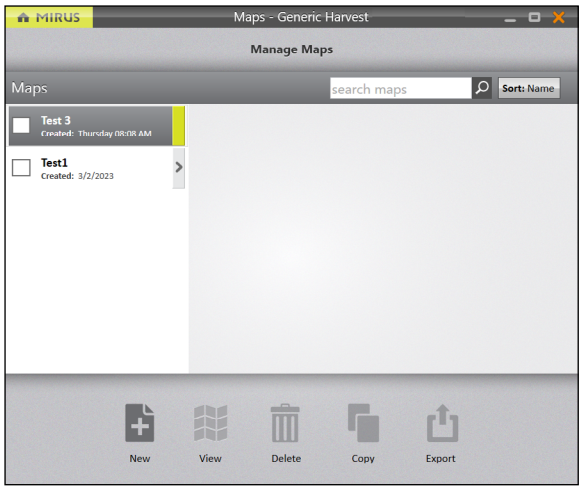


If you will be harvesting border plots, do not forget to include them in your map.

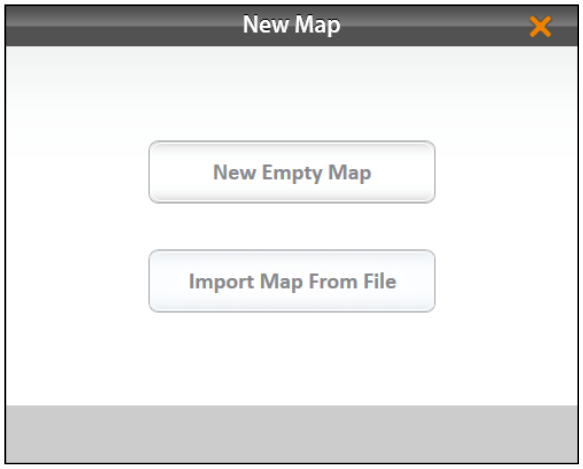


To import a 2D map,

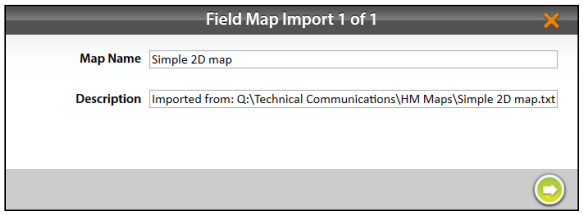
1. On the Main Menu screen, tap **Maps** .



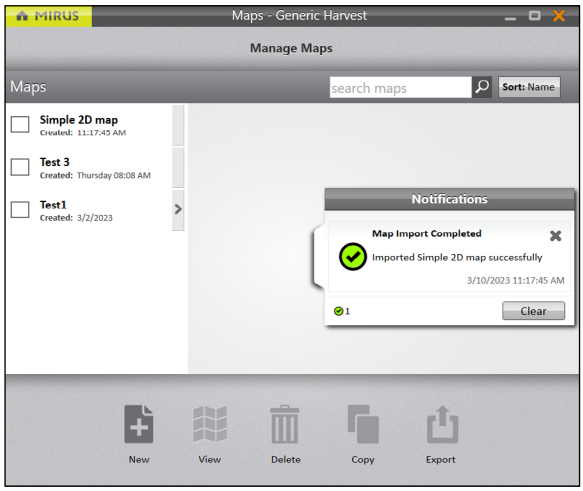
2. Tap **New**.



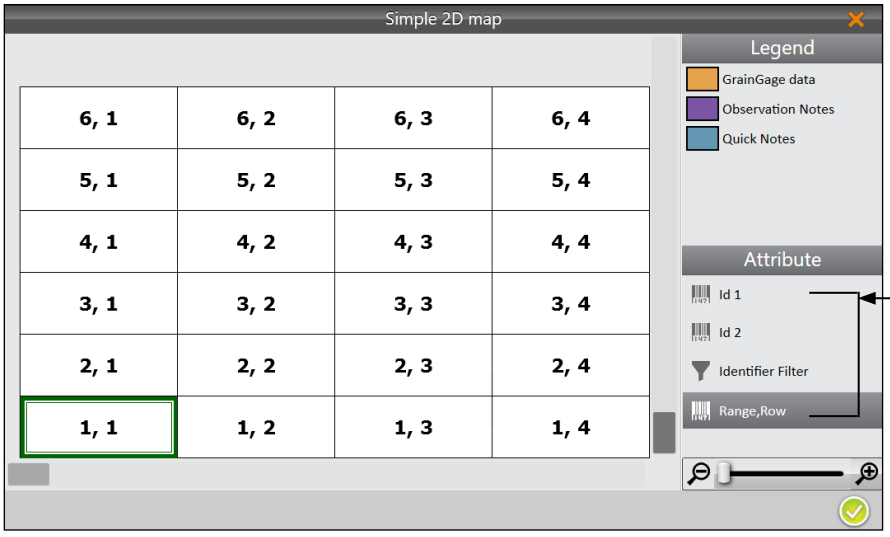
3. Tap **Import Map from File**.
4. Navigate to and select the desired file.



5. Change the default description (if desired).
6. Tap the next arrow .



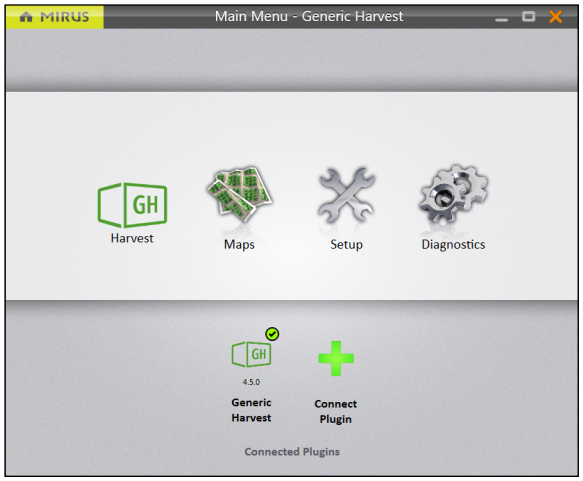
Mirus notifies you that the map has been imported successfully.



Mirus imports the additional attributes. Select to change view.

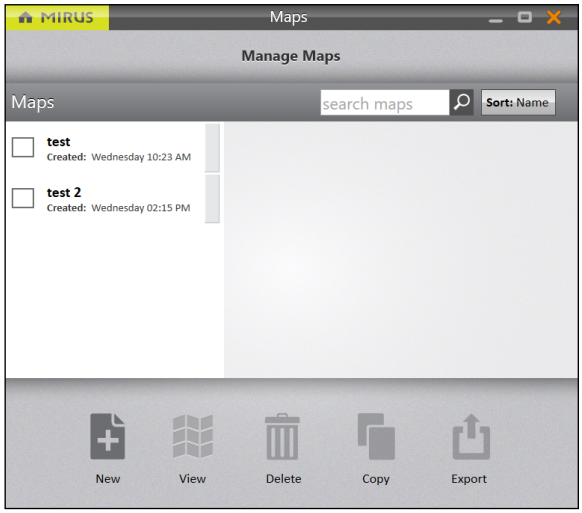
7.2.3 Import Multiple Maps

Mirus allows you to import multiple maps at the same time.

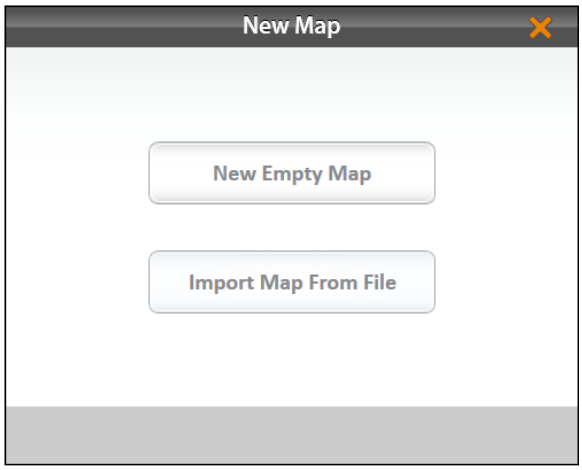


To import multiple maps,

1. From the Main Menu screen, tap **Maps** .

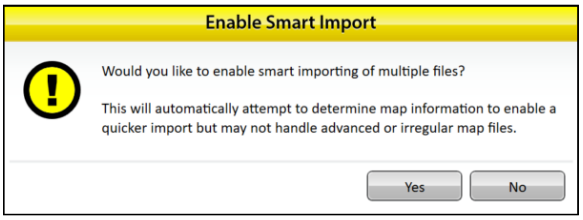


2. Tap **New**.



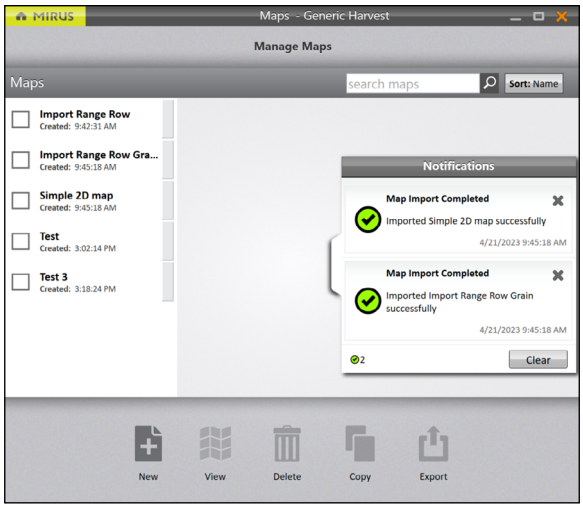
3. Tap **Import Map from File**.
4. Navigate to the desired files.
5. Select the files and tap **Open**.

Note: You can select multiple files by holding the CTRL key and selecting each file that you want to import.



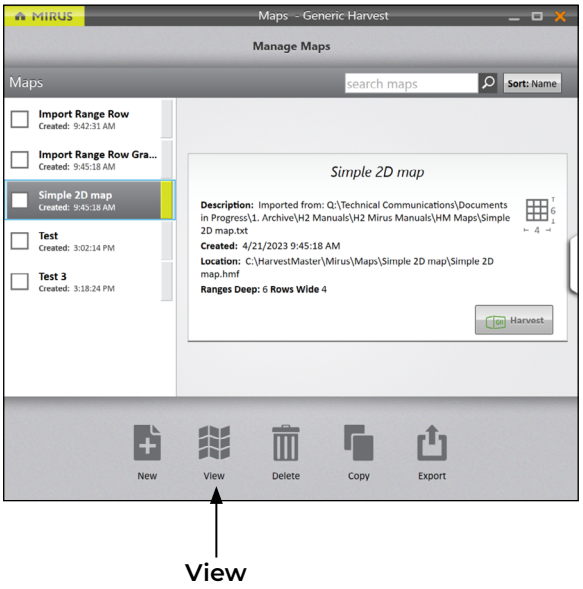
6. Tap **Yes** to enable Smart Import.

   Smart Import will import each file automatically without any additional input. If the map name already exists, the import will stop to allow you to change the name.



Mirus notifies you that the maps have been imported successfully.

7.3 View a Map

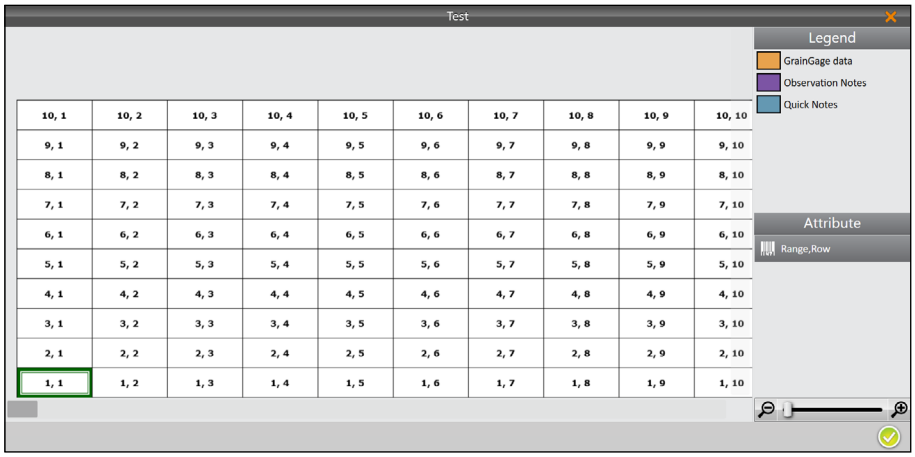


View

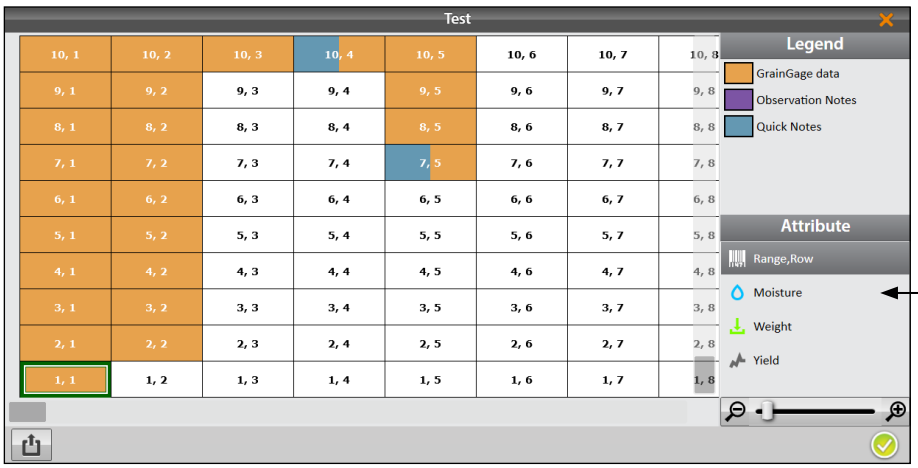
To view a map,

1. From the Manage Maps screen, select the map that you want to view.
2. Tap **View**  .

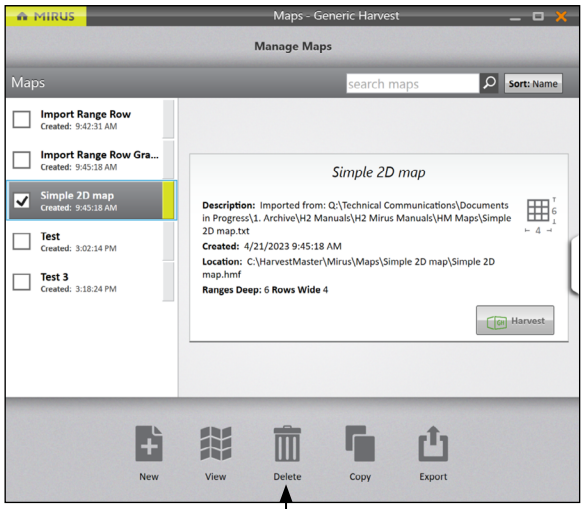
Mirus opens the Map View screen. The image below displays an unharvested map.



Depending on the attributes in the map and what data has been collected, Map View can be configured to display different attributes of the harvested product, as shown in the image below.



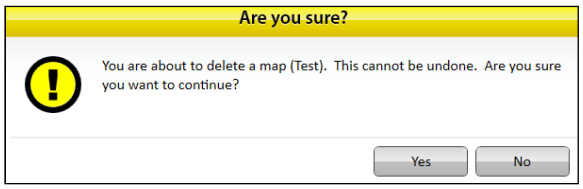
7.4 Delete a Map



Delete

To delete a map,

1. From the Manage Maps screen, select the map you want to delete.
2. Tap **Delete** .



Mirus asks if you are sure.

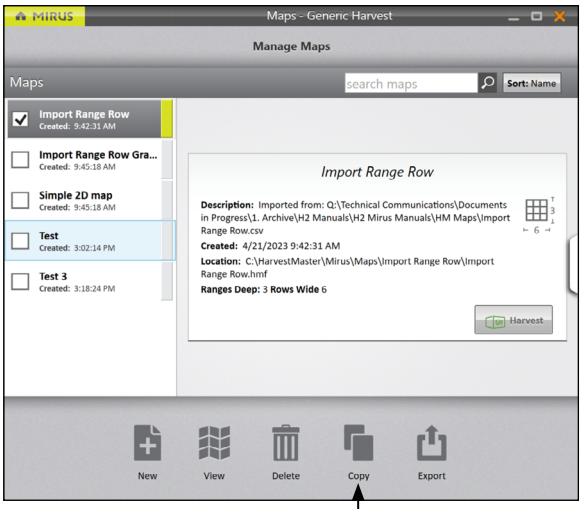
CAUTION: This cannot be undone! You cannot recover a deleted map.

3. If you choose to proceed, tap **Yes**.

Mirus deletes the map, and it is no longer available from the Manage Maps screen.

7.5 Copy a Map

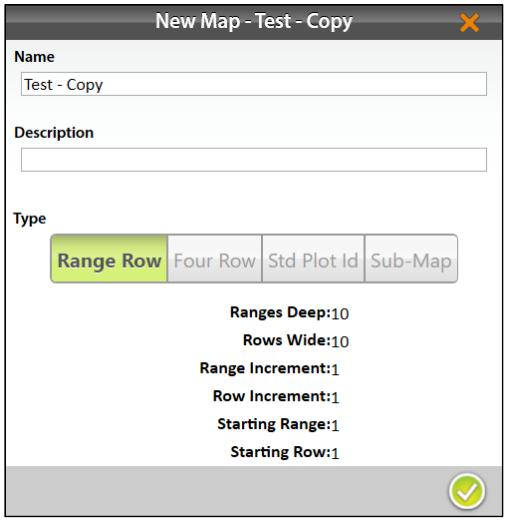
Maps can be reused from year to year. The Mirus copy feature copies the layout of the map but not the data within the map.



Copy

To copy a map,

1. From the Manage Maps screen, select the map you want to copy.
2. Tap **Copy** .



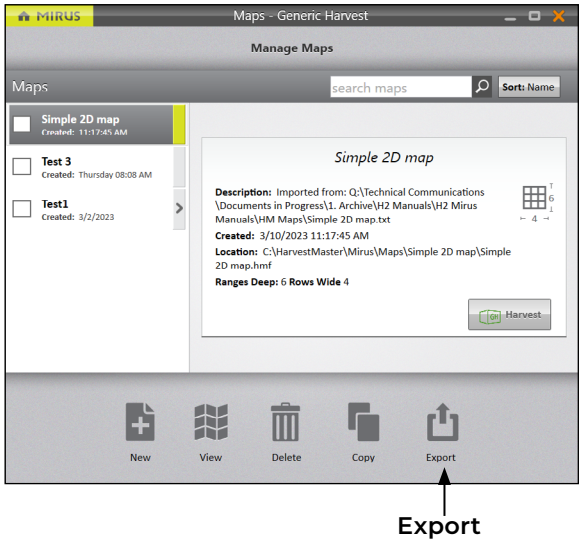
3. Enter the name and description for the map.
4. Tap the check icon to save the new copy.

Mirus adds it to the list of maps on the Manage Maps screen.

7.6 Export Map Data

The Manage Maps screen allows you to export a map as a data or heat map. The export data option creates a detailed spreadsheet of your data. The heat map option creates a color-coded visual map (in a spreadsheet) with the parameters you set for each color.

7.6.1 Export Data



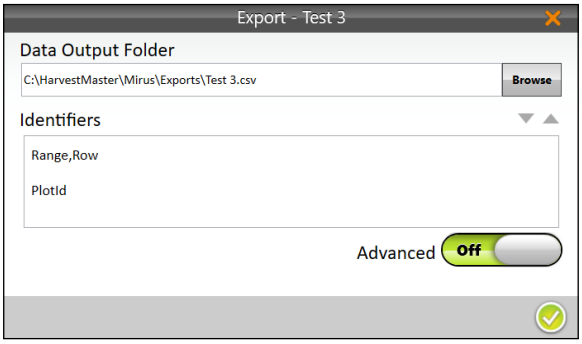
Export

To export data,

1. From the Manage Maps screen, select the map from which you want to export data.

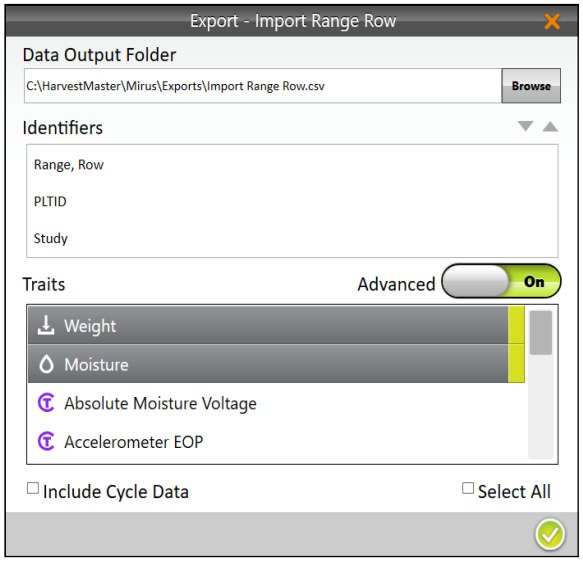
Note: To export multiple maps, select the checkbox next to each map that you want to export.

2. Tap **Export** .



3. Enter the file path for the exported data.
4. Select the preferred Identifiers.

   If **Advanced** is Off, Mirus exports only the data for weight and moisture.

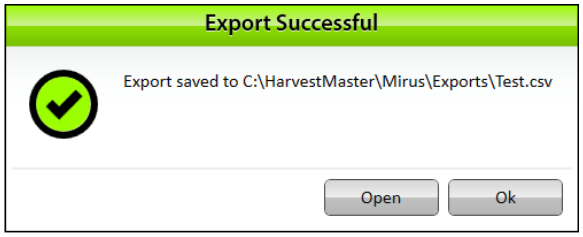


If **Advanced** is On, select the traits you want to export with the data from the **Traits** field.

a. Select **Select All** to export all the listed traits.

b. Select **Include Cycle Data** to include sub-cycle data.

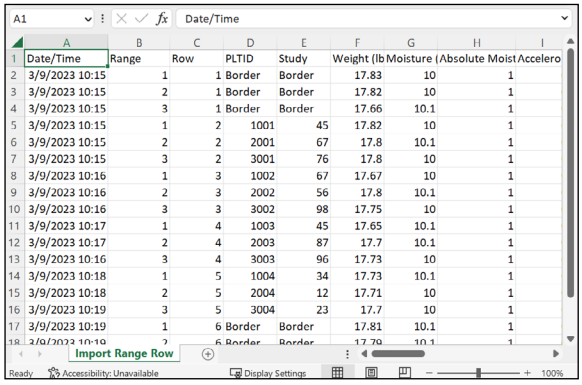
5. Tap the check icon to finish exporting the data.



Mirus notifies of the successful export.

6. Tap **OK** to finish the export.
7. Tap **Open** to finish the export and open the CSV file.

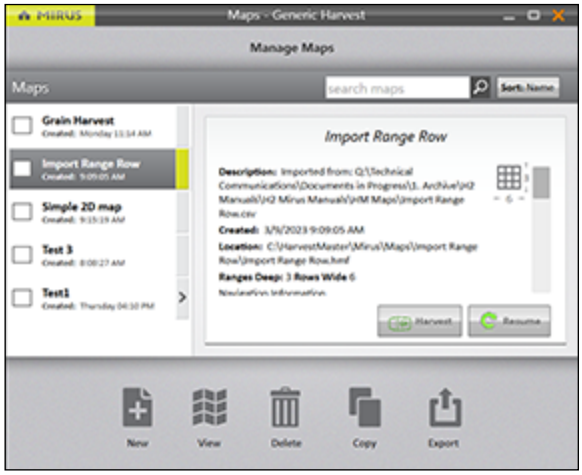
Mirus exports the data into CSV (comma delimited) form. This allows you to import the data into other programs for analysis.



	A	B	C	D	E	F	G	H	I
1	Date/Time	Range	Row	PLTID	Study	Weight (lb	Moisture (	Absolute Moist	Accelero
2	3/9/2023 10:15	1	1	Border	Border	17.83	10	1	
3	3/9/2023 10:15	2	1	Border	Border	17.82	10	1	
4	3/9/2023 10:15	3	1	Border	Border	17.66	10.1	1	
5	3/9/2023 10:15	1	2	1001	45	17.82	10	1	
6	3/9/2023 10:15	2	2	2001	67	17.8	10.1	1	
7	3/9/2023 10:15	3	2	3001	76	17.8	10	1	
8	3/9/2023 10:16	1	3	1002	67	17.67	10	1	
9	3/9/2023 10:16	2	3	2002	56	17.8	10.1	1	
10	3/9/2023 10:16	3	3	3002	98	17.75	10	1	
11	3/9/2023 10:17	1	4	1003	45	17.65	10.1	1	
12	3/9/2023 10:17	2	4	2003	87	17.7	10.1	1	
13	3/9/2023 10:16	3	4	3003	96	17.73	10	1	
14	3/9/2023 10:18	1	5	1004	34	17.73	10.1	1	
15	3/9/2023 10:18	2	5	2004	12	17.71	10	1	
16	3/9/2023 10:19	3	5	3004	23	17.7	10	1	
17	3/9/2023 10:19	1	6	Border	Border	17.81	10.1	1	

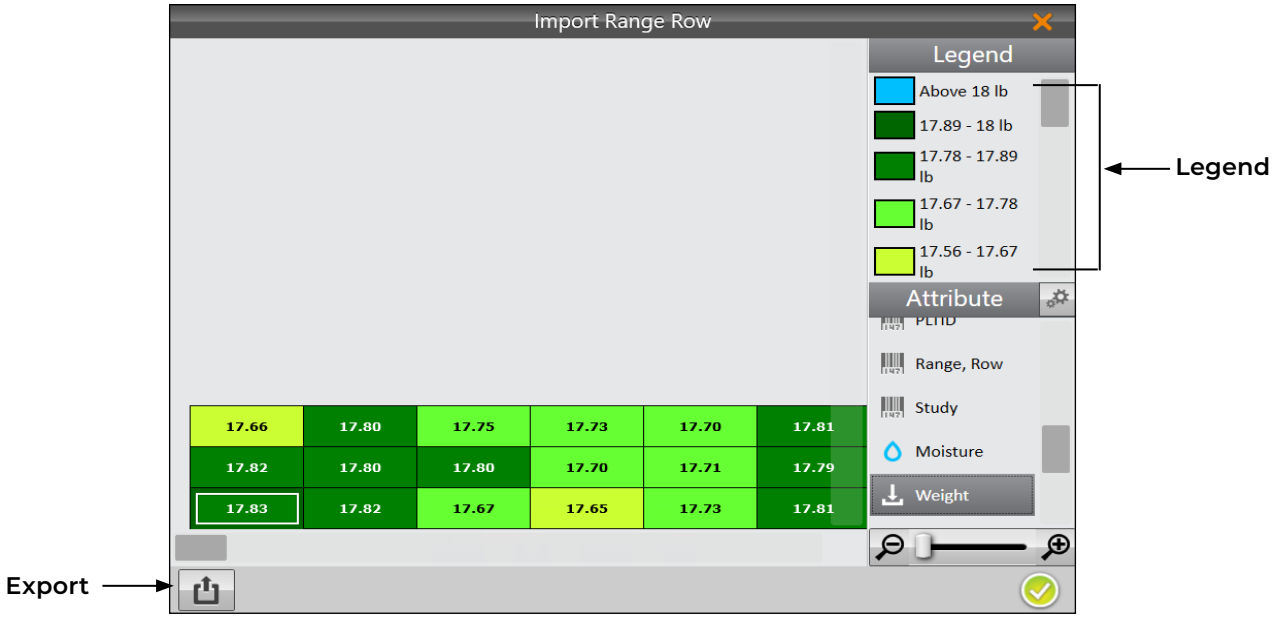
7.6.2 Export a Heat Map

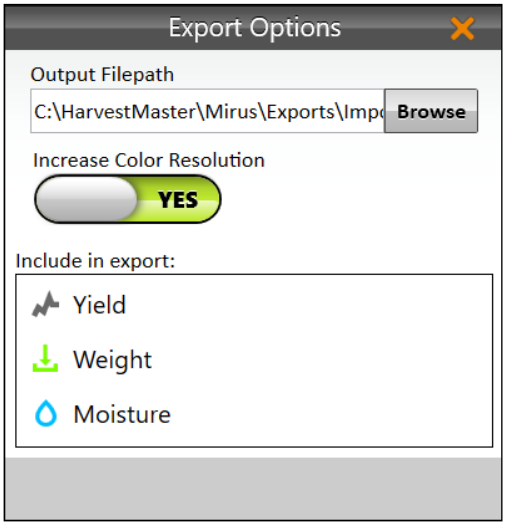
Exporting a heat map creates a color-coded visual map in a spreadsheet for each desired attribute. The colors in the heat map are determined by the Legend. You can alter the Legend by changing the minimum and maximum for each attribute. For instructions, see the following sections: Weight, **8.3.9 on page 97**; Moisture, **8.3.8 on page 96**; Yield, **8.3.10 on page 97**.



To export a heat map,

1. From the Manage Maps screen, select the map you want to export.
2. Tap **View** .





3. Tap the export icon .
4. Enter the file path for the exported map.
5. Select whether you want to increase color resolution.
6. Select the attributes you want included in the export.

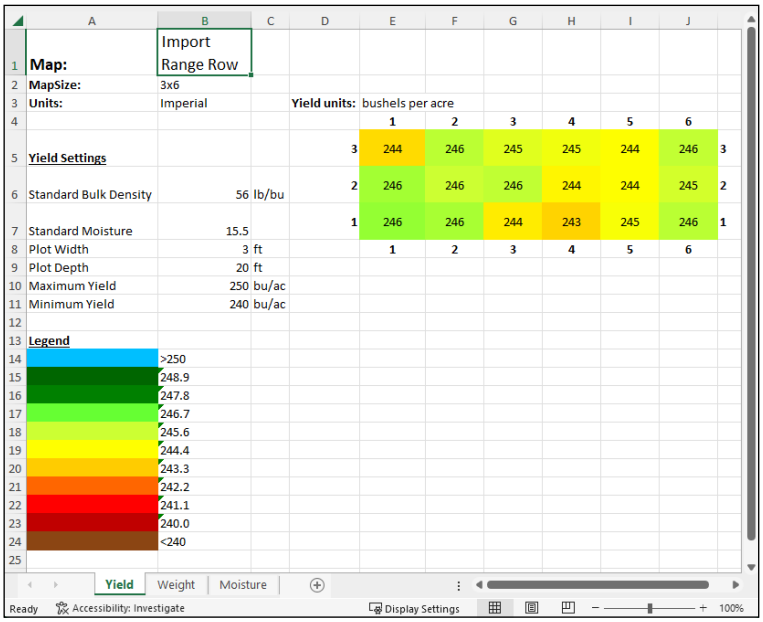
Note: If you select multiple attributes, each attribute will have a separate tab within the spreadsheet.

7. Tap the check icon to finish exporting the map.

Mirus notifies of the successful export.

8. Tap **OK** to finish the export.

If Microsoft Excel is installed, a spreadsheet opens automatically, showing the exported heat map.



	A	B	C	D	E	F	G	H	I	J
1	**Map:**	Import Range Row								
2	**MapSize:**	3x6								
3	**Units:**	Imperial		**Yield units:**	bushels per acre					
4					**1**	**2**	**3**	**4**	**5**	**6**
5	**Yield Settings**			**3**	244	246	245	245	244	246
6	Standard Bulk Density	56	lb/bu	**2**	246	246	246	244	244	245
7	Standard Moisture	15.5		**1**	246	246	244	243	245	246
8	Plot Width	3	ft		**1**	**2**	**3**	**4**	**5**	**6**
9	Plot Depth	20	ft							
10	Maximum Yield	250	bu/ac							
11	Minimum Yield	240	bu/ac							
12										
13	**Legend**									
14		>250								
15		248.9								
16		247.8								
17		246.7								
18		245.6								
19		244.4								
20		243.3								
21		242.2								
22		241.1								
23		240.0								
24		<240								
25										

Yield | Weight | Moisture

Ready | Accessibility: Investigate | Display Settings | 100%

mirus™

Generic Harvest Plugin

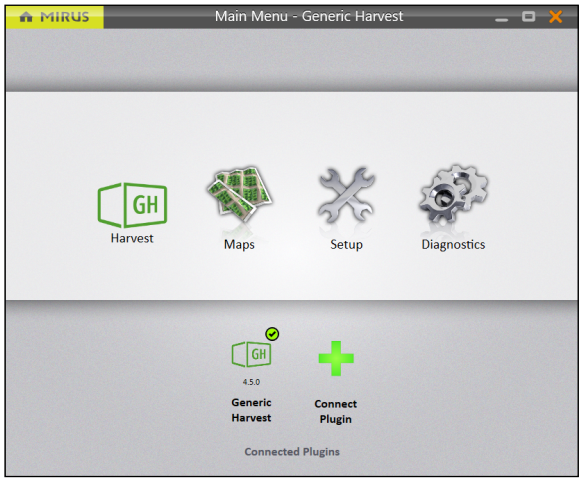
CHAPTER EIGHT

Harvest Crops

8 Harvest Crops

8.1 Methods for Entering Harvest Mode

You must create or import a map before you can harvest. Mirus offers three different routes for initiating or re-entering Harvest Mode.



From the Main Menu screen,

- Tap **Harvest** GH.
  - To harvest using an existing map, select the map and tap the check icon.
  - To harvest using a new map, tap the plus icon. (See **7.1 Create a New Field Map** on page 61.)

  Note: If the Harvest icon is not visible, see page 14 for instructions on loading the Generic Harvest device.

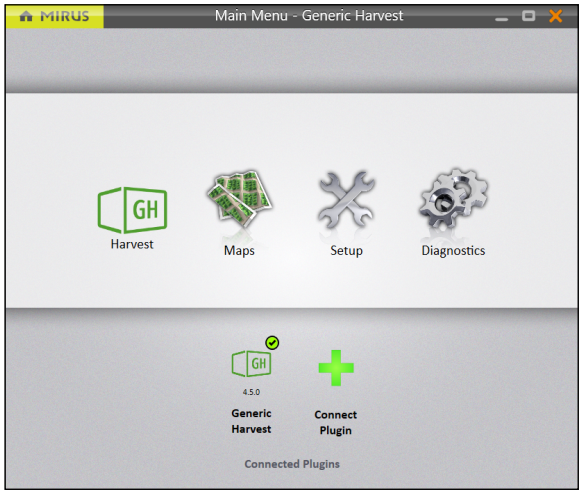
Or

- Tap **Maps**. Mirus opens the Manage Maps screen.
  - To harvest using an existing map, select the map and tap **Harvest**.
  - To harvest using a new map, tap **New**. (See **7.1 Create a New Field Map** on page 61.)

Or

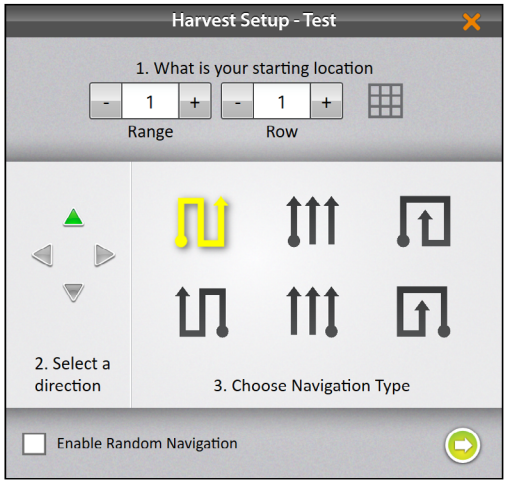
- Tap **Resume**. Mirus resumes harvesting the last map used (including the direction and navigation type). The name of the map appears below the Resume icon.

8.2 Begin a New Harvest



To begin a new harvest,

1. Enter Harvest Mode. (See **8.1 Methods for Entering Harvest Mode** on page 85.)



2. Enter the starting location.

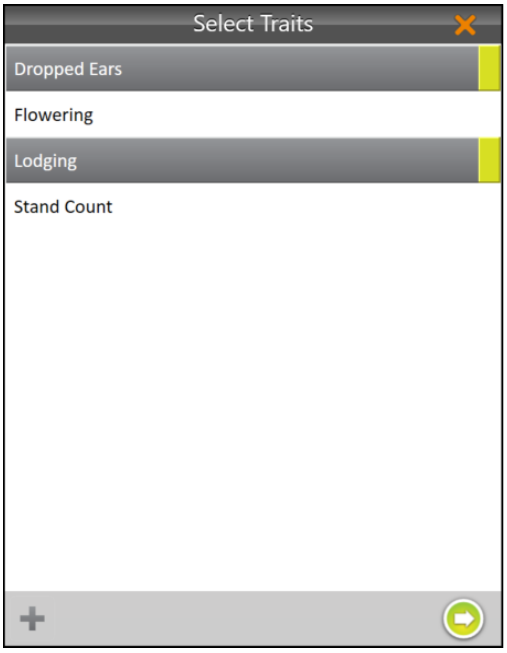
   Note: Tap the matrix to open another screen and choose the starting location.

3. Select the direction of harvest.
4. Choose a navigation type.
5. Tap the next arrow.

   *Note: If you select **Enable Random Navigation**, you can change your location on the Harvest screen just by tapping on the desired plot. This option is mostly used for note taking.*

6. Select which attributes you plan to record.

   Note: If you are using an EM moisture sensor, the Moisture icon also appears. Weight is always enabled, but you can modify the data post-process if the attribute is undesired.



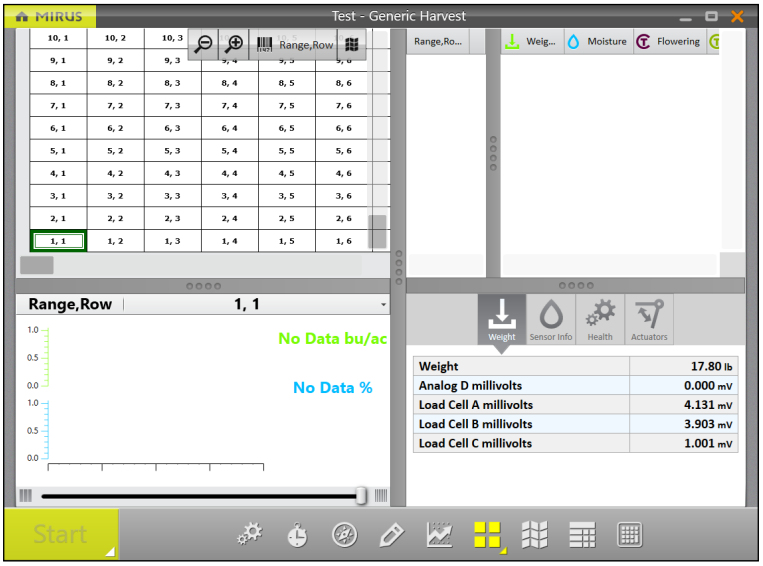
If **Traits** are enabled, the Select Traits dialog box will appear. Select a trait or create a new one. For more information about configuring Traits from the Setup screen, see **4.4 Define Measurable Traits on page 39**.

7. Select the traits you want to include.
8. Tap the next arrow.

If you selected **Moisture**, Mirus prompts you to select a moisture curve. For more information about calibrating moisture curves, go to **6.2 Moisture Calibration Overview on page 49**.

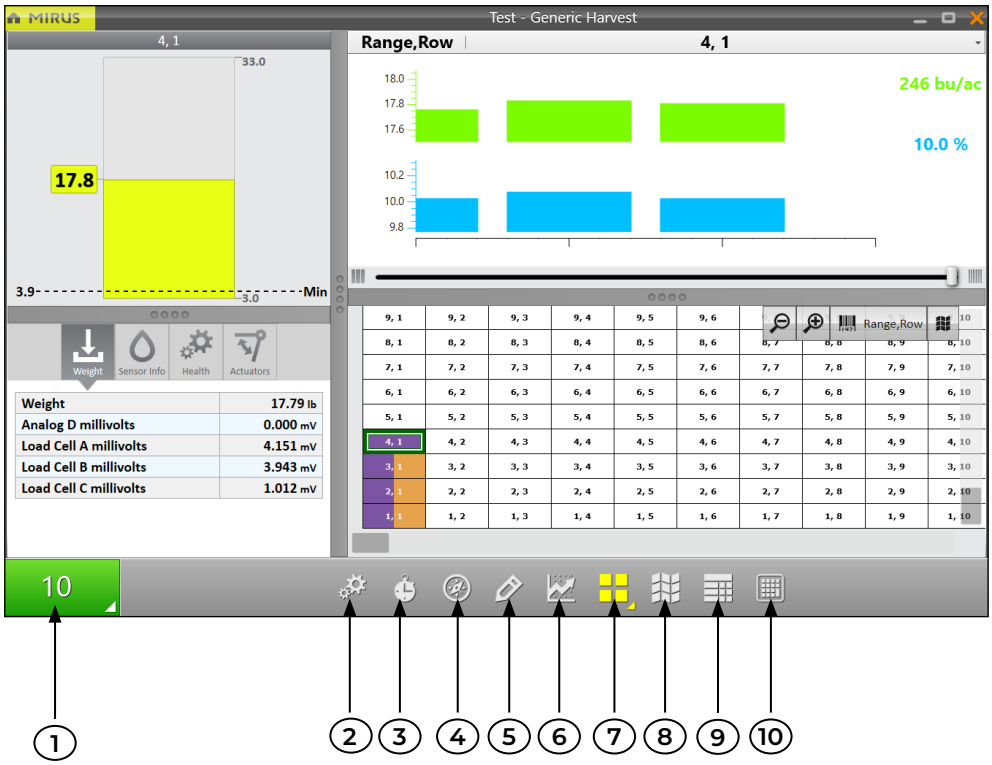
9. Select a moisture curve.
10. Tap the check icon .

Mirus opens the Harvest screen and is ready to be configured or to collect data.



8.3 Configure Harvest Screen Options

The Harvest screen provides several options for configuring how data is collected and presented during harvest.

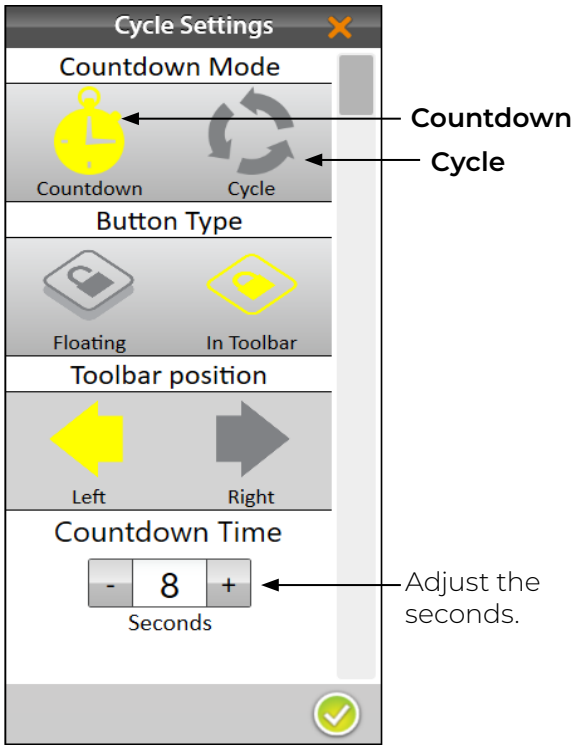


1. **Start/Cycle/Countdown/Go Button**: Start initiates harvest. Cycle initiates measurements and data collection for a specific plot. Countdown initiates a delay before measurements. Go indicates it's time to move to the next plot.
2. **Diagnostics**: Opens the Diagnostics screen for monitoring during harvest.
3. **Cycle Settings**: Allows the operator to change the Mode, Button Type, Position, and Countdown time for the Start/Cycle/Countdown/Go button.
4. **Navigation**: Opens the Change Location dialog box and allows the operator to make changes to location, direction, and navigation type.
5. **Observations**: Opens a screen in which the operator can record notes for each plot during harvest. This is also where you can add information about any traits you configured.
6. **Graph View**: Displays accumulating data as a graph.
7. **Quad View**: Divides the display into four smaller windows. The operator can adjust the size of each window and customize them each to display data in Cycle Data, Diagnostics, Graph, Info, List, Spatial, or Real Time Weight view. This screen should be used during your harvest.
8. **Map View**: Opens the Spatial display, also referred to as a heat map. This display can be configured to show attribute data plot by plot.
9. **List View**: Displays accumulating data as a list.
10. **Ten Key**: Numeric keypad for fast entry of trait and note data.

8.3.1 Configure Cycle Settings

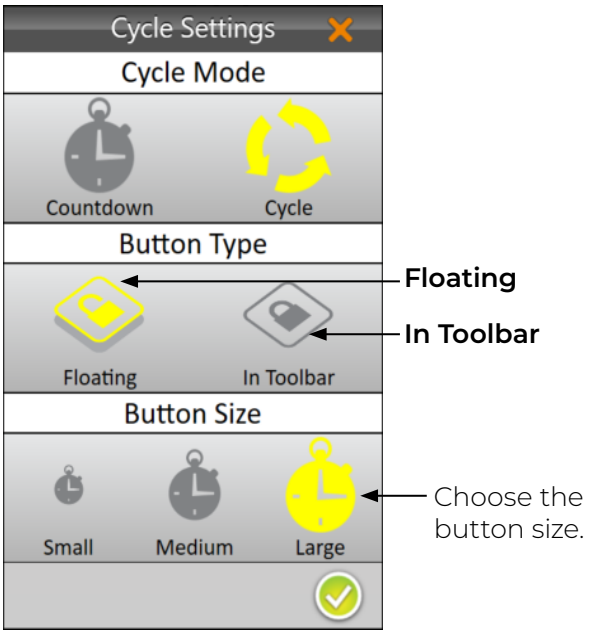
The cycle settings determine the settings of the Start/Cycle/Countdown/Go button. These settings can change the Countdown Mode, Button Type, Toolbar Position, and the Countdown Time.

The countdown timer sets a wait time at the start of each cycle to ensure that the harvested crop in the current plot reaches the GHS before cycling.



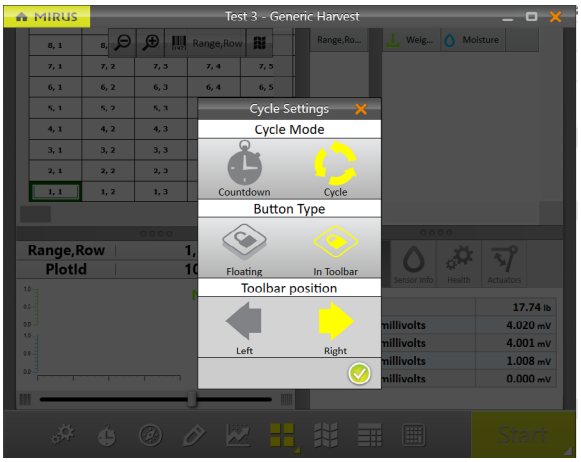
To configure the Countdown Mode,

1. Tap the cycle settings icon in the toolbar.
2. Tap **Countdown** or **Cycle**.
3. If you select **Countdown**, adjust the countdown time to equal the combine clean-out time. (If you select **Cycle**, there is no countdown timer.)
4. Tap the check icon.



To change the Button Type,

1. Tap the cycle settings icon in the toolbar.
2. Tap **Floating** or **In Toolbar**.
   - When you select **Floating**, Mirus prompts you to choose the size of the floating **Start/Cycle/Countdown/Go** button.
   - If you choose **Floating**, the **Start/Cycle/Countdown/Go** button appears as a separate dialog box that can be moved to any location.



To change the Toolbar position of the button,

1. Tap **In Toolbar**.
2. Tap **Left** or **Right**.

   The default position is left. If you select right, Mirus moves the Start/Cycle/Countdown/Go button to the other side of the screen.

3. Tap the check icon .

8.3.2 Quad View

Mirus provides the option of viewing four screens at once when Quad View is selected. Each screen can be configured to display the data differently. The screen options are as follows:

- **Diagnostics**: Displays the Diagnostics screen for monitoring during harvest.
- **Graph**: Shows the plot progression of weight and moisture in a graph.
- **Info**: Displays the weigh and moisture of the most recent plot.
- **List**: Displays accumulating data as a list.
- **Spatial**: Also referred to as a heat map, shows attribute data with colors plot by plot. The indicating colors are listed below:
  - Gold: The plot has harvest data
  - Purple: The plot has trait note data
  - Blue: The plot has a quick note.
- **Real Time Weight**: Displays the real time weight of the weigh bucket.

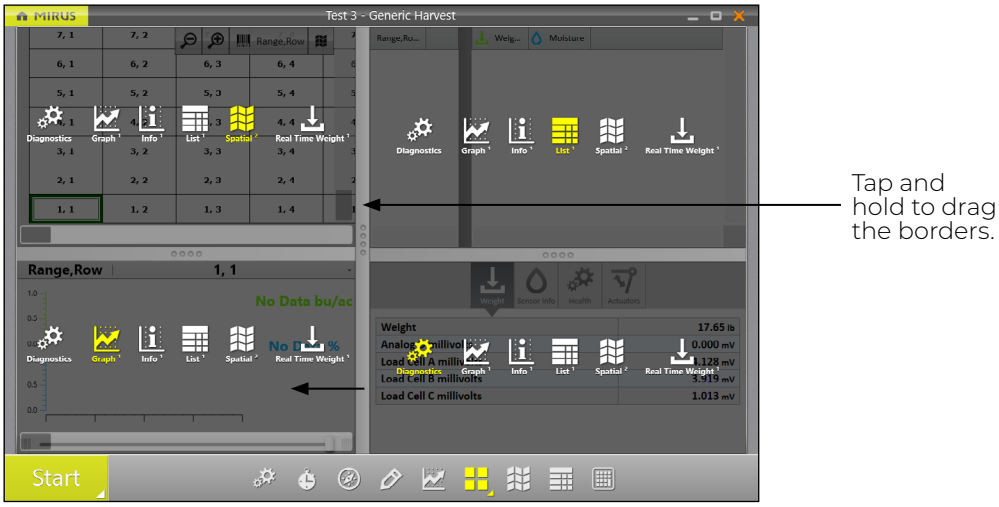
Each of the above options are also available on the main toolbar in Harvest Mode except for the options to view Cycle Data , Real Time Weight , and Info .

To configure the Quad View screens,

1. Tap the Quad View icon .

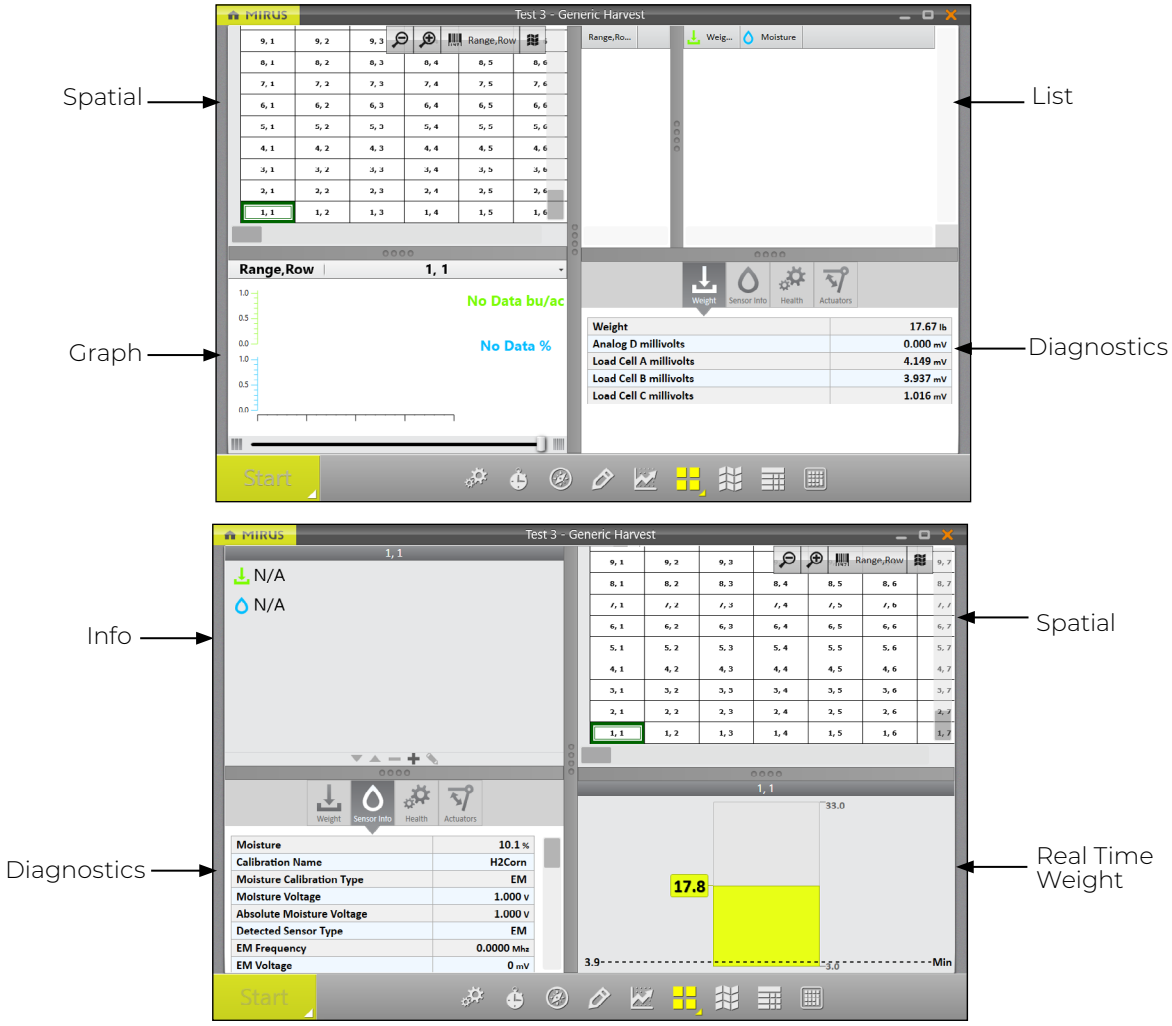
   If desired, change the borders of the four screens by dragging the borders.

2. Tap Quad View a second time. Mirus shows the display options for each of the four screens.



3. Tap the Quad View icon again. Mirus exits the configuration screens.

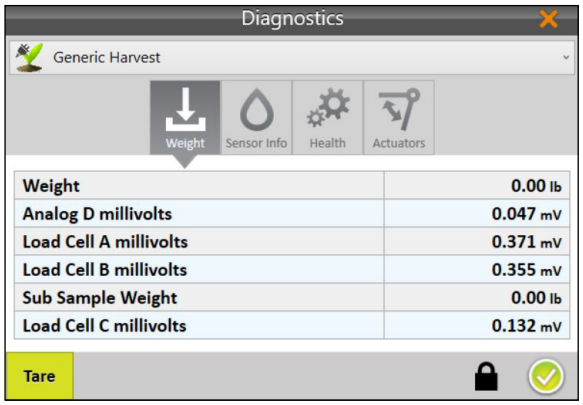
The following pictures show each of the Quad View options.



8.3.3 Diagnostics Screen

To access the Diagnostics screen in Harvest Mode,

1. Tap the gear icon on the toolbar.



2. Select the tab for the diagnostic function you want to view.

   Note: Select the Actuators tab to see the status of the gates and actuators while they cycle during the harvest.

   Note: The Diagnostics screen will not open while the GHS is cycling.

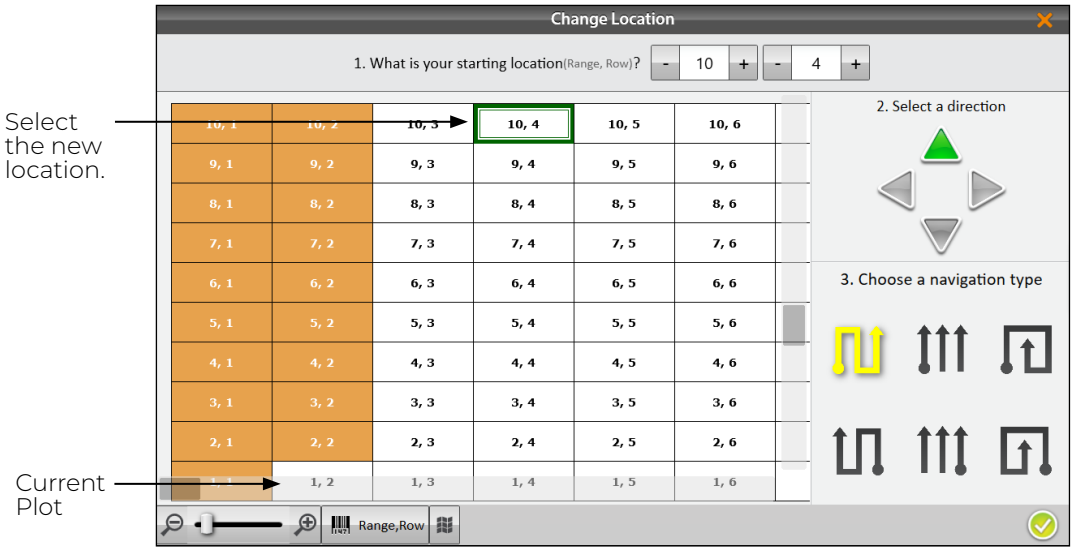
8.3.4 Navigation Screen

To change your location, direction, or navigation type,

1. Tap the navigation icon to open the Change Location dialog box.
2. Select the location on the map where you wish to resume data collection in one of two ways:
   - Tap the plot on the map.

   Or

   - Enter the range and row in the fields at the top of the dialog box.

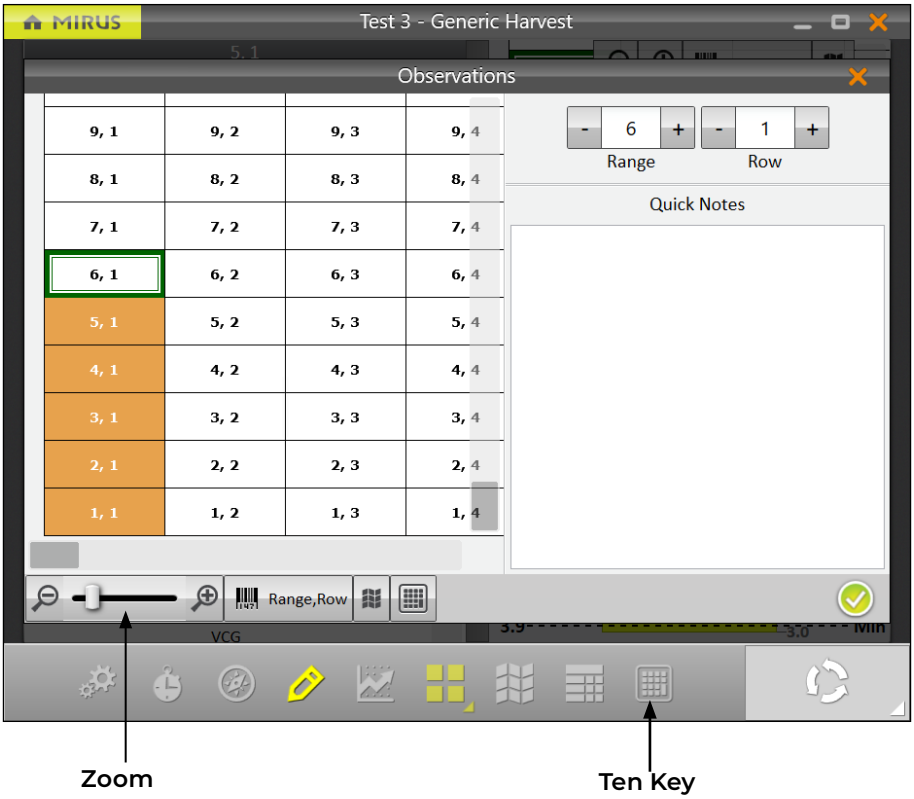


3. Select an arrow to change direction.
4. Select a navigation pattern by selecting one of the options in the lower right.
5. Tap the check icon .

8.3.5 Observations Screen

To open the Observations screen,

1. From the Harvest screen, tap the pencil icon .



The Observations screen shows plot position and provides character fields for notes on each trait and a Quick Notes text box to record any other observations for each plot. Mirus stores the quick notes alongside the harvest data.

Note: For help opening the on-screen keyboard, see ***9.3.5 On-Screen Keyboard Doesn't Open on page 108****.*

To open the Ten Key,

1. Tap the Ten Key icon for a floating numeric keypad that can be used for entering notes.

The Ten Key can also be found on the main toolbar.

8.3.6 Graph View

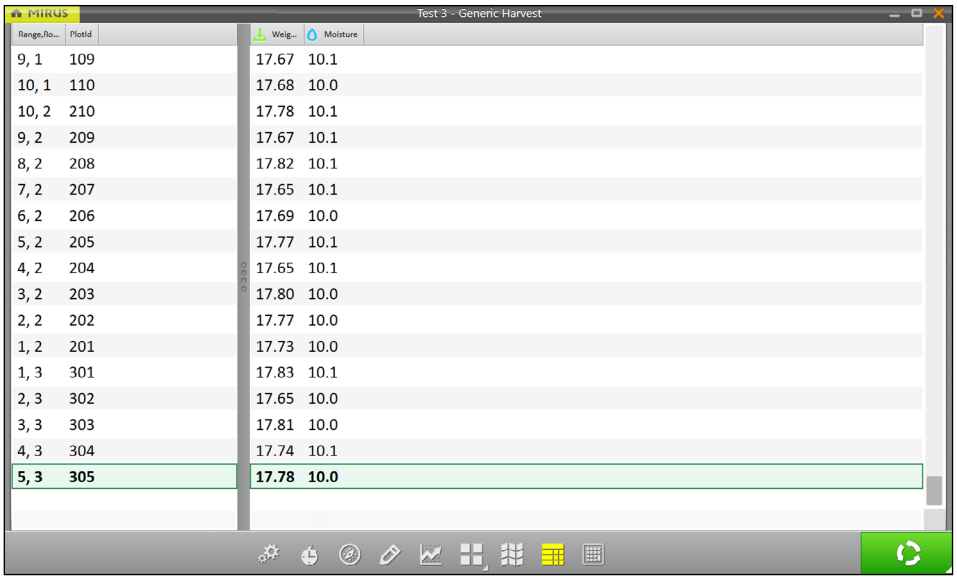
To view the harvest data in graph form, tap the graph icon in the toolbar.

The column to the right of the graph shows the data for the current plot.

In the graph, each bar (or point in the line graph) represents a plot. Each graph represents the map for two different traits: green for weight and blue for moisture. The values shown at the end of the graphs show the averages. The green average shows the yield based on the weight measurements and plot size. To set the yield parameters, see **8.3.10 Configure Plot Size and Yield in Spatial Display on page 97**.

8.3.7 List View

In List View, you can see the harvest data in the form of a spreadsheet.

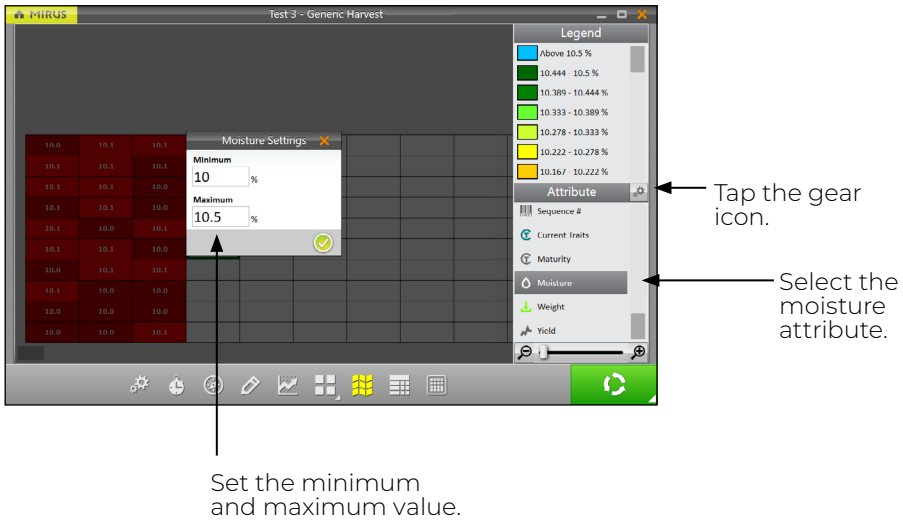


8.3.8 Configure Moisture in Spatial Display

To set the minimum and maximum moisture,

1. Tap the Spatial Display icon to display data in a heat map format.
2. Tap the **Moisture** attribute.
3. Tap the gear icon in the Attribute bar.
4. Set the **Minimum** and Maximum moisture.
5. Tap the check icon.

Adjusting the minimum and maximum values helps create a more detailed legend and define the scope of the graphs and maps. The narrower the minimum and maximum range, the more detailed the information displayed becomes.



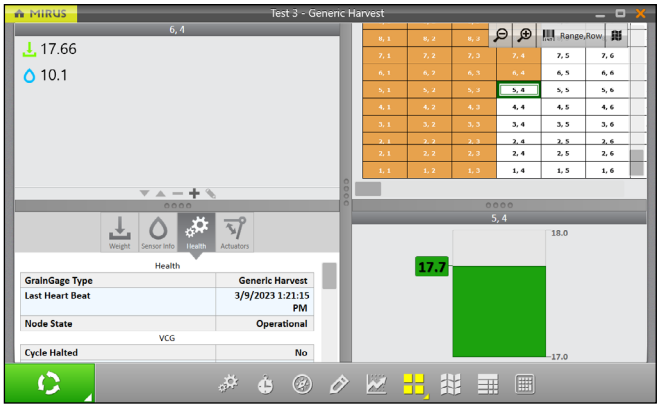
8.3.9 Configure Weight in Spatial Display

To set the minimum and maximum weight,

1. Tap the Spatial Display icon to display data in a heat map format.
2. Tap the **Weight** attribute.
3. Tap the gear icon in the Attribute bar.
4. Set the **Minimum** and **Maximum weight**.
5. Tap the check icon.

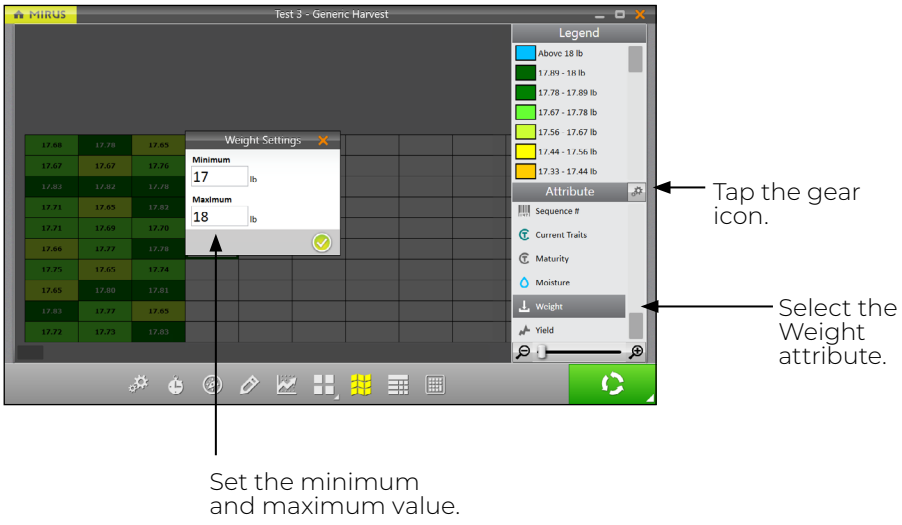
Adjusting the minimum and maximum weight values helps create a more detailed legend and define the scope of the graphs and maps. The narrower the minimum and maximum range, the more detailed the information displayed becomes.

The setting adjusts the maximum weight on the Real Time Weight display, which allows you to track how full the plot bucket gets with each plot. This is important to monitor so that the GHS doesn't overflow.



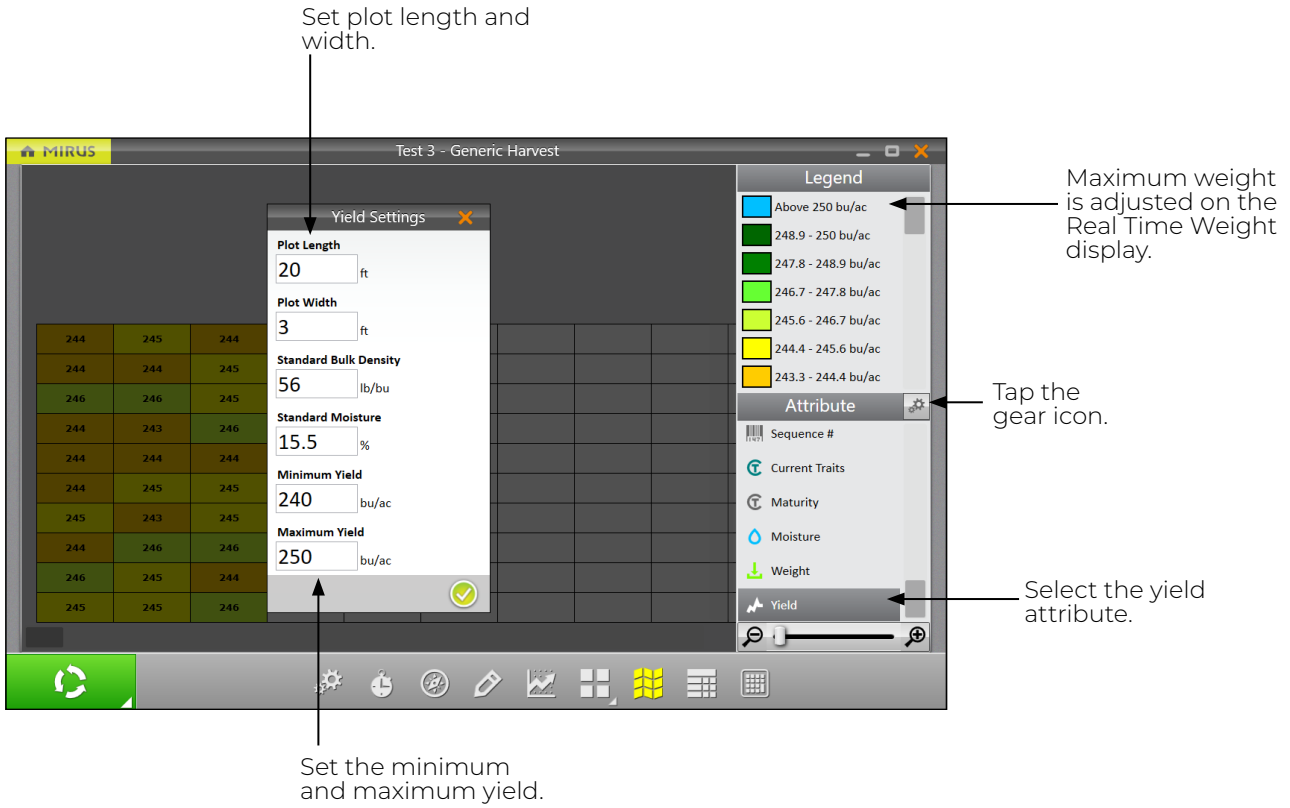
8.3.10 Configure Plot Size and Yield in Spatial Display

To set the minimum and maximum plot size and yield,



1. Tap the Spatial Display icon to display data in a heat map format.
2. Tap the **Yield** attribute.
3. Tap the gear icon in the Attribute bar.
4. Set the **Plot Length** and Width.
5. Set the **Minimum** and **Maximum Yield**.
6. Tap the check icon.

The values set here help calculate the yield per acre (bu/ac, kg/ha) using the weight measurements divided by the plot area. For each minimum and maximum changed, the Legend will change to match the correct values.



Adjusting the minimum and maximum values helps to create a more detailed legend and define the scope of the graphs and maps. The narrower the minimum and maximum range, the more detailed the information displayed becomes.

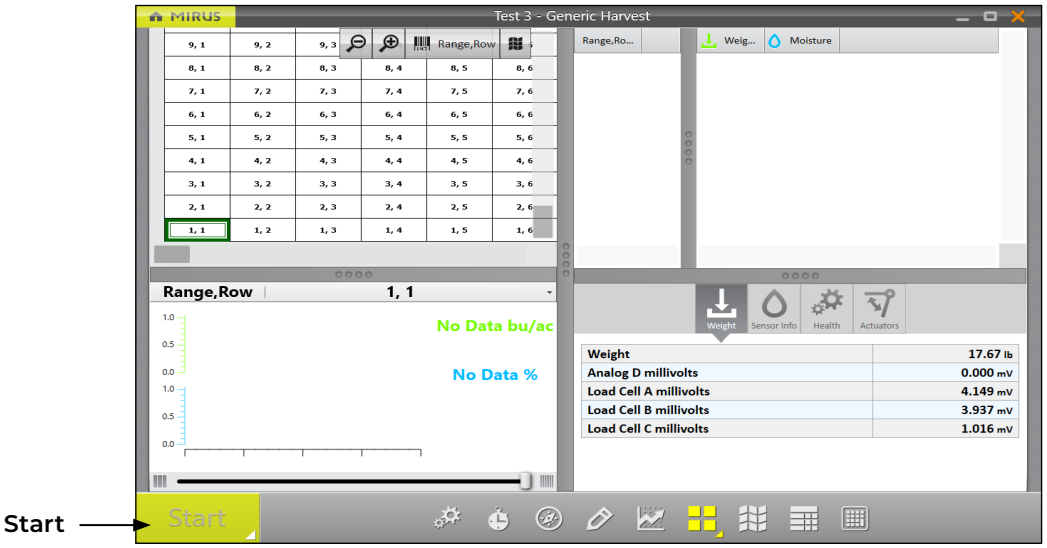
8.4 Collect Harvest Data

8.4.1 Harvest with Cycle Button

Note: It is best to use the countdown timer. Using the countdown timer typically gives a more consistent clean-out time from plot to plot which can improve the quality of your data.

To harvest with the Cycle button,

1. Open the Harvest screen.
2. Select a map, configure the harvest setup, choose traits, and a moisture curve. (See **8.1 Methods for Entering Harvest Mode on page 85** for specifics.)
3. Start the thresher and throttle up.
4. Tare the GHS if necessary.
5. Tap **Start** in Mirus.



6. Harvest the first plot.
7. Press **Remote Enter** or **Cycle**  when all the harvested crop is in the GHS.
8. When prompted with a green **Go** button  , start into the next plot.
9. Repeat for each plot.

The following table explains each stage of the **Start/Cycle/Go** button during harvest.

Cycle Mode			
	Button Stage	**Operator Action**	**Harvest Stage**
1.		Enter press when ready to harvest.	Harvest begins.
2.		Enter press after all the product has been delivered to the weigh bucket.	Isolation gate closes. *Note: The amount of product in the weigh bucket can be seen on the Real Time Weight display. Make sure the weight peaks and stabilizes before you press Cycle.*
3.		Wait for the cycle to end.	The red cycle indicator appears to show the ongoing cycle.
5.		N/A	The GHS is ready for the next plot.
6.		Return to #2 at the end of the next plot.	Mirus is ready to begin the cycle for the next plot.

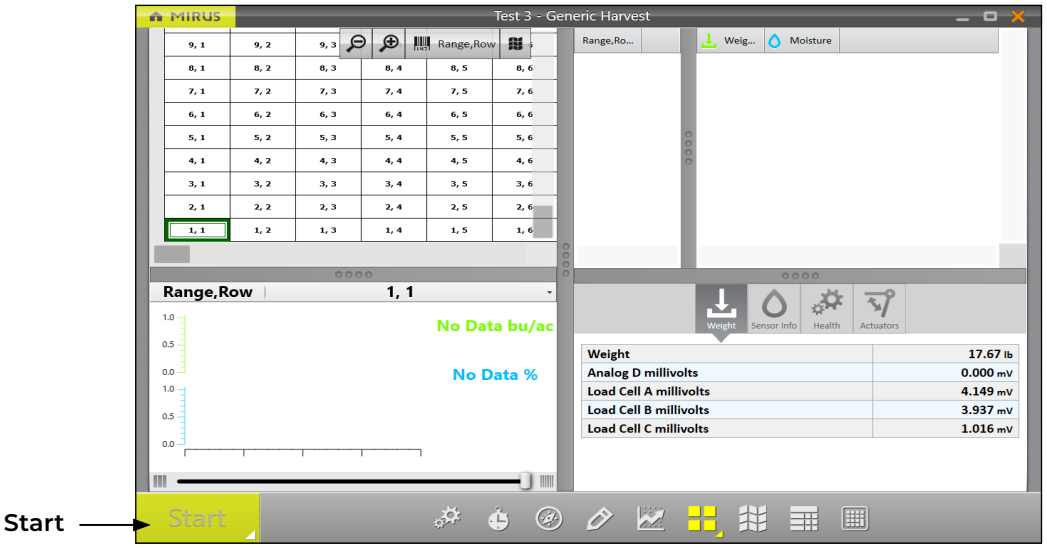
8.4.2 Harvest with Countdown Timer

Note: It is best to use the countdown timer. Using the countdown timer typically gives a more consistent clean-out time from plot to plot which can improve the quality of your data. For instructions on setting up the countdown timer, see **8.3.1 Configure Cycle Settings on page 89**.

To harvest with the countdown timer,

1. Open the Harvest screen.
2. Select a map, configure the harvest setup, choose traits, and choose a moisture curve. See **8.1 Methods for Entering Harvest Mode on page 85** for specifics.
3. Start the thresher and throttle up.
4. Tare the GHS if necessary.

5. Tap the **Start** button in Mirus.



6. Harvest the first plot.
7. When the head is stopped in the alley and clear, start the countdown timer by pressing remote enter or tapping the countdown timer button 10.

   Note: It is critical the countdown timer is set long enough for all the to be delivered to the GHS before reaching zero.
8. When prompted with a green **Go** button GO, start into the next plot.
9. Repeat for each plot.

The following table explains each stage of the **Start/Countdown/Go** button during harvest.

Countdown Mode			
	Button Stage	**Operator Action**	**Harvest Stage**
1.	Start	Enter press.	Harvest begins.
2.	10	Enter press at the end of the plot after all the harvested crop has cleared the head.	The GHS is waiting an **Enter press** at the end of the plot. *Note: The amount of harvested crop in the weigh bucket can be seen on the Real Time Weight screen.* An **Enter press** begins the countdown.
3.	8	Wait until the countdown ends.	The countdown indicates the amount of time set to complete the crop delivery to the GHS before the cycle starts.

Countdown Mode			
	Button Stage	**Operator Action**	**Harvest Stage**
4.		N/A	The cycle indicator briefly appears to show the isolation gate is closing and the GHS is starting to cycle.
6.		N/A	GHS is ready for the next plot.
7.		Return to #2 at the end of the next plot.	Mirus is ready to begin the cycle for the next plot.

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Generic Harvest Plugin

APPENDIX A

Troubleshooting

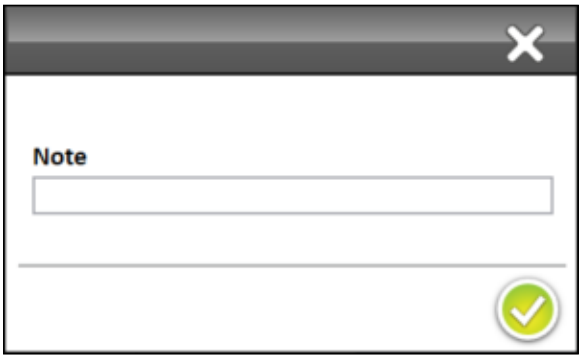
9 Appendix A: Troubleshooting Mirus

9.1 Error Logs

Error logs are used by HarvestMaster Field Service Engineers to pinpoint the problem occurring in Mirus.

9.1.1 Flag Errors

When experiencing an error, in Mirus version 4.3.0 and later, you can flag the error for the HarvestMaster Field Service Engineers. When an error has been flagged, the engineers can find it easily within the error logs.



- Use F5 to flag the error in the error log.
- Use F6 to flag and leave a message in the error log.

9.1.2 Find and Send Error and Backup Logs

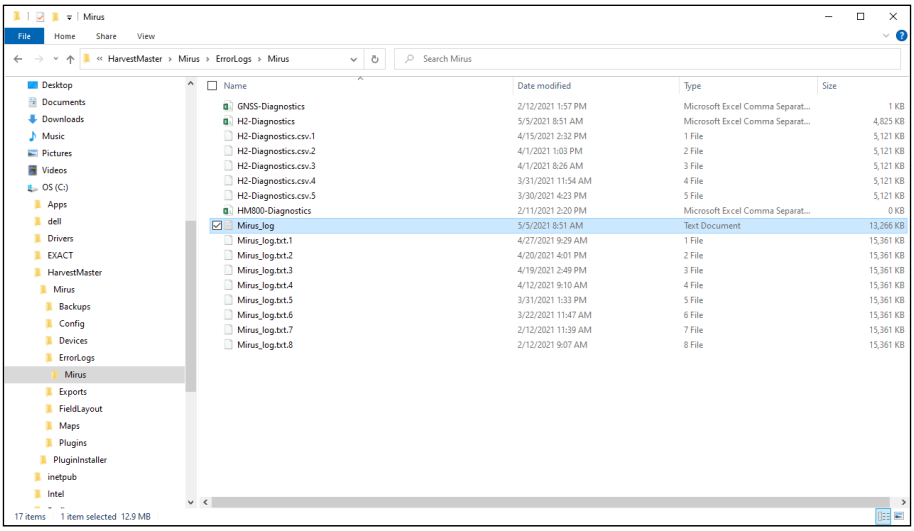
After an error has occurred, copy the error and backup log files as soon as possible to send to the HarvestMaster Field Service Engineers.

If you do not copy the error log files right after the error occurs, it will be harder to find the point of error or the error might get overwritten with newer error files.

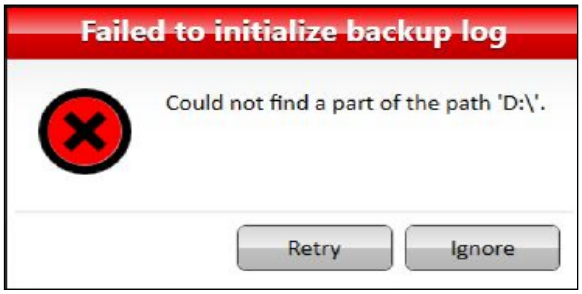
To find and send the error and backup logs to the HarvestMaster Field Service Engineers,

1. Open File Explorer on your device.
2. Go to C:\HarvestMaster\Mirus\Errorlogs\Mirus and C:\HarvestMaster\Mirus\Backups.

3. Send the Mirus_log text document and the relevant map file to the HarvestMaster Field Service Engineers.



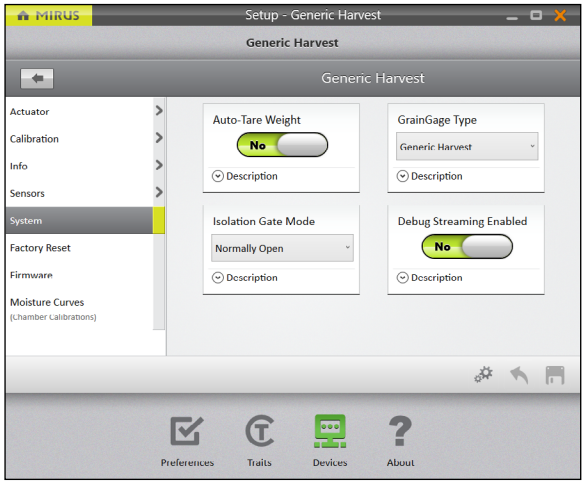
9.1.3 Missing Backup Log Location



If you change the default backup log location to an external drive or cloud storage and the drive is disconnected or the cloud storage is unavailable, this error message appears. Connect the external drive or change the backup log location.

9.2 Enable or Disable Debug Streaming

This option enables debug streaming messages from the DSP module. This option is on by default and HarvestMaster recommends leaving it on for troubleshooting purposes.



To find the debug streaming option,

1. Open the Setup > Generic Harvest > System screen.
2. Set **Debug Streaming Enabled** to Yes or No.
3. Tap **Save**.

9.3 Common Errors

9.3.1 Inaccurate Plot Weight

If weight values are inaccurate, open Diagnostics and follow the steps below.

1. If the bucket is mounted to the load cells, ensure the bucket is secure. If the bucket hangs from the load cells, ensure the bucket is not binding and can move freely in all directions.
2. Inspect and clean inside the bucket, around the bucket, and around the load cells with compressed air.
3. Ensure there is nothing putting positive or negative tension on the weigh bucket/load cells (air hoses, hydraulic hoses, cables, overload protection pin, and so on).
4. Apply negative and positive pressure to the bucket while watching the weight values in Diagnostics. Remove the pressure to ensure the weight returns to zero. Do this several times to ensure repeatability.
5. Put a known weight in the bucket with the top gate closed and check it against the weight shown in Diagnostics.
6. If a problem is identified with a load cell, try swapping with another load cell at the DSP module to see if the problem follows the load cell or the port on the module.

If the problem persists, contact the HarvestMaster Field Service Engineers. For contact information, see **9.4 Contact a HarvestMaster Field Service Engineer on page 108**.

9.3.2 Inaccurate Moisture

If the moisture readings are inaccurate,

1. Ensure you are meeting the minimum weight threshold.
2. Inspect and clean the moisture blade.
3. Touch the blade while watching the change in moisture readings within Diagnostics.
4. Check moisture temperature to ensure it is within 5–10 degrees of the ambient air temperature.

   Note: If the moisture sensor is located near the engine, the temperature reading will be significantly higher than the ambient air temperature.

5. Check the supply voltage to ensure it is between 12 and 14 V.
6. Check to ensure the moisture blade and sensor mounting screws are secure.

If the problem persists, contact a HarvestMaster Field Service Engineer. For contact information, see **9.4 Contact a HarvestMaster Field Service Engineer on page 108**.

9.3.3 Can't Connect to GHS

If you are having trouble connecting to GHS,

1. Ensure the system controller is turned on, and you have power to all the modules.
2. Check for a solid green power light, flashing yellow status light, and no flashing red light on each of the modules.
3. Ensure all the cables are properly connected.
   - A USB or serial cable between the tablet dock and the system controller.
   - A CAN cable between the system controller and the GHS.
4. Unplug the USB or serial cable from the dock and plug it directly into the tablet to check whether the dock is dysfunctional.
5. Ensure the GHS device is enabled. For instructions on how to enable the device, see **2.1.1 Add the Generic Harvest Plugin to Mirus on page 14**.
6. Shutdown and reboot the tablet. Turn off the system controller, and leave it off for 30 seconds. Then, turn it back on and attempt to connect.
7. Unplug the CAN and power cables on the modules, leave them for 30 seconds. Then, plug them back in and attempt to connect.

If the problem persists, contact a HarvestMaster Field Service Engineer. For contact information, see **9.4 Contact a HarvestMaster Field Service Engineer on page 108**.

9.3.4 Tare Warnings

CAUTION: Do not re-tare the system without knowing what is causing the tare warning.

Use the following table troubleshoot a tare warning.

Tare Warnings	
If	**Then**
Debris is in the bucket.	Clean the bucket to ensure that there is nothing remaining (harvested crop, debris, trash, and so on).
Positive or negative tension is on the weigh bucket or load cells.	Move any air hoses, cables, or overload protection pins putting tension on the weigh bucket or load cells.

Tare Warnings	
If	**Then**
Leftover harvest is in the weigh system.	The evacuation time is not long enough for the harvested crop to fully empty out of the GHS. • Go to Setup > Sensors > Weight > Evacuation Time. • Lengthen the evacuation time by 500 milliseconds. • Harvest another plot and check again.
Tare warning values have been adjusted.	Restore the values to the default setting. See the **Weight Sensors Settings on page 35**.

If the problem persists, contact a HarvestMaster Field Service Engineer.

9.3.5 On-Screen Keyboard Doesn't Open

If an on-screen keyboard doesn't open when you tap in a text box, such as Quick Notes, change the on-screen keyboard settings in Windows.

To change the on-screen keyboard settings,

- Windows 10—Open Settings > Devices. Tap **Typing**. Turn On **Show the touch keyboard or handwriting panel when not in tablet mode and there's no keyboard attached.**
- Windows 11—Open Settings > Personalization > Taskbar. In Touch keyboard, select **Always** or **When no keyboard attached**. Tap the keyboard icon on the Taskbar to open the on-screen keyboard.

Note: If you are using a Mesa Pro or Mesa 3, the default configurations assign one keypad button to the on-screen keyboard. In Mesa Pro, the default keypad button is P8. In Mesa 3, the default keypad button is p3.

9.4 Contact a HarvestMaster Field Service Engineer

Phone Number: 435-753-1881

Email: hmtechsupport@junipersys.com

Address: 1132 W 1700 N, Logan, UT 84321

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Generic Harvest Plugin

APPENDIX B

Generic Attachment

10 Appendix B: Generic Attachment

With the Mirus Generic Attachment, you can configure a second DSP module to add more load cell inputs to your Generic Harvest System. Each DSP module supports up to four load cells. If you are setting up a double cotton harvester or the Straw Weight System, you will use the Generic Attachment.

Note: For more information on the Straw Weight System, refer to Mirus Straw Weight Plugin User's Guide.

10.1 Add the Generic Attachment

To add the Generic Attachment, change the Node ID for the Generic Attachment DSP module, install the system script, register the attachment with HarvestMaster, and add the attachment within Mirus.

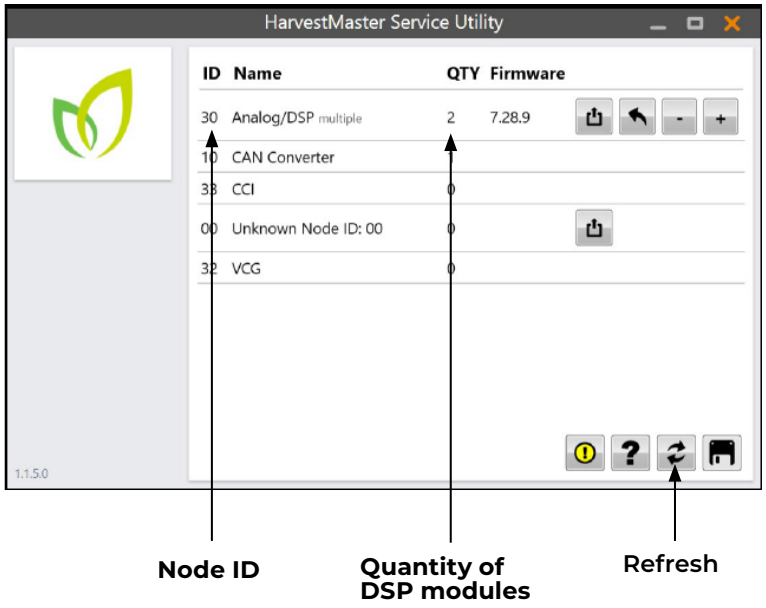
10.1.1 Change the Node ID

The Generic Harvest device and Generic Attachment each have their own DSP module. To differentiate the DSP modules in Mirus, change the Node ID for the Generic Attachment.

To change the Node ID for the Generic Attachment,

1. Open the HarvestMaster Service Utility at C:\HarvestMaster\Mirus\Devices\HM800\Tools\HM.Service.

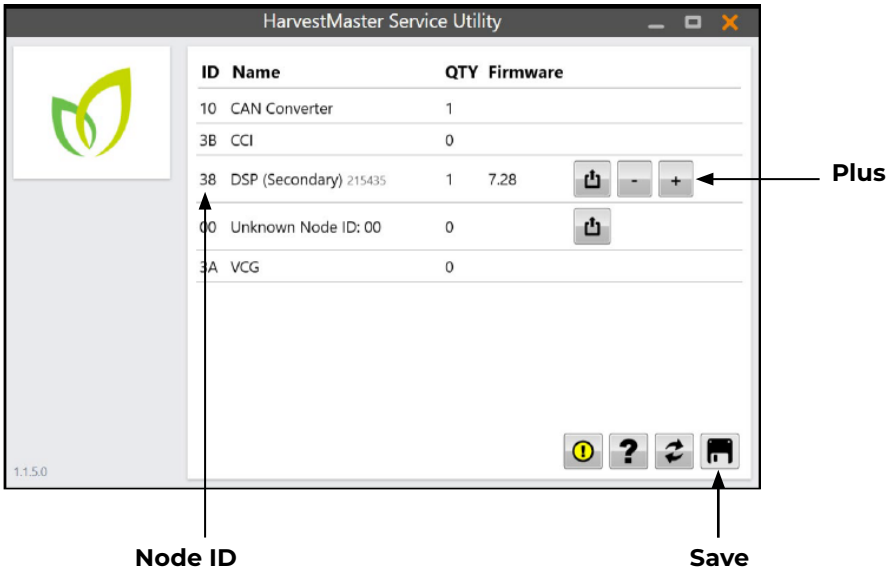
   The HarvestMaster Utility opens and shows two DSP modules with the Node ID of 30.



2. Unplug the CAN cable that connects the primary DSP module for the GHS.
3. Tap **Refresh**.

   Now the only DSP module listed in the service utility is the secondary DSP module for the Generic Attachment.

4. Tap **Plus** until the ID is 38.

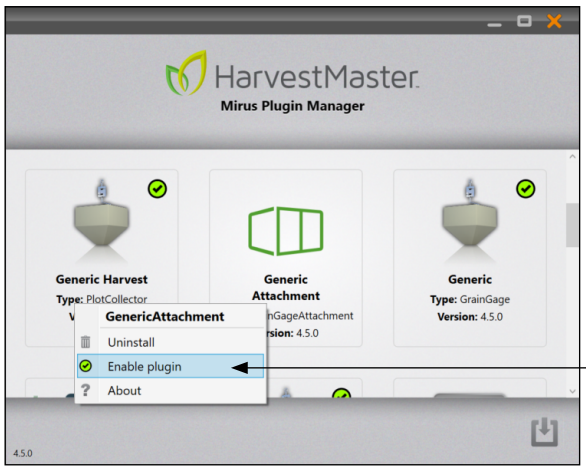


5. Tap **Save**.
6. Close the HarvestMaster Service Utility.

10.1.2 Install the System Script

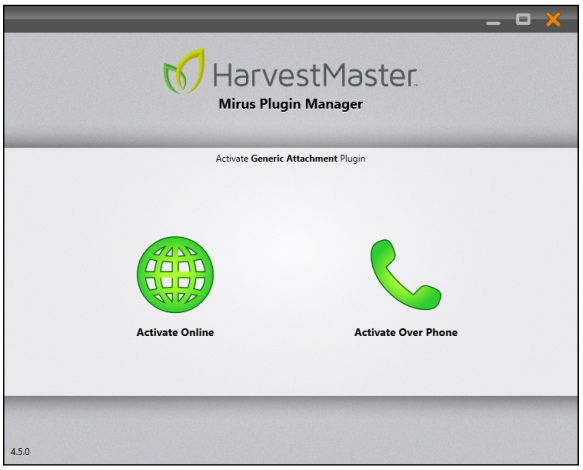
If you are setting up a double cotton harvester or the Straw Weight System, you will use the script installer to install another script and actuator settings for the attachment. For example, for a double cotton harvester, you will install the scripts for Double Cotton Harvester and Double Cotton Harvester Attachment. For more details, see **1.2.1 Install System Script** on page 10.

10.1.3 Register the Generic Attachment



To register the Generic Attachment with HarvestMaster,

1. In the Windows search box, search for Mirus Plugin Manager.
2. Open the **Mirus Plugin Manager** app.
3. In the plugin manager, tap **Generic Attachment**.
4. Tap **Enable plugin**.
5. Follow the installation instructions.



6. When you see the Mirus Plugin Manager Activate Generic Attachment Plugin screen, tap **Activate online**.

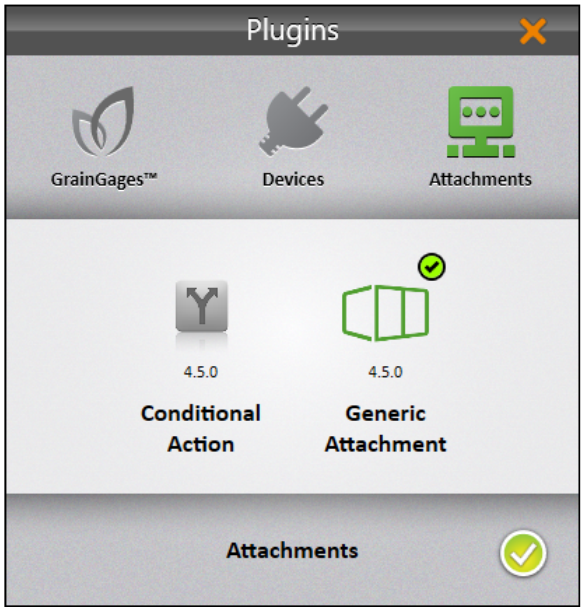
   Note: When you purchased the Generic Attachment, you were sent a registration card, which includes the serial number for the plugin.

7. HarvestMaster will send the unlock code via email.
8. Return to the activation screen and enter the serial number and unlock code.

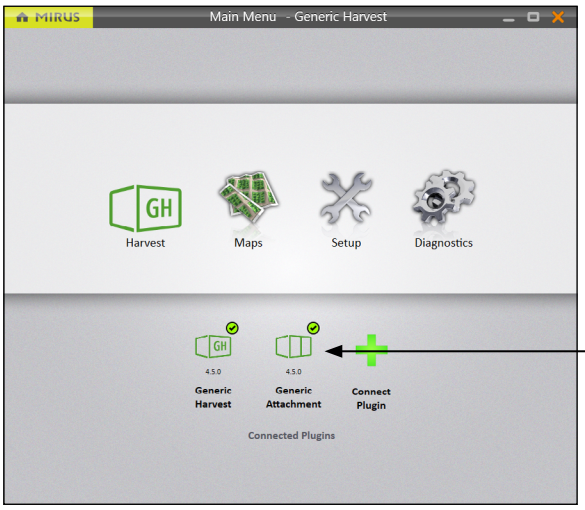
10.1.4 Add the Generic Attachment within Mirus

To add the Generic Attachment within Mirus,

1. Open Mirus.
2. From the Main Menu screen, tap **Connect Plugin**.



3. Tap **Attachments**.
4. Tap **Generic Attachment**. A check mark appears in the top right corner of the icon.
5. Tap the check icon .



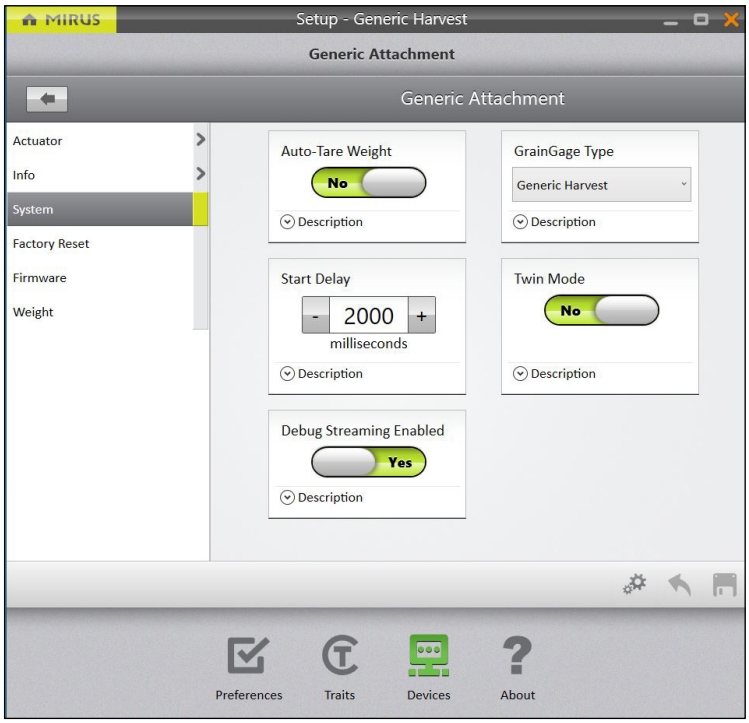
Mirus adds the Generic Attachment to the Main Menu screen.

10.2 Define System Settings for Generic Attachment

To define the system settings for the Generic Attachment,

1. From the Setup > Generic Attachment screen, tap **System**.

   Mirus opens the System screen where you can define system settings for the Generic Attachment.



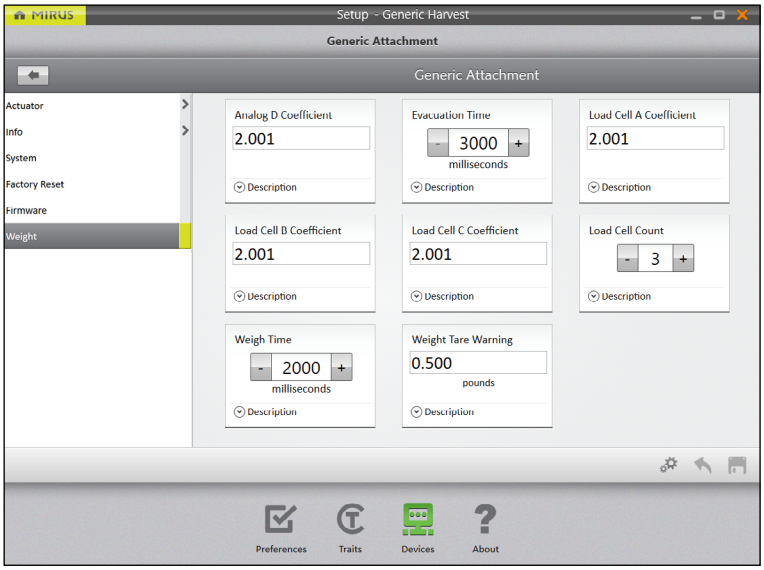
Generic Attachment System Settings		
Item	**Default Value**	**Description**
Auto-Tare Weight	No	Enables or disables the taring (or setting to zero) of the load cells after each plot. Set to Yes if you want Mirus to tare the load cells after each plot and plan to empty the bucket or belt at another time.
GrainGage Type	Generic Harvest	Select the type of harvest system connected to Mirus.
Start Delay	0 milliseconds	Determine the amount of time (in milliseconds) that Mirus waits before running the attachment script. If you set Twin Mode to Yes, the system ignores this value.
Twin Mode	No	Determine whether the system collects data for the right bucket. Select Yes to collect data for the right side, and select No to get a secondary weight.
Debug Streaming Enabled	Yes	Enable or disable the debug streaming messages for the DSP module. HarvestMaster recommends setting to Yes.

10.3 Configure Weight Sensors for Generic Attachment

To configure the weight sensors tied to the Generic Attachment,

1. From the Setup > Generic Attachment screen, tap **Weight**.

   Mirus opens the Weight Sensors screen on which you can configure weigh bucket settings.



Weight Sensors Settings		
Setup Parameter	**Default Value**	**Action**
Load Cell A, B, C, & Analog D Coefficients	2.000	Enter the calibrated weight for each active load cell on your system. (See **10.4 Calibrate Generic Attachment Load Cells on page 115**.)
Evacuation Time	2000 msec	The time it takes to evacuate the harvested crop from the bucket.
Load Cell Count	3	The number of load cells being used.
Weigh Time	2000 msec	The period over which weight readings are averaged. A shorter weigh time may reduce the accuracy of the measurement.
Weight Tare Warning	.500 lb	This is the threshold above which a tare warning is generated after the weigh bucket evacuation.

10.4 Calibrate Generic Attachment Load Cells

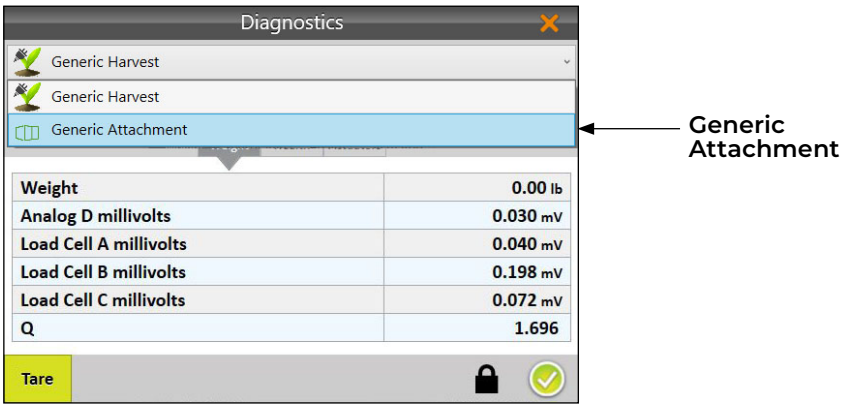
When you calibrate the weight load cells, you convert millivolt readings from the load cells into pounds or kilograms. The procedure you follow depends on whether you have matching load cells. See **4.2.1 Calibrate Unmatched Load Cells on page 36** and **4.2.2 Calibrate Matched Load Cells on page 37**.

10.4.1 Unmatched Load Cells

If your load cells are different sizes, calibrate the load cells separately.

To calibrate the weight for one load cell,

1. Tap **Diagnostics** from the Main Menu screen. The Diagnostics screen opens.
2. Tap the dropdown menu and select **Generic Attachment**.



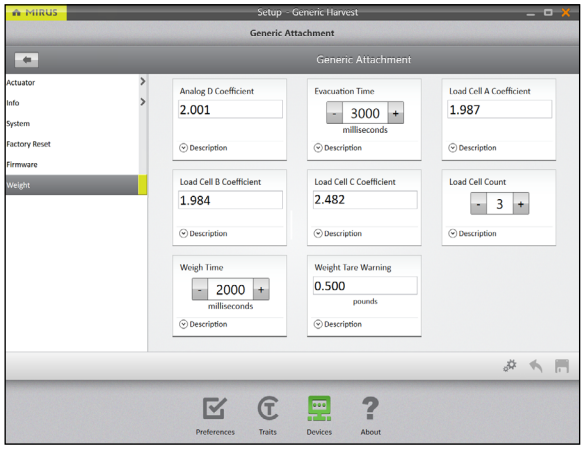
3. Tap **Tare**.

4. Place a known weight directly over one load cell.

   Note: Preferably all the weight is measured by only this load cell.

5. Write down the measured weight as shown in Weight.
6. Calculate the load cell coefficient, using the following formula.

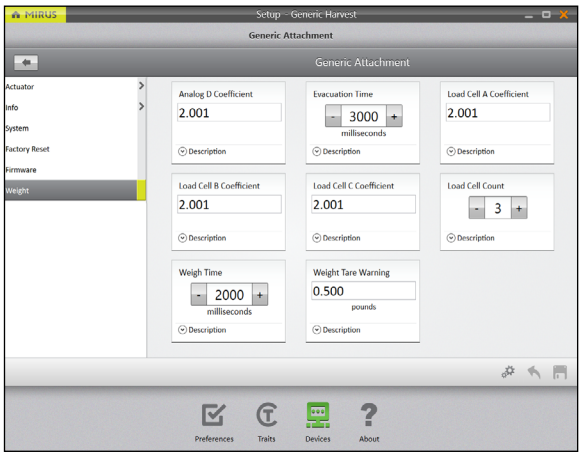
$$load\ cell\ coefficient = actual\ weight\ /\ measured\ weight\ (current\ coefficient)$$



7. Open Setup > Generic Attachment > Weight screen.
8. Enter the load cell coefficient in the corresponding Load Cell Coefficient box.
9. Tap **Save**.
10. Repeat this process for each load cell.

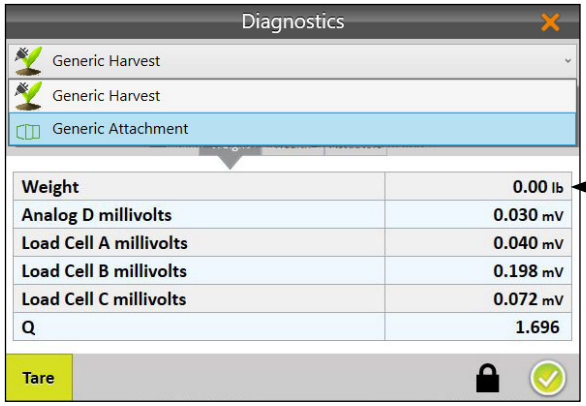
10.4.2 Matched Load Cells

If you have multiple load cells that are the same size, calculate the load cell calibration one time for all the matching load cells.



To calculate the load cell coefficients for matched load cells,

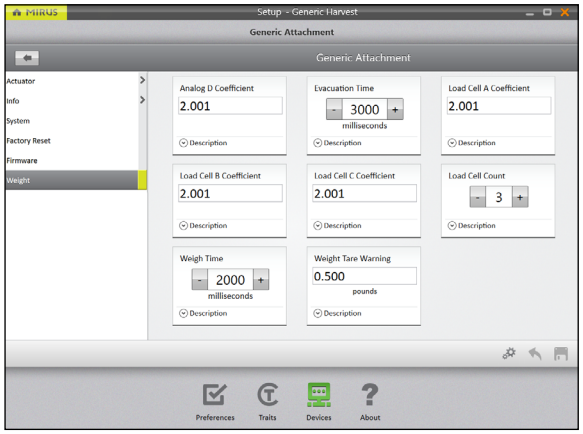
1. Open the Setup > Generic Attachment > Weight screen.
2. Make sure all the load cells have the same load cell coefficient.
3. Tap **Save** if you change any values.
4. Return to the Main Menu and tap **Diagnostics**.



Generic Attachment.

5. Tap the dropdown menu and select **Generic Attachment**.
6. Tap **Tare** if the Weight is greater than zero.
7. Place a known weight in the center of the weigh bucket.
8. Write down the weight shown on the Diagnostics screen.
9. Calculate the load cell coefficient, using the formula

load cell coefficient = actual weight / measured weight (current coefficient)



10. On the Setup > Generic Attachment > Weight screen, enter the calculated load cell coefficient in all the Load Cell Coefficient boxes.
11. Tap **Save**.

10.5 Control Generic Attachment Actuators

10.5.1 Open the Actuator Screen

To open the Actuator screen,

1. Open the Setup > Generic Attachment > Actuator screen.
2. Select a DSP actuator.

Mirus opens the Actuator screen on which you can configure settings for the actuator.

10.5.2 Default Settings for Double Cotton Harvester Attachment

The script for Double Cotton Harvester Attachment installs default settings for DSP actuator 1 named Weigh Basket and DSP actuator 4 named Air Diverter, as shown in the tables.

DSP Actuator 1 Named Weigh Basket	
Setup Parameter	**Default Value**
Actuator Type	Dual
Close Transition Time	600 msec
DSP Actuator 1 Close State Name	Close
DSP Actuator 1 Name	Weigh Basket
DSP Actuator 1 Open State Name	Open
Limit Switch on Close	No
Limit Switch on Open	No
Open State Time	800 msec

DSP Actuator 1 Named Weigh Basket	
Setup Parameter	**Default Value**
Open Transition Time	600 msec

DSP Actuator 4 Named Air Diverter	
Setup Parameter	**Default Value**
Actuator Type	Dual
Close Transition Time	200 msec
DSP Actuator 4 Close State Name	Close
DSP Actuator 4 Name	Air Diverter
DSP Actuator 4 Open State Name	Open
Limit Switch on Close	No
Limit Switch on Open	No
Open State Time	0 msec
Open Transition Time	200 msec

10.5.3 Default Settings for Straw Weight

The script for Straw Weight installs default settings for DSP actuator 1 named Air Diverter, DSP actuator 2 named Conveyor Belt, and DSP actuator 3 named Straw Release Gate, as shown in the tables.

DSP Actuator 1 Named Air Diverter	
Setup Parameter	**Default Value**
Actuator Type	Dual
Close Transition Time	2000 msec
DSP Actuator 1 Close State Name	Off

DSP Actuator 1 Named Air Diverter	
Setup Parameter	**Default Value**
DSP Actuator 1 Name	Air Diverter
DSP Actuator 1 Open State Name	On
Limit Switch on Close	No
Limit Switch on Open	No
Open State Time	0 msec
Open Transition Time	200 msec

DSP Actuator 2 Named Conveyor Belt	
Setup Parameter	**Default Value**
Actuator Type	Dual
Close Transition Time	8000 msec
DSP Actuator 2 Close State Name	On
DSP Actuator 2 Name	Conveyor Belt
DSP Actuator 2 Open State Name	Off
Limit Switch on Close	No
Limit Switch on Open	No
Open State Time	0 msec
Open Transition Time	200 msec

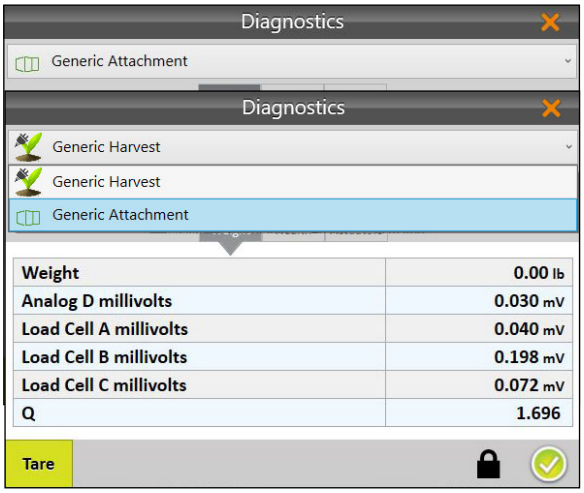
DSP Actuator 3 Named Straw Release Gate	
Setup Parameter	**Default Value**
Actuator Type	Dual
Close Transition Time	200 msec
DSP Actuator 3 Close State Name	Open
DSP Actuator 3 Name	Straw Release Gate
DSP Actuator 3 Open State Name	Close
Limit Switch on Close	No
Limit Switch on Open	No
Open State Time	5000 msec
Open Transition Time	200 msec

10.6 Use Diagnostics for the Generic Attachment

To view diagnostic information for the Generic Attachment,

1. On the Setup screen, tap **Diagnostics**.
2. Tap the dropdown menu and select **Generic Attachment**.

10.6.1 Use the Weight Diagnostics

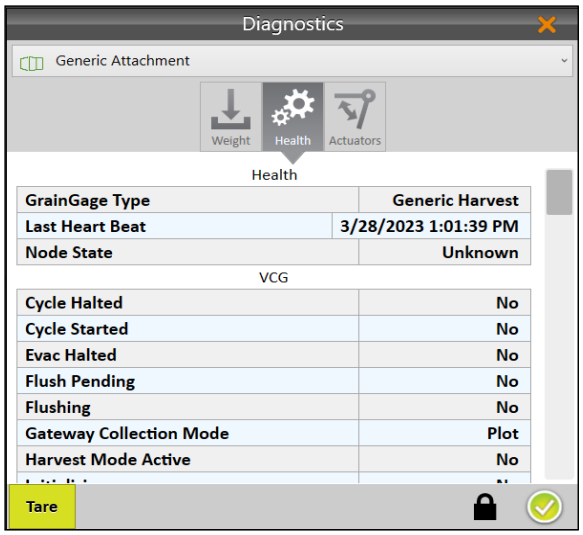


On the Weight Diagnostics screen, Mirus displays live values and other data for the load cells.

Note: For instructions on checking the weigh bucket calibration, see **5.3.1 Check the Weigh Bucket Calibration on page 45**.

Weight Diagnostics	
Item	**Description**
Weight	Displays the weight of the contents in the weigh bucket. To change the units of measure, see **2.2.2 Set Preferred Units of Measure** on page 16.
Load Cell A, B, C, & Analog D, millivolts	Shows the mV reading for the four load cells. The load cells measure plot weight.
Q	If the Straw Weight System is installed, displays the slope and motion calibration value. It is calibrated during the system installation and allows the weight to tare to zero. Slope and motion is not used in weight calculations and cannot be enabled. For more information, see *Mirus Straw Weight Plugin User's Guide*.

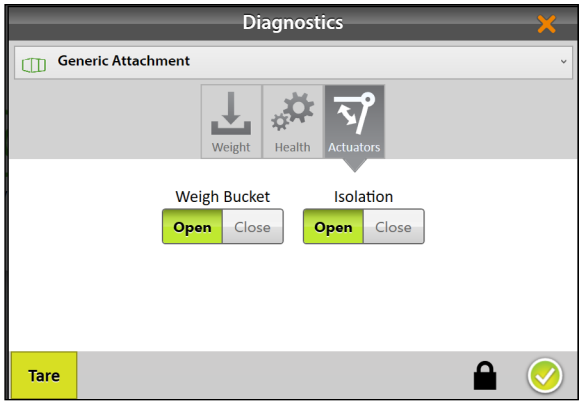
10.6.2 Use Health Diagnostics



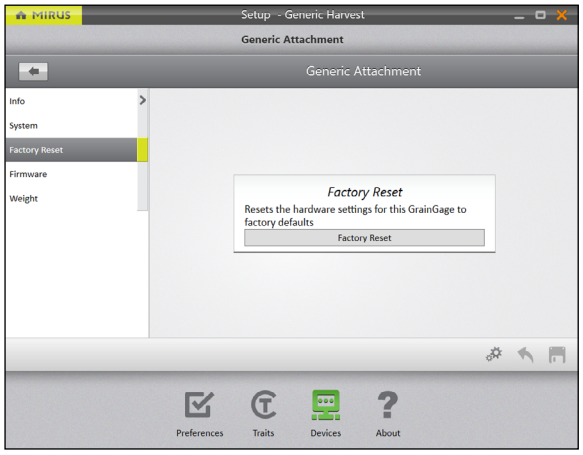
The Health Diagnostics screen is used by HarvestMaster Field Service Engineers.

10.6.3 Use Actuator Diagnostics

Use the Actuators Diagnostics screen to manually test the actuators controlling all gates connected to the Generic Attachment.



10.7 Reset Generic Attachment to Factory Settings



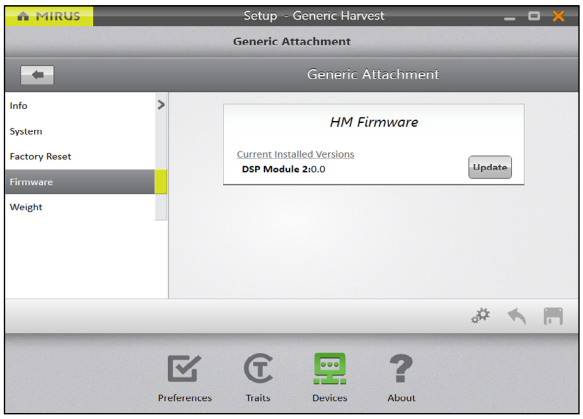
You can reset the Generic Attachment to factory settings from the Factory Reset screen.

To perform a factory reset for the Generic Attachment,

1. Open the Setup > Generic Attachment screen.
2. Tap **Factory Reset**.

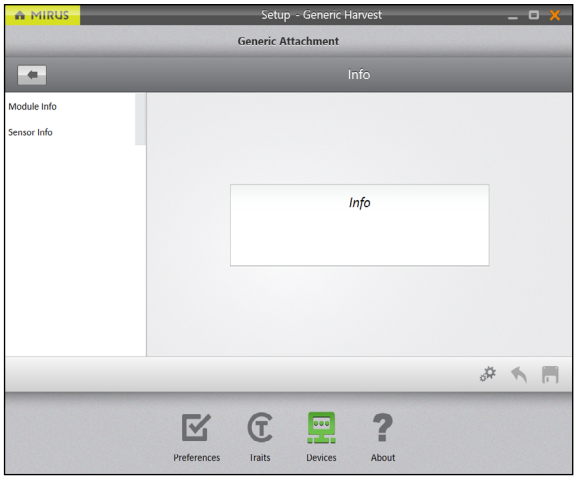
CAUTION: This action cannot be undone! Resetting to factory defaults clears all your settings, including actuator timers and weight calibrations. This should only be done in consultation with a HarvestMaster Field Service Engineer.

10.8 Update Generic Attachment Firmware



The purpose of this screen is to help HarvestMaster Field Service Engineers during troubleshooting procedures. When you install or update Mirus, the program checks for the latest firmware and updates it automatically.

10.9 View Generic Attachment Info



From the Setup > Generic Attachment screen,

1. Tap **Info**.

From the Info screen, view specifications for each connected component, such as serial number, module ID, and build date.

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Generic Harvest Plugin

APPENDIX C

Conditional Action Plugin

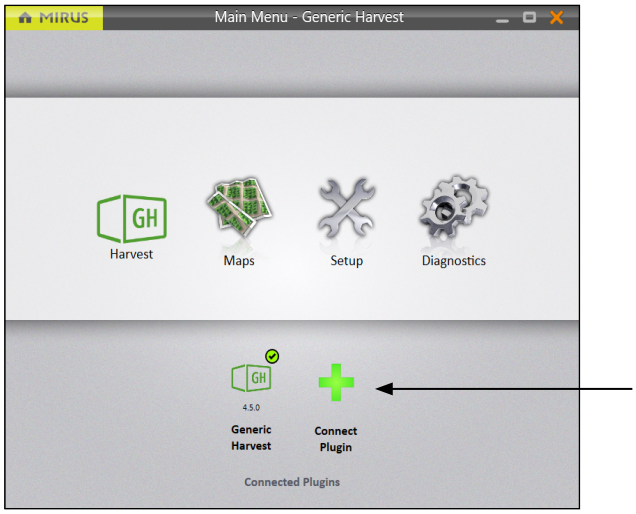
11 Appendix C: Conditional Action Plugin

The Conditional Action plugin allows users to perform custom actions at various points of the harvest process. Conditional actions are preferred to manual script modifications for the following reasons:

- Conditional actions are easier to see and turn on or off.
- Conditional actions can be edited with a user interface (UI) and are validated upon entering harvest, creating fewer errors than modifying scripts..
- Conditional actions easily transfer to another computer or tablet.
- Conditional actions can be named to make their functions more clear.
- Some behavior is only possible with a conditional actions, such as performing actions prior to the GHS evacuation.

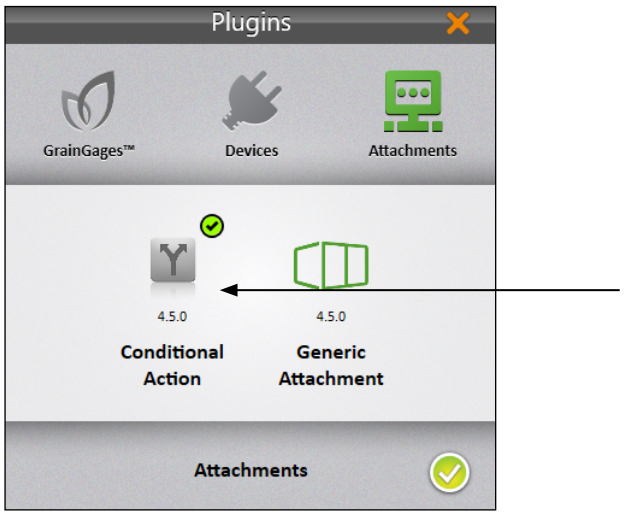
Note: You can use a conditional action to modify or intercept inter-cycle behavior of the GHS. You cannot perform synchronous actions after a cycle starts and before a cycle completes. If you need to execute actions within a GHS cycle, please contact a HarvestMaster Field Service Engineer.

11.1 Create a Conditional Action



To create a conditional action,

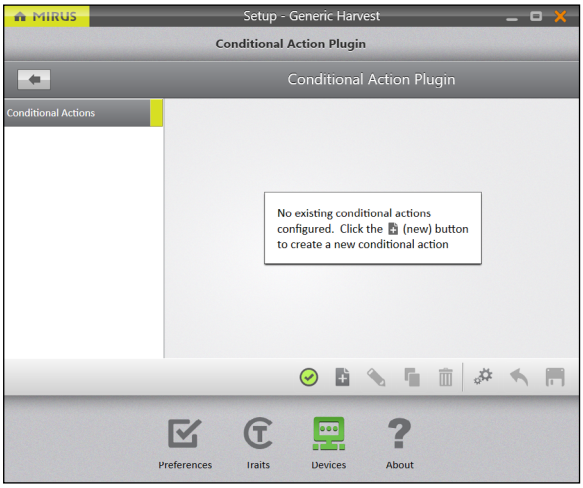
1. Connect the Conditional Action plugin.
   a. Tap **Connect Plugin**.



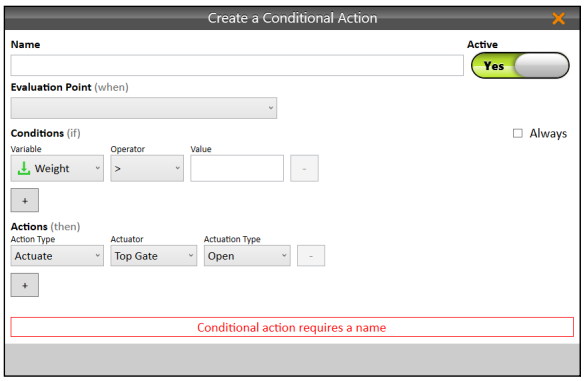
b. Under the Attachments tab, tap **Conditional Action**.

When the plugin has been selected a green check will appear in the corner.

c. Tap the check icon .

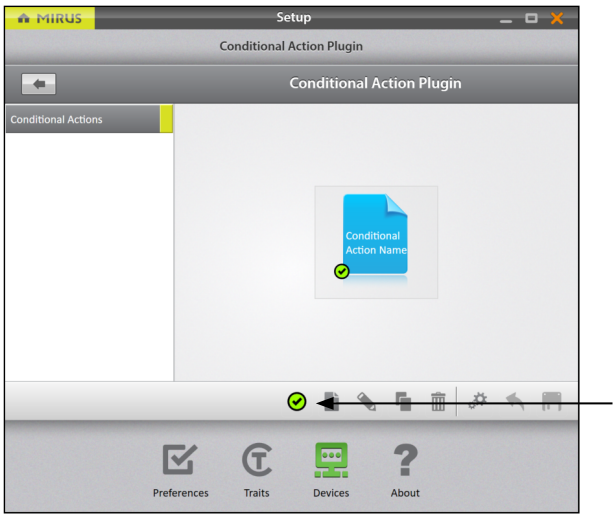


2. Go to Setup > Conditional Action Plugin > Conditional Actions.
3. Tap the new icon .



4. Name the conditional action.
   - This is also the filename that will be used when the conditional action is saved to C:\HarvestMaster\Mirus\Config\ConditionalAction\Conditions.
5. Set **Active** to Yes or No.
   - If set to Yes, the defined conditional action will be evaluated during harvest.
   - If set to No, the conditional action will be skipped during harvest.
6. Select an **Evaluation Point** (when) from the dropdown menu.
   - This option allows the user to define the point at which the active conditional actions will be evaluated.
   - The sequence of these evaluation points are explained in **11.2 Evaluation Points on page 128**.

7. If you want the actions to always be performed at the specified evaluation point, select **Always**.
8. Select the **Conditions (if)**.
   - Conditions (if) are optional conditions that control if the defined actions will be executed.
   - More explanation of conditions and variables is provided in **11.3 Conditions on page 129**.
9. Add **Actions (then)**.
   - The dropdown menus include a list of actions to be performed in sequence if the conditions are met at the designated evaluation point.
   - More details about actions are provided in **11.4 Actions on page 130**.
10. Tap the check icon .



A green check next to the conditional action icon indicates that it is turned on. To turn the conditional action on or off, tap the green check.

11.2 Evaluation Points

The designated evaluation point of a conditional action determines when, in the sequence of a cycle, a conditional action will be evaluated and executed. Evaluation points happen in sequence, which means subsequent evaluation points will not be executed until the previous evaluation point has completed.

The following table explains when an evaluation point occurs:

Evaluation Point (when)	
Option	**Description**
On ENTER Press	Evaluation occurs when the remote enter or Cycle button is selected. If a countdown timer is enabled, it occurs as soon as the countdown timer starts.

Evaluation Point (when)	
Option	**Description**
Plot is starting	Evaluation occurs when the GHS is about to begin cycling a plot for the first time. Evaluation occurs before the isolation gate closes, except in the case where the plot was started by an overflow.
Cycle is starting	Evaluation occurs at the start of the cycle after a plot is started. There is only one cycle per plot.
Before sub-cycle evac	This option is not applicable to Generic Harvest.
Before cycle evac	This option is not applicable to Generic Harvest.
Before plot evac	Evaluation occurs before the final evacuation of harvested crop from the GHS. *Note: At this point, weight and moisture data is available for the plot, and conditional actions can be performed on plot totals and averages.*
Cycle completed	This option is not applicable to Generic Harvest.
Plot completed	Evaluation occurs at the end of the plot after the tare check occurs.

11.3 Conditions

Users can also define conditions that determine whether an action should be performed. For example, a user may only want to collect a sub-sample if the weight for the plot is above a specified value (for example, 5 lbs). Conditions can be defined for a few variables.

Conditions (if)	
Variable	**Description**
Weight and Moisture	Weight and moisture are used to compare a context sensitive weight and moisture measurement value to a specified value. These variables can only be used with the "Before [Type] Evac" and "[Type] Completed" evaluation points. This is because these are the points at which the data is available from the GHS. The weight and moisture variables are context sensitive, based on the evaluation point: • If you are using a cycle evaluation point, it will compare cycle totals/averages of weight and/or moisture. • If you are using a plot evaluation point, it will compare against the plot totals/averages of weight and/or moisture.

Conditions (if)	
Variable	**Description**
ID1/ID2/ID3	ID1/ID2/ID3 is used to conditionally execute actions based off the plot identifier values of an imported map. If a sub-sample should only be taken for specific plots, a map could be imported that has a "1" for a plot that requires a sub-sample. A condition of if "ID1" = "1" could be assigned, so the actions to control the sub-sampler only occur on designated plots. The identifier that maps to ID1/ID2/ID3 is defined in the Graph View with the ID1/ID2/ID3 drop-down selectors.
Is Flush Cycle	This option is not applicable to Generic Harvest.
Cycle Count	This option is not applicable to Generic Harvest.

11.4 Actions

The actions in a conditional action are the functions to be performed at an evaluation point, should the conditions be met. For example, an action would be helpful when an air diverter needs to be actuated at the start of a flush cycle to ensure all the harvested product from the cyclone has fallen into the GHS before closing the isolation gate.

Actions (then)	
Action Type	**Description**
Actuate	Allows the user to actuate a specified actuator open or close.
Delay	Allows the user to delay the cycling sequence for a specified amount of time (in milliseconds).

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Generic Harvest Plugin

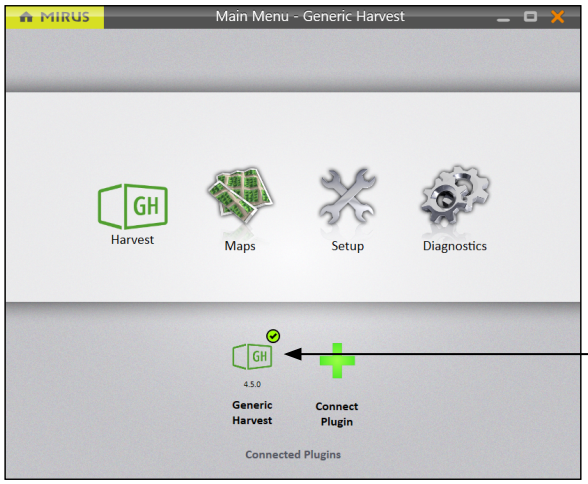
APPENDIX D

Mirus Note Taking

12 Appendix C: Mirus Note Taking

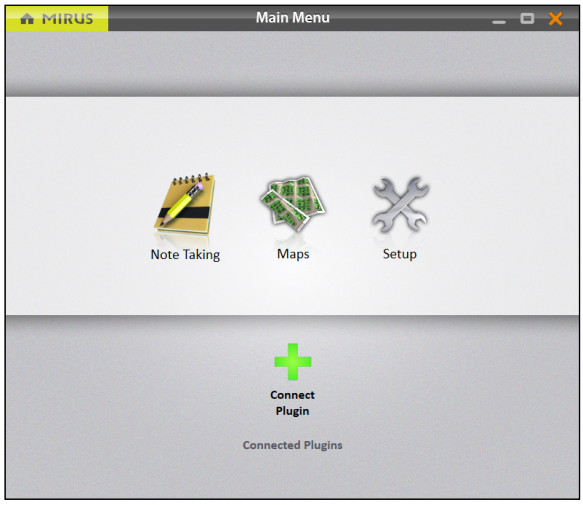
Mirus Note Taking provides a simplified process of taking notes in the field using many of the same tools supplied for harvest. Mirus Note Taking uses intuitive data collection forms, color-coded heat maps, and customized pick lists to help streamline your data collection process. It can help identify sections within your plots by range and row or by a specific sub-section of your trial using sub-maps (as explained in **7 Create and Use Field Maps on page 61**). The navigation feature tracks your location as you walk and collect data within the field. By adding the GNSS plugin, you can have the option to locate and navigate to plot information using GNSS coordinates.

12.1 Enter Note Taking

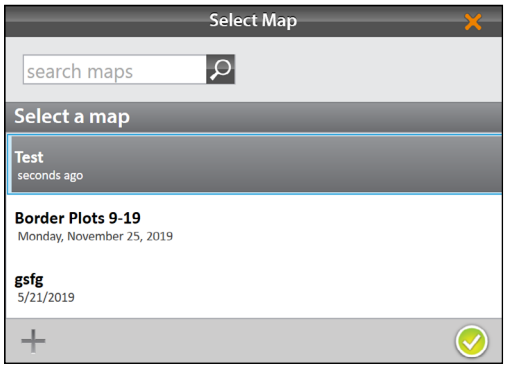


To enter Note Taking,

1. Disable Generic Harvest (if connected) by tapping the plugin with the green check.

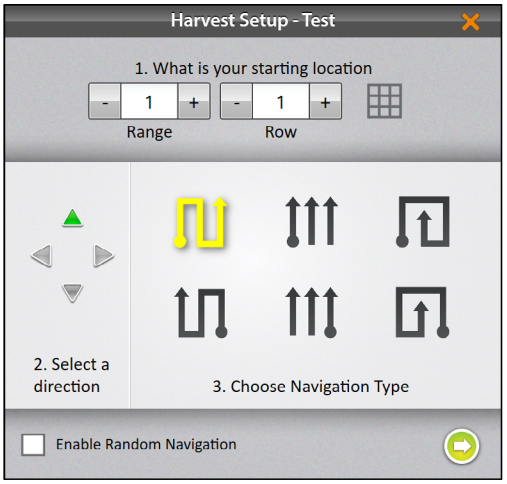


2. Tap **Note Taking**.



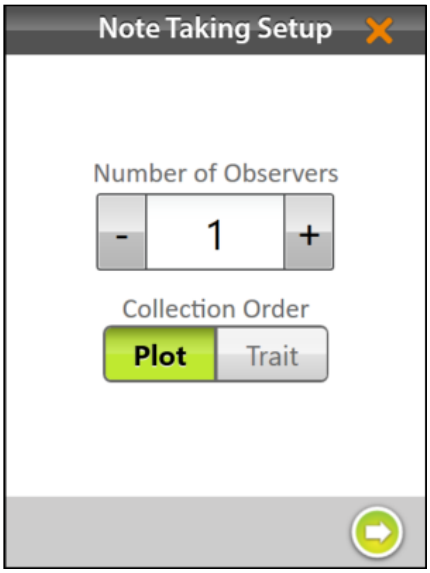
3. Select a map or tap the plus icon to create or import a new map.
4. Tap the check icon.

   For more information about creating or importing a map, see **7.1 Create a New Field Map on page 61** or **7.2 Import a Map on page 70**.

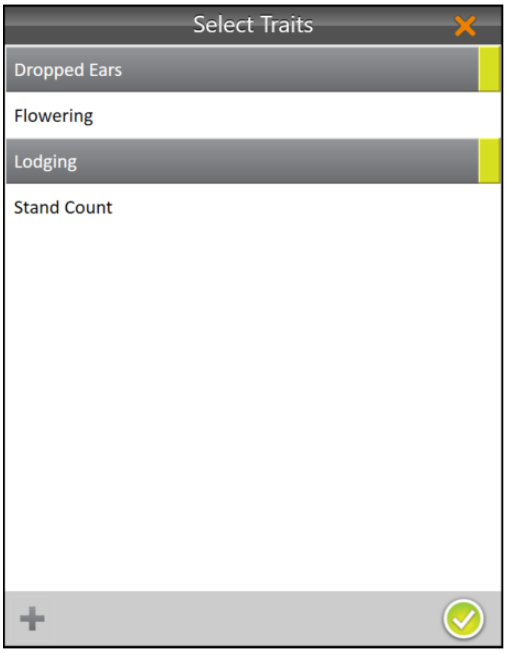


5. Enter the starting location.

   Note: Tap the matrix to bring up another screen to allow you to choose the starting location.
6. Select the direction of harvest.
7. Select a navigation type.
8. Tap the next arrow.



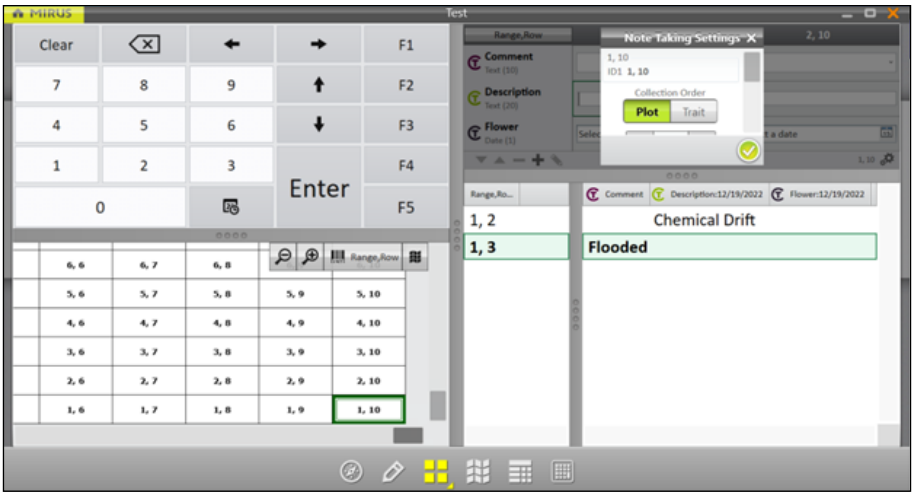
9. Enter the number of observers and the collection order.
   - **Number of Observers**: Multiple observers can use the same handheld device. The person holding the handheld will add the notes from the additional observers.
   - **Plot Order**: Mirus will prompt you to enter all the selected traits for each plot before moving to the next observer.
   - **Trait Order**: Mirus will prompt you to enter one trait at a time per plot through all the observers before routing to the next row or range.



10. Select one or all of the traits to include.
11. Tap the check icon .

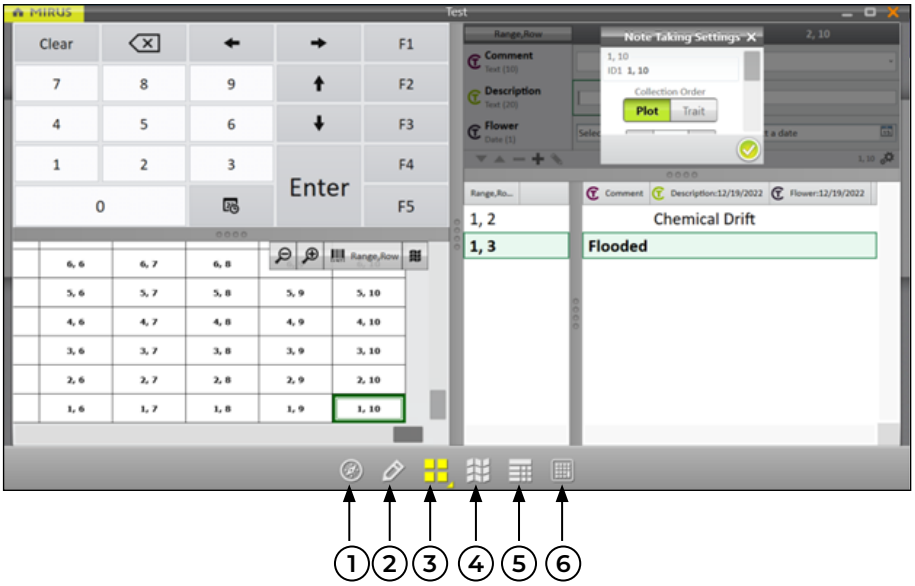
    For more information about configuring Traits from the Setup screen, see **4.4 Define Measurable Traits on page 39**.

Mirus opens the Note Taking screen and is ready to be configured or collect data.



12.2 Configure the Note Taking Screen

The Note Taking Quad View is similar to the Harvest Mode Quad View (**8.3 Configure Harvest Screen Options on page 88**). It can provide several options for configuring how data is collected and presented during collection.



1. **Navigation**: Opens the Change Location dialog box and allows the operator to make changes to location, direction, and navigation type.
2. **Observations/Notes**: Opens a dialog box where the operator can record notes for each plot during harvest. This is also where you can add information about any traits you configured.
3. **Quad View**: Divides the display into four smaller windows. The operator can adjust the size of each window and customize them each to display data in List, Spatial, Observations/Notes, or Ten Key view. This screen should be used during collection.
4. **Map View**: Opens the Spatial Display, also referred to as a heat map. This display can be configured to show attribute data plot by plot.
5. **List View**: Displays the accumulating data as a list.
6. **Ten Key**: Numeric keypad for fast entry of trait and note data.

12.2.1 Navigation Screen

The Navigation screen can be used to change your location, direction, or navigation type.

12.2.2 Observations/Notes Screen

The Observation/Notes screen shows plot position and provides character fields for notes on each trait.

When this screen is selected as on of the Quad Views, data entry uses the navigation function defined by the user to move from plot to plot. This screen works well for ratings or counts collected on every plot.

When this screen is selected from the toolbar, it allows data entry on a random plot selection, such as heading or maturity data collection. Just select the plot from the spatial view then enter data using the keyboard. A quick note can also be entered from this screen.

In addition, on this screen you can manually open the Note Taking Settings by tapping the gear icon  in the lower right corner.

For more information about this screen, see **8.3.5 Observations Screen on page 93**.

12.2.3 Quad View

Mirus provides the option of viewing four screens at once when Quad View is selected. Each screen can be configured to display the data differently. The screen options are as follows:

- **List**: Displays accumulated data as a list.
- **Spatial**: Also referred to as a heat map, it shows attribute data with colors plot by plot. This is the only screen that can be shown in multiple quadrants.
- **Notes**: Opens a dialog box where the operator can record notes for each plot during harvest.
- **Ten Key**: Numeric keypad for fast entry of trait and note data.

For more information about this screen, see **8.3.2 Quad View on page 90**.

12.2.4 Map View

The Map View shows the spatial display, also referred to as a heat map. This display can be configured to show attribute data plot by plot. You can use the Attribute list to select the data you want displayed.

For more information about configuring this screen, see **8.3.8 Configure Moisture in Spatial Display on page 96**, **8.3.9 Configure Weight in Spatial Display on page 97**, and **8.3.10 Configure Plot Size and Yield in Spatial Display on page 97**.

12.2.5 List View

In List View, you can see the data in the form of a spreadsheet.

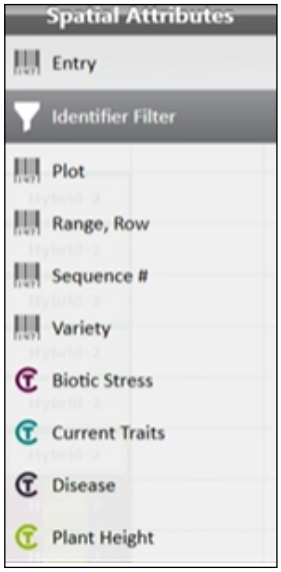
12.2.6 Ten Key

The Ten Key provides a way to enter quick notes. It can be accessed from the Quad View or the toolbar.

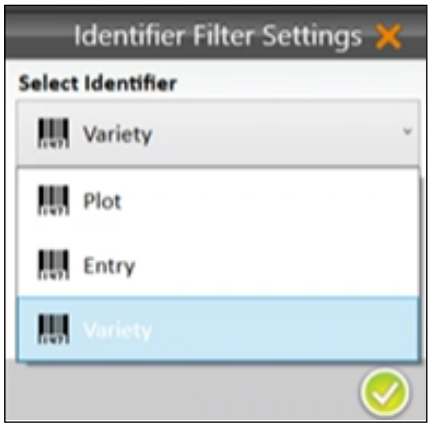
For more information about this screen, see **8.3.5 Observations Screen on page 93**.

12.3 Identifier Search (Imported Maps Only)

With imported maps, you can search identifiers to find certain plots in the field that are part of a test block you want to collect data on. This feature can only be used on maps that are imported with identifiers.



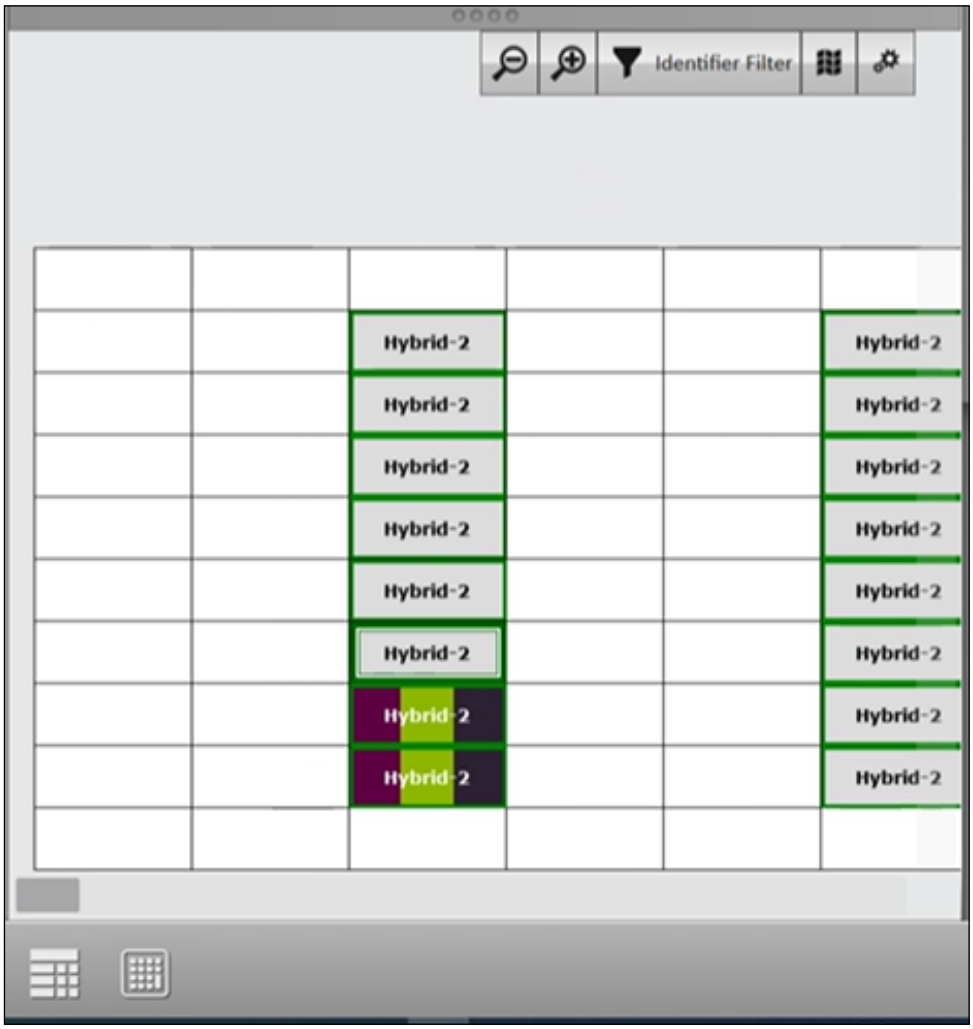
1. Select **Identifier Filter** from the attribute list.
2. Select the settings gears.



3. Select the identifier you would like to filter/search.
   Note: The options available from the dropdown list vary based on your map.

4. Choose "is exactly" or "contains."
5. Enter your search criteria.
   Note: The search criteria must be based on information included in your map.
6. Tap the check icon ✓.

With the identifier filter applied, the spatial view will show only the plots that contain that match.



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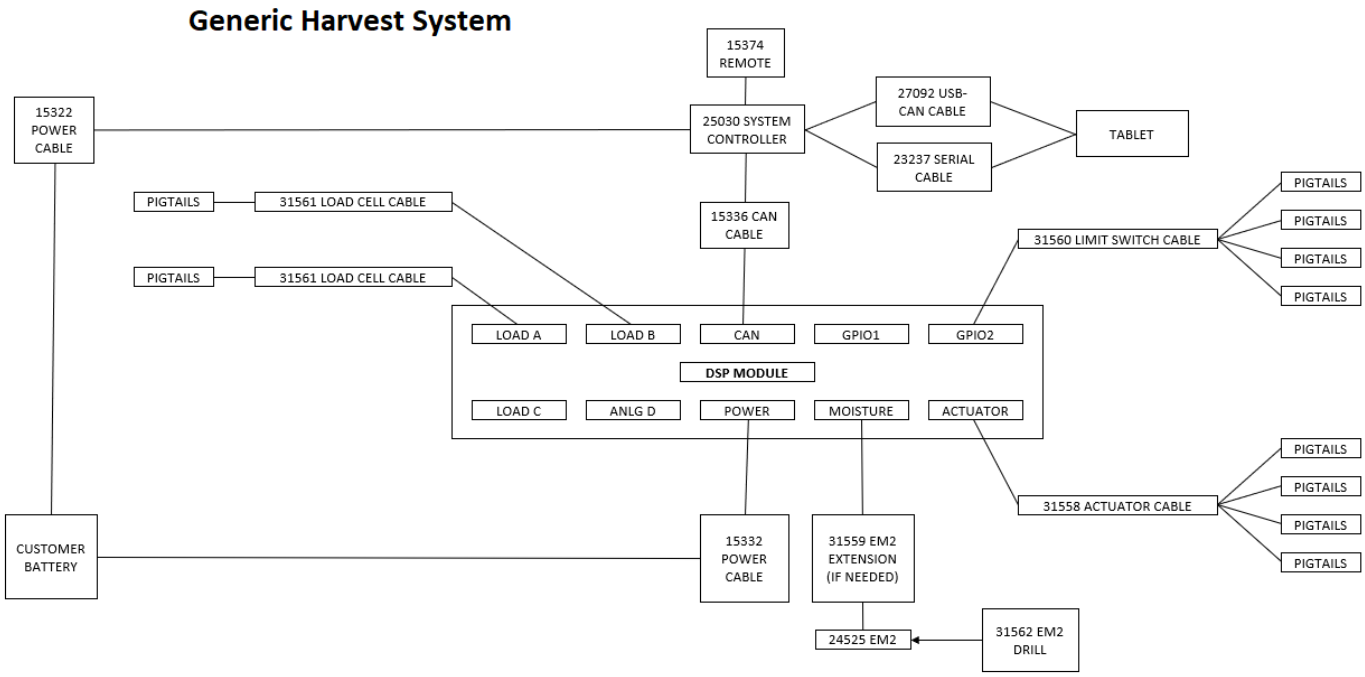
APPENDIX E

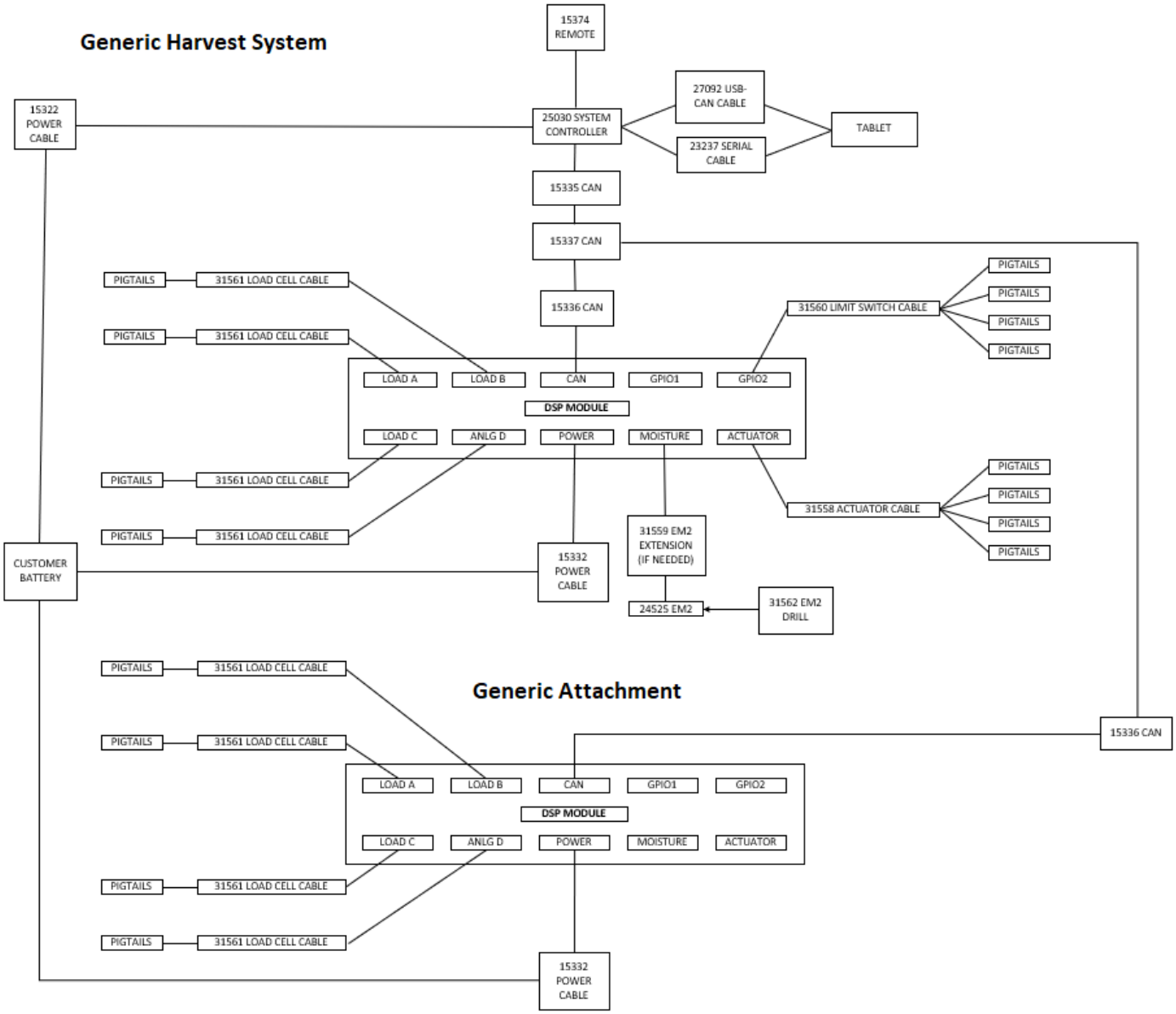
Connections and Wiring Diagrams

13 Appendix E: Connections and Wiring Diagrams

13.1 Wiring Diagram for Generic Harvest System



13.2 Wiring Diagram for the Generic Attachment



13.3 Wiring for the System Controller

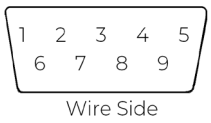
13.3.1 CAN #1 and CAN #2 Port

CAN Cable (15336), CAN to USB Cable (27092)			
Pin	**Wire Color**	**Signal**	**Notes**
1	Red	Excite Power	
2	Yellow	CAN+ (Differential signal HIGH)	
3	Black	CAN Power Ground	
4	Green	CAN - (Differential signal LOW)	
5	N/C	CAN Power Ground	
6	N/C	N/C	
7	N/C	N/C	
8	N/C	CAN Power Ground	

13.3.2 Remote

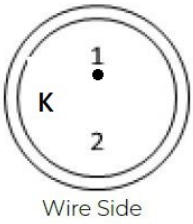
Remote Enter (15374)			
Pin	**Wire Color**	**Signal**	**Notes**
1	Red	Remote Interrupt 1 - A on remote switch	
2	N/C	Remote Interrupt 2	
3	Black	Power Ground - C on remote switch	
4	N/C	N/C	
5	N/C	N/C	

13.3.3 9-pin RS-232 Serial Data Port



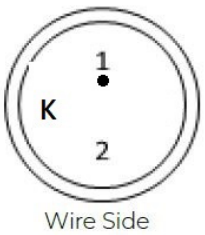
Standard Serial Cable (23237)			
Pin	**Wire Color**	**Signal**	**Notes**
1	Black	DCD	
2	Brown	RXD	Receive Data
3	Red	TXD	Transmit Data
4	Orange	N/C	
5	Yellow	Ground	Power Ground
6	Green	DSR	Data Set Ready
7	Blue	N/C	
8	Purple	D+	USB +
9	Gray	D-	USB -

13.3.4 Power



12 V Power Cable (15332)			
Pin	**Wire Color**	**Signal**	**Notes**
1	Black	Ground	
2	Red	12 V VDC	

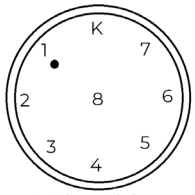
13.3.5 Tablet Charge



Tablet Charge Cable (25089)			
Pin	**Wire Color**	**Signal**	**Notes**
1	Red	12 V VDC	13A Max Current
2	Black	Ground	

13.4 Wiring for DSP Module Ports

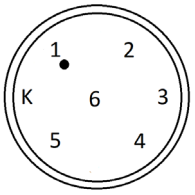
13.4.1 GPIO 1 Port (Cable PN 26566)



Wire Side

Power, Ground, Digital Inputs, DSP 5 & DSP 6 Actuator Controls			
Pin	**Wire Color**	**Signal**	**Notes**
1	Red	+12 V DC unregulated power	Connector 1, Pin 1
2	Black	Power ground	Connector 1, Pin 2
3	White	Digital in 1	Connector 1, Pin 3
4	Green	Digital in 7	Connector 1, Pin 4
5	Brown	Digital in 8	Connector 1, Pin 5
6	Blue	Digital in 2	Connector 1, Pin 6
7	Red (2 Cond.)	H-Bridge 3 out FWD	Connector 2, Pin 1 (DSP 5 Actuator)
8	Black (2 Cond.)	H-Bridge 3 out RVRS	Connector 2, Pin 2 (DSP 6 Actuator)

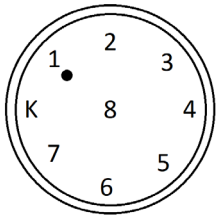
13.4.2 GPIO 2 Port (Cable PN 31560)



Wire Side

Up to Four Limit Switches Inputs			
Pin	**Wire Color**	**Signal**	**Notes**
1	Red	+12 V DC unregulated power	12 V supply for all limit switches
2	Orange	Power Ground	Ground for all limit switches
3	Yellow	Digital in 3	Limit Switch Input 1
4	Green	Digital in 4	Limit Switch Input 2
5	Blue	Digital in 5	Limit Switch Input 3
6	Brown	Digital in 6	Limit Switch Input 4

13.4.3 Actuator Port (Cable PN 31558)

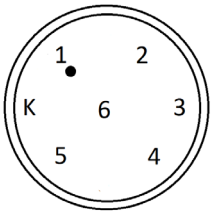


Wire Side

Up to Four Actuator Controls			
Pin	**Wire Color**	**Signal**	**Notes**
1	Black	Ground	- Act 1
2	Black	Ground	- Act 2
3	Black	Ground	- Act 3
4	Black	Ground	- Act 4
5	Red	H bridge 1 FWD	+Act 1, Dual actuator
6	Red	H bridge 1 RVRS	+Act 2, Dual control
7	Red	H bridge 2 RVRS	+Act 3, Dual control
8	Red	H bridge 2 FWD	+Act 4, Dual control

13.4.4 Load A, B, C, and D Ports

Generic Harvest supports Load A, Load B, Load C, and ANLG D ports. When applicable, Load C port is used for sub-samples.

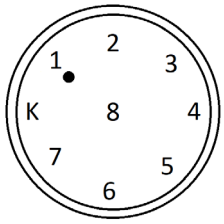


Wire Side

Load A, B, C and D Ports			
Pin	**Wire Color**	**Signal**	**Notes**
1	Red	5 V Excitation	5.000 V +/- 0.005 mV
2	N/C	No Connection	
3	White	Load Signal Out -	Millivolt level output from load cell
4	Green	Load Signal Out +	Approx. 15 mV full scale
5	Black	Load Cell Ground	
6	Shield	Cable Shield Connection	Chassis Ground

13.4.5 CAN Port (Cable PN 15336)

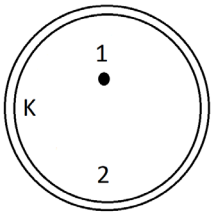
The Control Area Network (CAN) port is 250 Kbit/second ISOBUS compatible.



Wire Side

Can Cable			
Pin	**Wire Color**	**Signal**	**Notes**
1	Red	Excite power	
2	Yellow	CAN+	CAN differential signal (high)
3	Black	CAN ground	Relative ground for the CAN
4	Green	CAN-	CAN differential signal (low)
5	N/C	N/C	
6	N/A	RS-232 debug TX	Product diagnostics, special cable
7	N/A	RS-232 debug RX	Product diagnostics, special cable
8	N/A	RS-232 ground	Product diagnostics, special cable

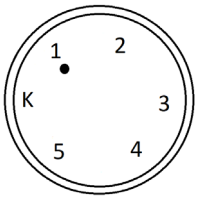
13.4.6 Power Port (Cable PN 15332)



Wire Side

12 V Power Cable			
Pin	**Wire Color**	**Signal**	**Notes**
1	Black	Power Ground	Connect to combine battery (chassis ground)
2	Red	+12 V DC automotive power	9 to 18 V operating range Connect, fused, to combine battery, +12 V terminal

13.4.7 Moisture Port (Sensor PN 29111)

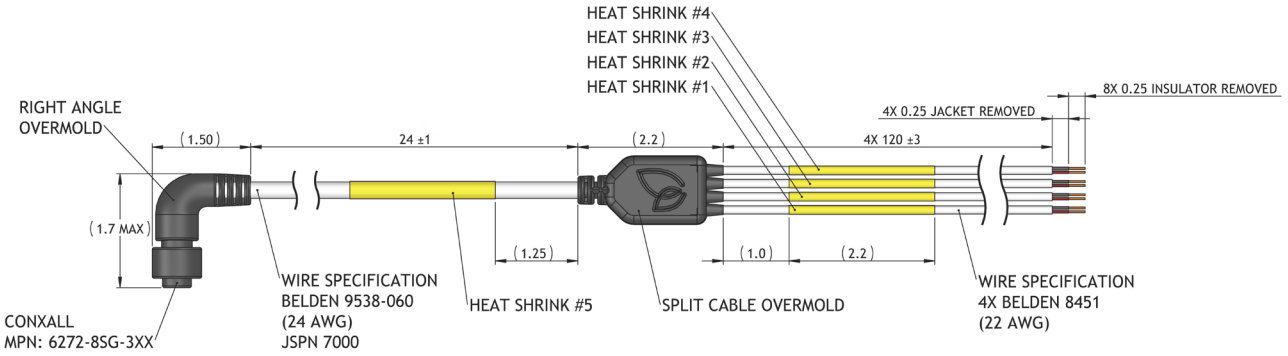


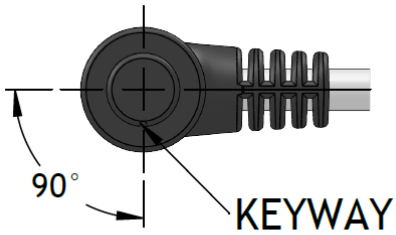
Wire Side

EM Moisture			
Pin	**Wire Color**	**Signal**	**Notes**
1	Red	+12 V DC sensor power	9 to 15 V operating range
2	Black	Sensor power ground	
3	Green	RS-485-	

EM Moisture			
Pin	**Wire Color**	**Signal**	**Notes**
4	White	RS-485+	
5	Shield	Sensor wiring shield	

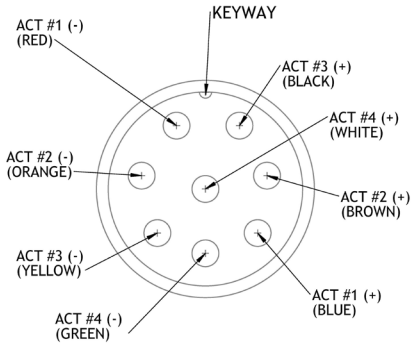
13.5 Wiring for Actuator Cable (PN 31558)



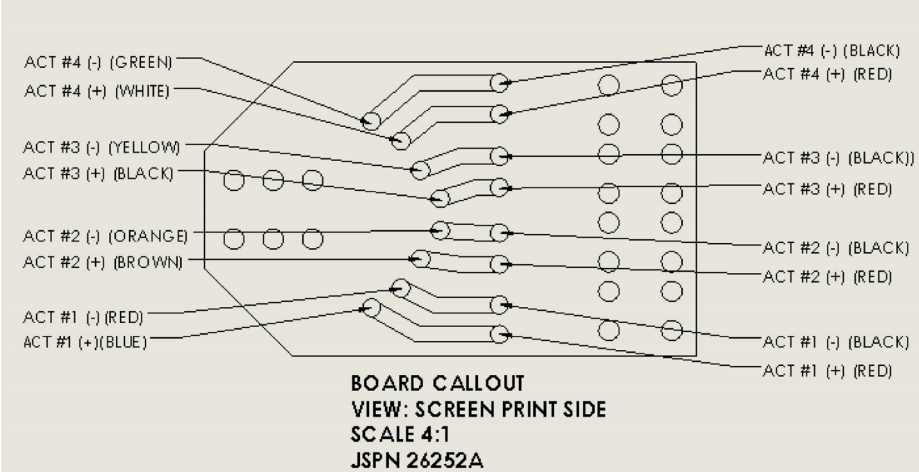


HEAT SHRINK LABELS:
#1: ACTUATOR 1
#2: ACTUATOR 2
#3: ACTUATOR 3
#4: ACTUATOR 4
#5: H2 GHM ACTUATOR CABLE #31558

NOTES:
1. RIGHT ANGLE OVERMOLD MATERIAL: MACROMELT OM678
2. SPLIT CABLE OVERMOLD: JSPN 26228
3. SPLIT CABLE OVERMOLD MATERIAL: MACROMELT OM678
4. COLOR: BLACK
5. SURFACES OR FACES AFFECTED BY CHANGES FROM PREVIOUS REVISION ARE HIGHLIGHTED IN GREEN
6. FOR 3D CAD DATA USE FILE: 31558-X0 H2 GHM ACTUATOR CABLE.STEP, IGS, x_t, x_b
7. FOR GENERAL INSPECTION CRITERIA SEE LATEST REV OF 15466 CABLE OVERMOLD SPECIFICATION

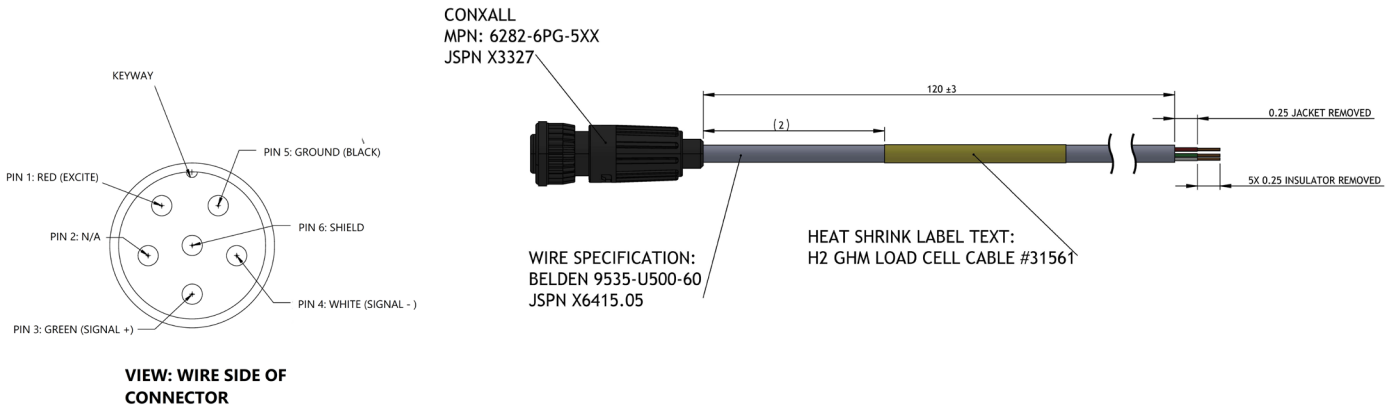


PIN CALLOUT
VIEW: WIRE SIDE
SCALE 1:2

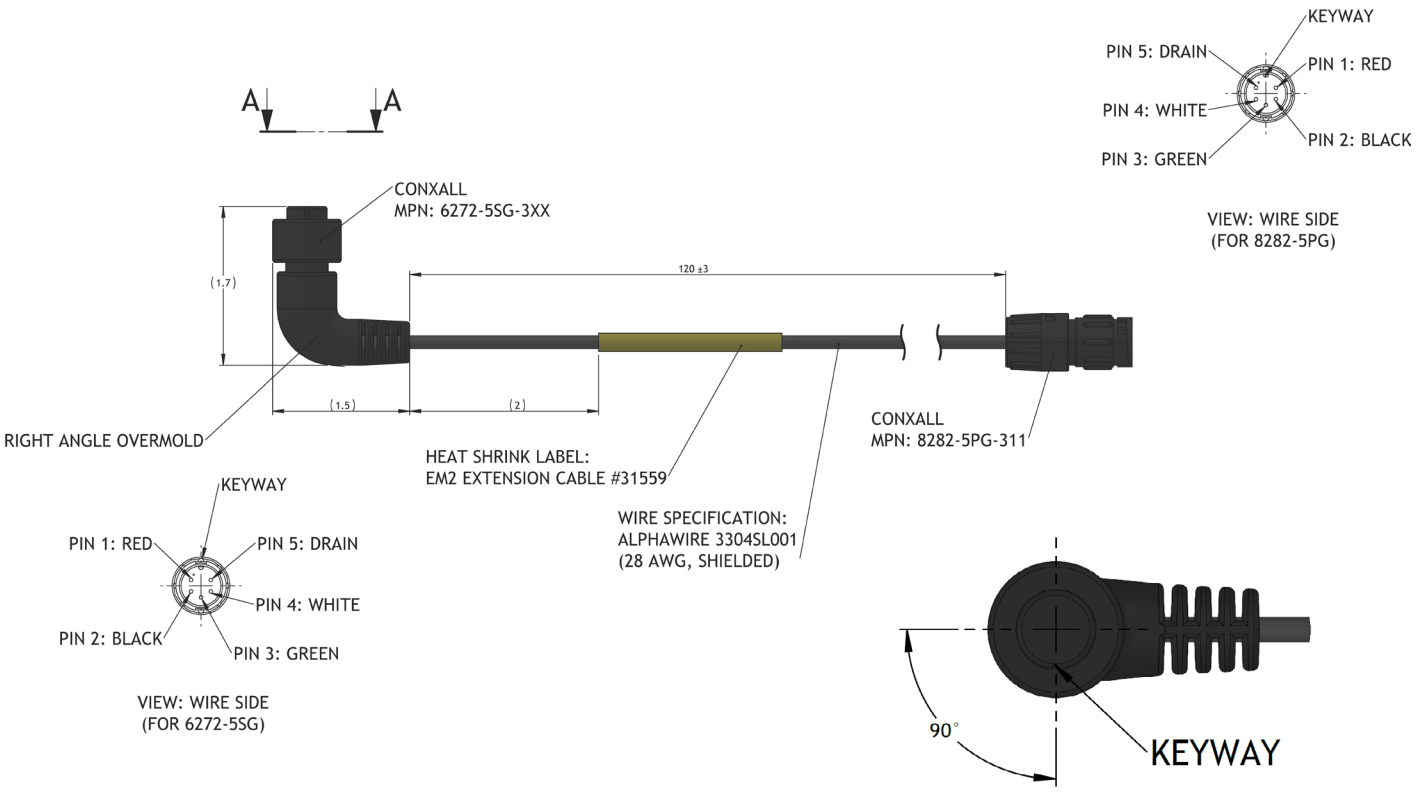


BOARD CALLOUT
VIEW: SCREEN PRINT SIDE
SCALE 4:1
JSPN 26252A

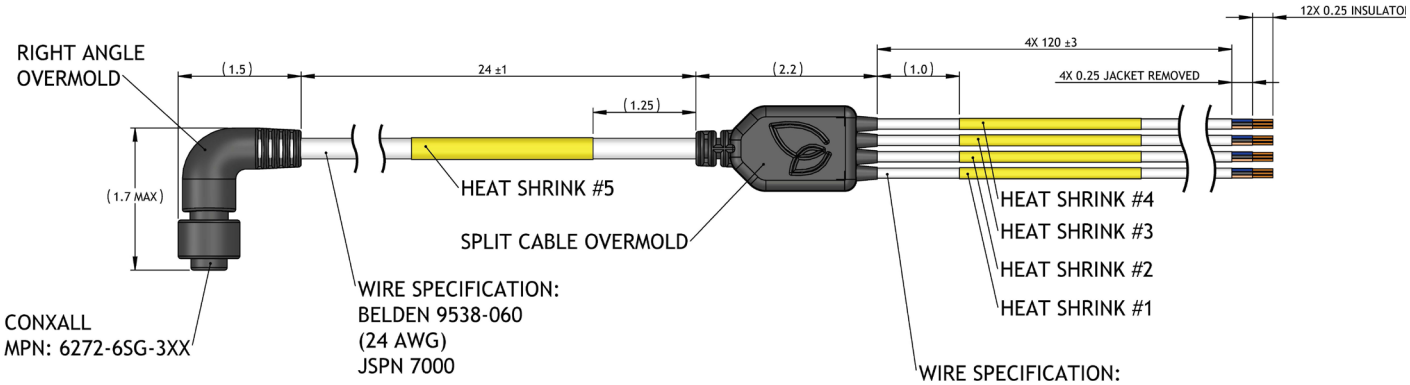
13.6 Wiring for Load Cell Cable (PN 31561)

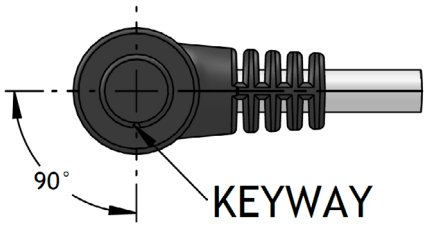


13.7 Wiring for Extension Cable (PN 31559)

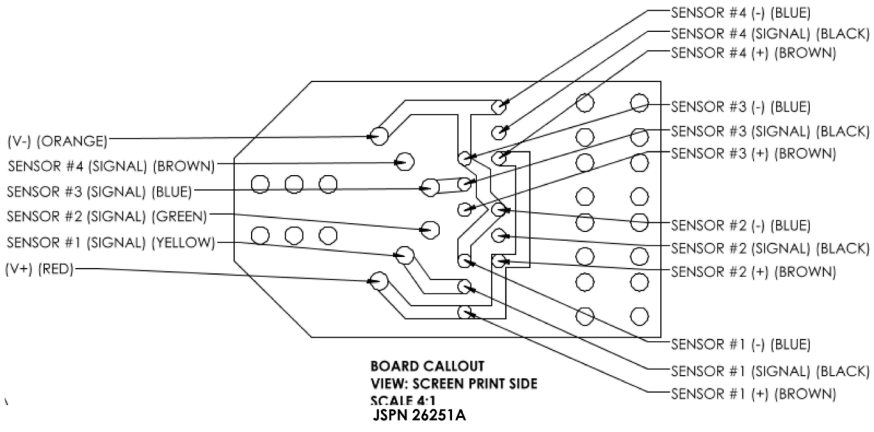


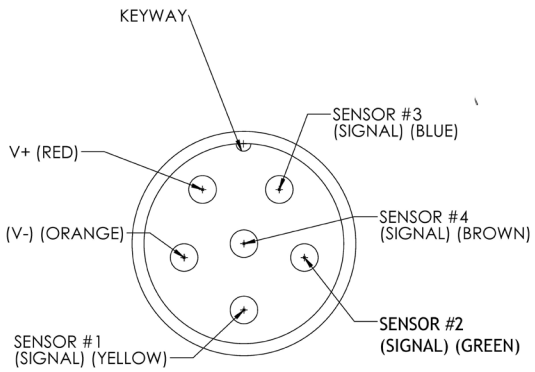
13.8 Wiring for Limit Switch Cable (PN 31560)





HEAT SHRINK LABELS:
#1: SENSOR 1
#2: SENSOR 2
#3: SENSOR 3
#4: SENSOR 4
#5: H2 GHM LIMIT SWITCH CABLE #31560





13.9 Install Fuse on HarvestMaster Power Cable

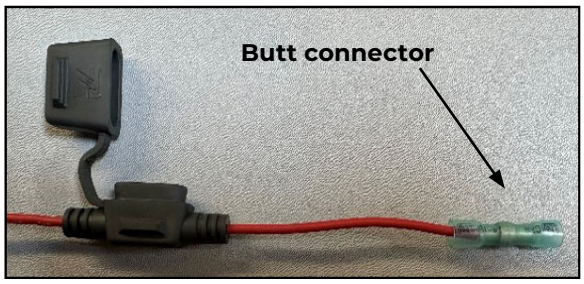
HarvestMaster products require an ATC fuse (20 A) on all power supply cables.

To install an ATC fuse,

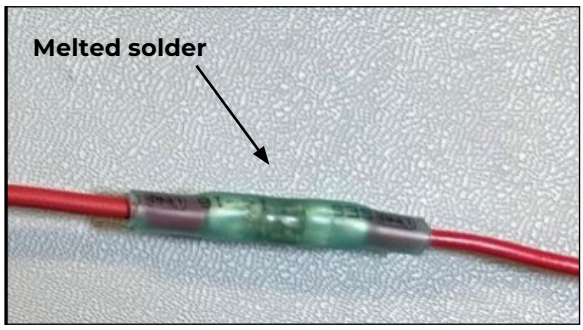
1. Locate the positive red wire in the power cable (PN 15332) at the battery. Disconnect the red power wire from the battery if necessary.
2. Cut off 10 in. from the end of the red power wire.

   Note: If the wire was connected to the battery with a ring terminal, cut off the ring terminal.
3. Strip 3/8 - 1/2 in. from the end of the red power wire.
4. Crimp a butt connector onto the stripped end of the red power wire.

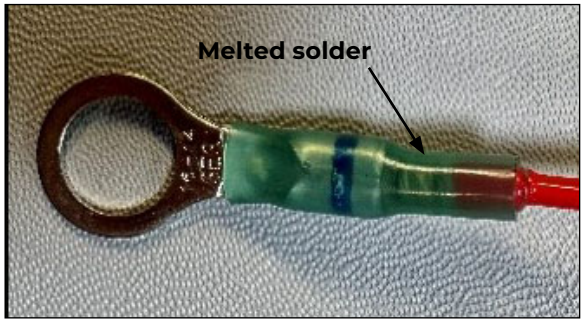
5. Strip 3/8 - 1/2 in. from both wire leads coming from the fuse holder.



6. Insert one of the wire leads into the butt connector attached to the red power wire and crimp the connection.



7. Heat the butt connection until the plastic forms around the wires and the solder in the center is melted.



8. Crimp a ring terminal to the other stripped wire lead coming from the fuse holder.
9. Heat the connection until the plastic forms around the wire and the solder is melted.

10. Place the ATC fuse (20 A) in the fuse holder and close the cap.

11. Connect the ring terminal to the battery.
12. Repeat steps 1-11 if you have an additional power cable (PN 15332).

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APPENDIX F

Sensor and Module Error Codes

14 Appendix F: Sensor and Module Error Codes

14.1 Moisture Sensor LED Error Codes

The EM2 Moisture Sensor contains an orange LED and a red LED. The red LED displays error codes by groupings of short pulses, beginning after a long (one second) "on" pulse. For instance, an error code of 21 would be displayed as two short red light pulses, pause, then one short red light pulse followed by a pause. If more than one error code is present, the next error code begins showing right after the first, until all error codes have been displayed. This is followed again by a long (one second) red "on." Then the sequence restarts.

Moisture Sensor LED Error Codes

Error Code	Description
11	Stack overflow—sentinel byte overwritten
12	Watchdog reset has occurred
13	Timed task buffer overflow
21	Input buffer overrun (>25 character packet received)
22	Checksum error detected
23	Unrecognized command
24	RS485 busy (for 5 ms) encountered
25	Transmit message aborted due to the 50 ms RS485 busy
31	Frequency interrupt overrun (missed frequency count)
32	Frequency measurement zero error (no oscillation counts)
33	Frequency measurement range error (>4.2 MHz)
44	System supply voltage below +10.5 V
45	System voltage above +16.0 V
55	Invalid error code

14.2 DSP Module Bootloader Error Codes

The red and yellow lights flash to show the DSP module bootloader error codes.

DSP Module Bootloader Error Codes

Code	Description
Red & Yellow single blink per 1.5 sec	Waiting for update
Red & Yellow double blink per 1.5 sec	Flash memory empty
Red & Yellow triple blink per 1.5 sec	Flash memory corrupted
Red & Yellow quadruple blink per 1.5 sec	Firmware incompatible

14.3 DSP Module Runtime Error Codes

The red X light flashes to show the DSP module runtime error codes.

DSP Module Runtime Error Codes

Code	Description
1	Hardware error
2	OS software error
4	Hardware stack overflow
5	Software stack overflow
7	BSS overflow
8	OS RAM overflow
9	TCB overflow
10	FIFO overflow
11	CAN overflow

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APPENDIX G

Limited Warranty

15 Appendix G: Limited Warranty

15.1 Hardware

All products manufactured by Juniper Systems, Inc. (Juniper Systems) when properly installed, calibrated, and operated in accordance with instruction manuals accompanying the hardware and used for the purpose for which the hardware was designed shall be free from defects in materials and workmanship for a period of one (1) year from the date of shipment.

In the event a defect in materials or workmanship is discovered and reported to Juniper Systems within the one year period, Juniper Systems will, at its option, repair the defect or replace the defective product. Juniper Systems' obligation hereunder will be limited to such repair or replacement.

The customer shall have the responsibility to ship the defective equipment to Juniper Systems with all cost of shipment prepaid. After repair or replacement Juniper Systems will, at their own expense, ship the replacement or repaired item back to the customer using the same type of carrier.

15.2 Software

Software products that are designed by Juniper Systems for use with a hardware product and that are properly installed on that hardware product are warranted to the end user not to fail to execute their programming instructions due to defects in material or workmanship for a period of one year from the date of delivery.

If Juniper Systems receives notice of such defects during the one year warranty period, Juniper Systems shall, at its option, repair or replace the defective software media. Warranty is limited to repair or replacement of software media.

The warranties provided herein do not apply in the case of improper or inadequate maintenance or in the case of repair by any person not previously authorized in writing by Juniper Systems to do such maintenance or make such repairs.

These warranties likewise do not apply where the products have been operated outside the environmental specification of the product, where software products other than those specified by Juniper Systems have been used, or where attempts at software interface have been made by any person not previously authorized by Juniper Systems to perform such interfacing operations.

15.3 Disclaimer of Warranties

The warranties set forth herein are in lieu of all other warranties of Juniper Systems, whether written, oral or implied. Juniper Systems makes no warranties regarding its products (hardware or software), including without limitation warranties as to merchantability, fitness for a particular purpose, any warranty arising from course of performance, course of dealing, or usage of trade whether any of the foregoing warranties are either expressed or implied. Juniper Systems specifically makes no warranties as to the suitability of its products for any particular application. Juniper Systems shall in no event be liable for special, incidental, or consequential damages in connection with or arising out of the furnishing, performance or use of any product covered by this agreement whether such claim is based upon warranty (express or implied), contract, strict liability, negligence or otherwise.

15.4 Updates or Modifications

Juniper Systems shall be under no obligation to update or modify its products except as herein noted to correct program errors. Furthermore, the customer agrees that all representations and warranties

contained herein shall be immediately null and void in the event of any modification, alteration or change in or to any product affected by or on behalf of the customer except for a change made by Juniper Systems.

15.5 Removal of Serial Number

Removal of the Juniper Systems serial number label from an instrument will void any warranty on the said instrument. Juniper Systems will not repair or update an instrument and return it to an individual if the instrument is without the said serial number label.

15.6 Extended Warranties

Juniper Systems offers a variety of warranty options to extend coverage beyond the standard warranty. You can contact Juniper Systems Customer Service Department for details at (435) 753-1881 (6 am–5 pm MT, Mon-Fri).

mirus™

Generic Harvest Plugin

INDEX

Index

E

F

G

H

I

L

M

N

O

P

R

S

T

U

V

W

Wiring diagrams