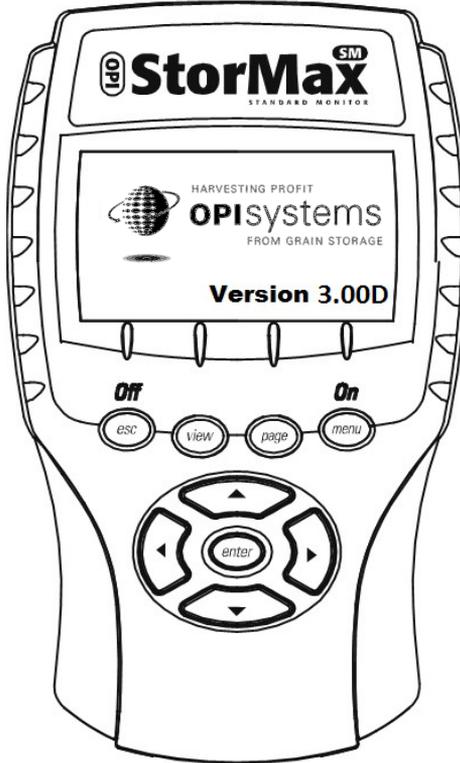




OPI StorMax
Monitor User Manual
Version 3.0



Handheld Digital Monitor



User Manual

Version 3.0 / June 2013

The World Leader in Grain Quality Management

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Contents

1.0	Introduction	5
2.0	StorMax Features	6
3.0	Overview of StorMax Digital Monitors	7
3.1	The StorMax System	7
3.2	Monitor Buttons.....	9
4.0	Defining Your Site	11
4.1	Required Materials.....	11
4.2	Drawing a Plan View.....	11
4.3	Creating a Cable List	14
5.0	Basic Monitor Operation	17
5.1	Activation and Registration	17
5.2	Units.....	17
5.3	Auto Power	18
5.4	Date/Time	19
5.5	Data Logging Memory.....	19
5.6	Contrast	20
5.7	Font Size.....	20
5.8	System Properties	21
5.9	Demo Mode	21
6.0	Working with Demo Mode	22
6.1	Exploring Sites.....	22
6.2	Viewing the Latest Sensor Results	22
6.3	Comparing Historical Results.....	24
6.4	2D Graph	26
6.5	Disabling Demo Mode.....	28
7.0	Configuring StorMax	29
7.1	Change Customer Name	29
7.2	Add Group	30
7.3	Add Cables and Assign Addresses.....	32
7.4	Adding OPI-ONE and Thermocouple Cables.....	34
7.5	Grain Type	36
7.6	Organizing the Sensing Cables	38
7.7	Program Cables.....	38
7.8	Configuring Cables for Data Logging	40
7.9	Install Cables and Interconnects.....	42
7.10	Backing Up Configuration Data.....	42
8.0	Operating Your Monitor	43
8.1	Reading StorMax Cables	43
8.2	Logging StorMax Cable Results	43
8.3	Deleting Group and Cable Data.....	44
8.4	Deleting All Data from the Monitor	44
9.0	MONI-KITU and MONI-3WIR Three-Wire Adapter	45
9.1	Three-Wire Adapters.....	45

9.2	Viewing Cables with the Three-Wire Adapter	46
9.3	Adding a Cable in a Three-Wire System.....	46
9.4	Logging Sensor Results.....	46
10.0	OPI-ONE and Thermocouple Adapters	47
10.1	Connecting the OPI-ONE and Thermocouple Adapters.....	47
10.2	Viewing OPI-ONE and Thermocouple Cable Results	47
10.3	Adding OPI-ONE or Thermocouple Cables to the System.....	48
10.4	Logging Sensor Results.....	49
11.0	Maintaining the Monitor.....	50
11.1	Keeping the Monitor Current.....	50
11.2	Expanding a Site.....	50
11.3	Changing Group Names	51
11.4	Deleting Groups.....	51
11.5	Changing Cable Names.....	52
11.6	Deleting Cables	53
11.7	Replacing StorMax Cables	53
12.0	Detailed Battery Information	54
12.1	Battery Operation.....	54
12.2	Rechargeable Battery Brands.....	54
12.3	Recharging the Batteries	54
13.0	Troubleshooting.....	56

1.0 Introduction

Thank you for purchasing your StorMax digital monitoring system. You have just invested in one of the most powerful advanced grain management products in the market today. In its simplest form, StorMax reads temperature and moisture profiles for one or more cables that are connected in a storage structure and delivers the results right to your handheld unit. These moisture values are calculated from the temperature and relative humidity readings and from the grain curves in the software. StorMax also reads other types of sensing devices that are available in the market.

IMPORTANT: *It is extremely important that all of the information in this manual be read before you perform any of the grain monitoring procedures. Failure to do so may cause some of the temperature and moisture information to be hidden or misunderstood, which could result in the grain being damaged.*

IMPORTANT: Follow Battery charging instructions in section 12.3 of this manual. Failure to follow these instructions may cause batteries to leak or explode!

The system setup procedures are written as step-by-step instructions that must be followed in the order they appear.

2.0 StorMax Features

The StorMax digital monitoring system contains the following features:

- Automatic recognition of StorMax moisture and temperature cables because the handheld unit *knows* which cables and bins are being read.
- Reads single or multiple StorMax cables at one time.
- Displays temperature, relative humidity, and moisture sensor readings by sensor and cable.
- Ability to choose between Fahrenheit and Celsius for displayed temperature results.
- Logs sensor data for retrieval and/or trending analyses.
- Two font sizes are available to suit user preference.
- Graphical orientation used to display results.
- Backlit screen.*
- Interface with a computer to recharge the batteries, back up the monitor's configuration data, and update program and grain curves.**
- Rechargeable batteries.**
- Connects to OPI-ONE cables using an optional adapter.
- Connects to Thermocouple cables using an optional adapter.
- Upgradeable to accommodate future sensing capabilities.

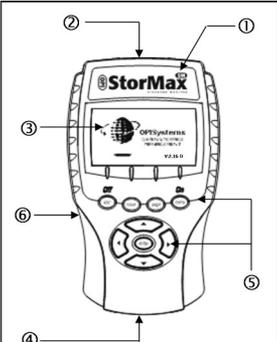
* DM model only.

** MONI-KITU required.

3.0 Overview of StorMax Digital Monitors

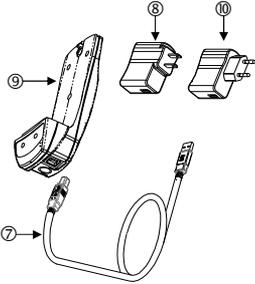
3.1 The StorMax System

Monitor

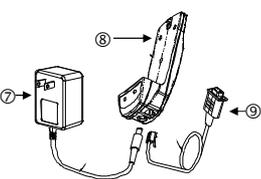
	①	Standard Monitor (SM) is blue or Deluxe Monitor (DM) is black. The DM monitor includes a backlit display screen.
	②	Two-pin female connection used to connect the StorMax handheld unit to: <ul style="list-style-type: none"> • two-wire male connector used for individual or small groups of StorMax temperature cables. • two-wire male connector used for StorMax moisture cables.
	③	Display screen used to configure StorMax and the various sensors on each cable, and to view sensor results for a structure.
	④	Fifteen pin universal connection used to connect <ul style="list-style-type: none"> • the MONI-KITU USB PC / Power Adaptor unit (newer models) to the handheld unit. This also contains a three-wire connector. • the MONI-KITA Serial Port PC / Power Adaptor unit (older models) to the handheld unit. • three-wire adapter (MONI-3WIR) with female connection to read larger groups of temperature cables at one time. • OPI-ONE adapter (MONI-OPIA) to read OPI-ONE cables. • Thermocouple adapter to read Thermocouple cables. <p>NOTE: Both models of PC / Power Adapters are used to</p> <ul style="list-style-type: none"> • recharge the three AA rechargeable alkaline batteries (i.e., Pure Energy). • connect StorMax to a computer to transfer data and program updates.

	<p>⑤ StorMax is a menu-driven system that is operated by five function buttons and four directional arrows. For a detailed explanation of each button, refer to Section 3.2, Monitor Buttons.</p>
	<p>⑥ Battery compartment is located on the back of the monitor. It holds three AA alkaline rechargeable batteries.</p>

MONI-KITU (USB PC / Power Adaptor)

	<p>⑦ A standard A-B USB cable will connect the MONI-KITU on the StorMax unit to a USB connection on a computer. The connection is used to recharge the batteries and transfer data from the computer.</p> <p>NOTE: The ‘power’ light on the MONI-KITU unit will turn red to indicate that the batteries are being recharged. Charging stops automatically after 12 hours and is indicated by the glowing green light.</p> <p>NOTE: When data is being transmitted or received, the data light on the MONI-KITU unit will alternatively flash red and green to indicate that the connection is active and that the unit should not be disconnected until all the data is transferred.</p>
	<p>⑧ A North American-style stand-alone USB charger is standard with the MONI-KITU.</p>
	<p>⑨ USB PC / Power Adaptor unit. The MONI-KITU contains a connector for a three-wire adapter. This enables the monitor to read three-wire systems while connected to the MONI-KITU.</p>
	<p>⑩ A European Style stand-alone USB charger is available for the MONI-KITU.</p>

MONI-KITA (Serial Port PC / Power Adaptor)

	<p>⑦ For older models of the StorMax monitor that use the MONI-KITA, an AC adaptor is used to recharge the batteries.</p> <p>NOTE: The ‘power’ light on the MONI-KITA unit will turn red to indicate there is power available from the adaptor.</p> <p>NOTE: The battery charger should only be plugged in for a maximum of 12 hours.</p>
	<p>⑧ Serial Port PC / Power Adaptor unit.</p>
	<p>⑨ A connection cable is used to connect the MONI-KITA unit to a nine-pin serial port on a computer. In the event that the computer does not have a serial port, use the MONI-KITU described above).</p> <p>NOTE: The data light on the MONI-KITA does not indicate communication with the computer. The computer can be connected and operating correctly and the data light will not flash. This is normal.</p>

3.2 Monitor Buttons

All of the StorMax monitoring functions are performed using five functional buttons and four directional arrow keys. The following is a description of the tasks performed by each of those buttons and keys. The procedures outlined within this manual provide additional instructions about how and when to use the buttons and arrows to complete specific tasks.

Buttons/ Keys	Description
	<p>The escape/Off button</p> <ul style="list-style-type: none"> • shuts the monitor off. Press and hold for button for two seconds and the unit will turn off. • cancels the current task. • moves back one screen.
	<p>The view button</p> <ul style="list-style-type: none"> • accesses site layout and allows individual structures and cables to be selected. Also known as the View screen.

Buttons/ Keys	Description
	<p>The page button is used to scroll through the three display screens that are provided by StorMax. The screens are for a cable, or cables, in a storage structure and include:</p> <ul style="list-style-type: none"> • The latest grain temperature, relative humidity, and moisture content readings. • Historic temperature, relative humidity, and moisture content readings. • A 2-D graph that show comparisons between temperature, relative humidity, and moisture content over time.
	<p>The menu/On button</p> <ul style="list-style-type: none"> • turns the StorMax handheld monitor on. Press the button once briefly. • engages/disengages the backlight (DM model only). Press and hold for two seconds to activate or deactivate the light. • accesses screen-specific menus. Press button once. • accesses Main Menu. Press the button twice.
	<p>The enter button</p> <ul style="list-style-type: none"> • accepts a setting that has been entered. • finalizes a task, such as obtaining a reading from a sensing cable while in the View screen. • accesses the edit functions to change settings.
	<p>The left and right arrows</p> <ul style="list-style-type: none"> • move the cursor left or right one position at a time. • in the view screen: <ul style="list-style-type: none"> (▶) opens a group and moves cursor down one position. (◀) closes a group and moves cursor up one position.
	<p>The up and down arrows</p> <ul style="list-style-type: none"> • move the cursor up and down one position.

4.0 Defining Your Site

This section provides the procedures that are required to accurately define the physical layout of your site and all the storage structures.

IMPORTANT: It is very important that all of the information in this section of the manual be read and completed before any grain monitoring procedures are performed. Failure to do so may cause the monitor to be set up incorrectly, which will prevent you from taking full advantage of the monitor's features to help you protect the quality of the stored grain.

The Defining Your Site procedures are written as step-by-step instructions that must be followed in the order they appear.

4.1 Required Materials

Before you start, the following are required:

- knowledge of the site, storage structures, and the grain being stored
- when only temperature is being monitored, know the placement of the temperature cables (all of them) in the structures
- when temperature and moisture content are being monitored, know the placement of the moisture cables (all of them) in the structures. There may be a combination of temperature and moisture cables in the same bin.
- pen or pencil
- permanent marker.

4.2 Drawing a Plan View

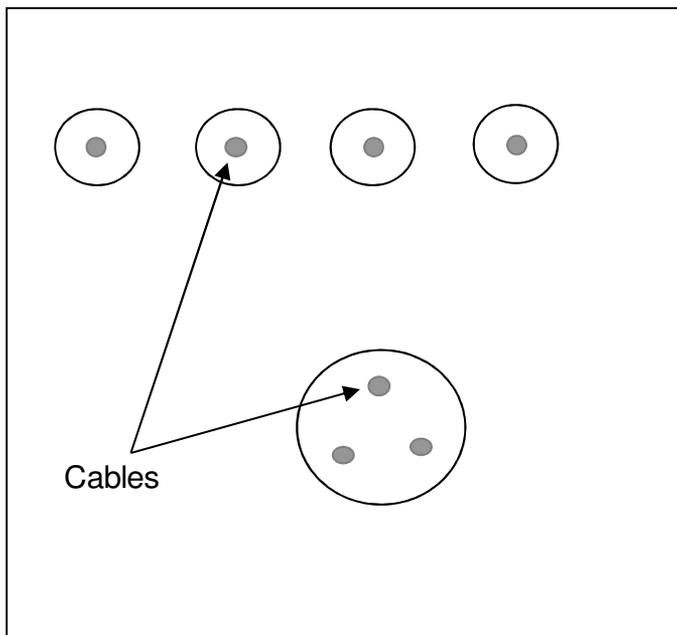
4.2.1 Make a drawing of your site. Ensure the following are included:

- a plan view for the storage structures that will be monitored at the site
- identify how many cable(s) will be installed in each structure
- indicate where the cables will be installed in the structures.

Refer to the Figure 1 below for an example of a site plan.

NOTE: Grid paper to create a *Plan View of Your Site* has been included in the StorMax monitor package.

Figure 1 Site Plan for Brown Farm



4.2.2 Write the Customer Name for the site at the top of the drawing.

NOTE: A Customer Name can contain up to nine characters (letters and/or numbers), but the name must begin with a letter, such as:

- BROWNFARM
- FORD FARM
- B AND B

4.2.3 Organize your cables into meaningful groups. A group represents one or more cables that are conveniently interconnected so they can be monitored from one central location. Grouping also enables cable results to be viewed together on the main display screen.

NOTE: There is a limit to how many cables can be connected in a group. This limit is referred to as CAP 100 and is described in the Cable Installation Guide. If you exceed the CAP 100 for a group and want the group to stay together, a three-wire mode can be used. Three-wire mode only operates with temperature cables. The three-wire adapter is not compatible with moisture cables. See Section 9, Three-Wire Adapter, for more information.

4.2.4 Draw lines to connect each group. Refer to Figure 2 as an example.

4.2.5 Choose a name for each group. As with Customer Name, a Group Name can contain up to nine characters (letters and/or numbers) and must also begin with a letter, such as:

- NORTHROW
- BIGBIN
- GROUP 10

Write the group names that you have selected on the site drawing. See Figure 2 as an example.

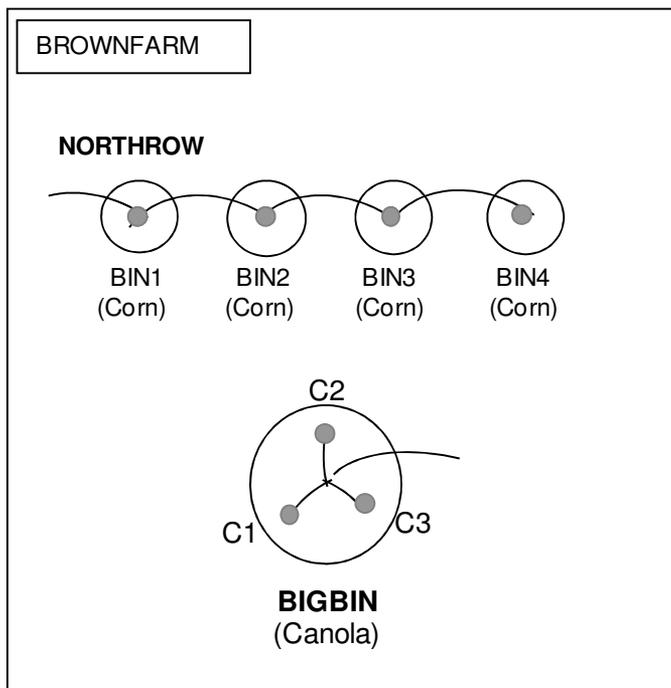
4.2.6 For each storage structure, indicate the type of grain being stored. Write the grain type under the group name on your drawing. See Figure 2 as an example. The grain type for each cable or group can be changed in the monitor any time the grain stored in the bin is changed.

4.2.7 Choose a name for each cable in the group. Ensure the name contains a maximum of four characters (letters and/or numbers, including the character), but does not start with the letter A, such as:

- BIN1
- BN21
- B101
- C1
- 2A

Write the Cable Name beside the corresponding cable on the drawing. See Figure 2 as an example.

Figure 2 Plan View for Brown Farm



The drawing is now complete. It should contain all the storage structures, cables, customer name, cable names, and groups for the site, along with the type of grain stored in each structure.

4.3 Creating a Cable List

The next step is to copy the information from the site drawing onto a list of cables. This list is used to organize the information as it will appear in the StorMax monitor.

NOTE: On the grid paper that was used to create the *Plan View of Your Site* that was included in the StorMax monitor package, is a table called *Cable List*.

- 4.3.1 Using the Site Plan drawing as a reference, complete the Customer Name, Group Name, and Cable Name fields on the Cable List.

Refer to Figure 3 as an example.

Figure 3 Cable List for Brown Farm (Example 1)

Customer Name: BROWNFARM			
Group Name	Cable Name		
NORTHROW	BIN1		
	BIN2		
	BIN3		
	BIN4		
BIGBIN	C1		
	C2		
	C3		

NOTE: Every StorMax cable must be programmed with a unique address, so that the monitor will recognize the different cables when they are plugged into a group. All addresses begin with the letter A and range from 1 to 255 (A-1 to A-255). After the cables are programmed in the StorMax monitor, the cable addresses become an *invisible* part of the system, so you don't have to be concerned with knowing what addresses go with what cables. OPI-ONE and Thermocouple cables do not get addresses.

- 4.3.2 Write the cable addresses onto the *Cable List* starting with A1, and sequentially assign an address to each cable.

Refer to Figure 4 for an example.

Figure 4 Cable List for Brown Farm (Example 2)

Customer Name: BROWNFARM			
Group Name	Cable Name	Cable Address	
NORTHROW	BIN1	A1	
	BIN2	A2	
	BIN3	A3	
	BIN4	A4	
BIGBIN	C1	A5	
	C2	A6	
	C3	A7	

- 4.3.3 The last column in the *Cable List* is used to identify the code for each cable. A 12-digit alpha-numeric code identifies the sensor insert located on the lead wire of the sensor and a separate 12-digit alpha-numeric code identifies the cable body located just below the head of the cable. Write the sensor insert code on the *Cable List* in the corresponding row. This code is not required for programming, but is critical if it becomes necessary to obtain a replacement element.

Refer to Figure 5 for an example of a completed *Cable List*.

Figure 5 Cable List for Brown Farm (Example 3)

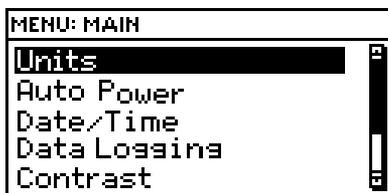
Customer Name: BROWNFARM			
Group Name	Cable Name	Cable Address	Cable Code
NORTHROW	BIN1	A1	04ED-I019-SE3B
	BIN2	A2	04ED-I019-SE3B
	BIN3	A3	04ED-I019-SE3B
	BIN4	A4	04ED-I019-SE3B
BIGBIN	C1	A5	05ED-I023-SE3A
	C2	A6	05ED-I023-SE3A
	C3	A7	05ED-I023-SE3A

5.0 Basic Monitor Operation

This section describes the submenu items that are included in the Main Menu. These items are used to set up the monitor using your preferences for operating the handheld unit and for displaying the data.

5.0.1 Press  (On) to power up the monitor.

5.0.2 Press  twice to select the Main Menu.



NOTE: When a scroll bar appears on the right hand side of the screen, it indicates that there are more choices available than what can be shown on the screen. Use the ▲ and ▼ arrows to view the full range of choices on the menu.

5.1 Activation and Registration

The StorMax monitor V3.0 is ready to use right out of the box. You are encouraged to register the monitor on the OPI-integriss website at www.advancedgrainmanagement.com. This registration activates your monitor warranty and gains you access to a no-cost demo version of IntegrissAdvance PC software.

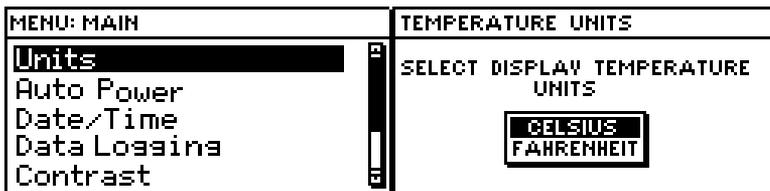
With the demo version of IntegrissAdvance you can backup your configuration, download updates to the monitor firmware and download new moisture curves to the monitor.

Upgrading to the full version of Integriss Advance will enable you to store your logged temperature and moisture data to the PC, view the data on tables and graphs, alarms and print reports.

Refer to the accompanying brochures for Integriss Advance for the signup procedure.

5.2 Units

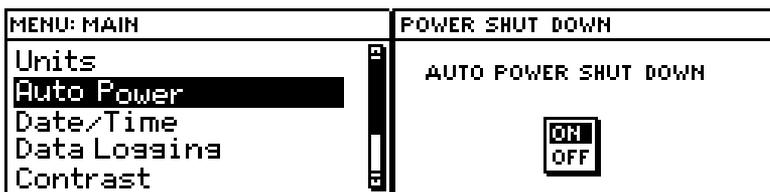
- 5.2.1 Press the ▲ or ▼ arrows on the Main Menu until **Units** is highlighted. Press . Press the ▲ or ▼ arrows to select **Fahrenheit** or **Celsius**. Press  to save your selection. The Main Menu will re-appear.



5.3 Auto Power

Auto Power is used by the monitor to save battery life. If Auto Power is turned on, the monitor will shut off after a few minutes of inactivity. If Auto Power is turned off, the monitor will remain on until the low-battery indicator appears, at which time the unit will shut off. The low battery indicator is set to appear when there is 8 minutes of battery life remaining. Once it has reached the end of the 8 minutes the monitor will automatically shut down.

- 5.3.1 Press the ▲ or ▼ arrows on the Main Menu until **Auto Power** is highlighted. Press . Press the ▲ or ▼ arrows to select **ON** or **OFF**. Press  to save your selection. The Main Menu will re-appear.



5.4 Date/Time

- 5.4.1 Press the ▲ or ▼ arrows on the Main Menu until **Date/Time** is highlighted. Press **enter**. To change a date or time, press the ▲ ▼ and/or ◀ ▶ arrows until the portion of the date or time that needs to be changed is highlighted. Press **enter**. If there are two digits (e.g., Year), press the ◀ or ▶ arrows to toggle between the two digits. Press the ▲ or ▼ arrows until the desired value is displayed in the field. Press **enter** to save your selection. Repeat until the date and time are correct. Press **esc** to return to Main Menu.

MENU: MAIN	TIME / DATE
Units	11 / MR / 04 02:37:28 P
Auto Power	
Date/Time	
Data Logging	
Contrast	

5.5 Data Logging Memory

- 5.5.1 Press the ▲ or ▼ arrows on the Main Menu until **Data Logging** is highlighted. Press **enter**.

MENU: MAIN	MENU: DATA LOGGING OPTIONS
Data Logging	Memory Wrap/Stop Reset Memory
Contrast	
Font Size	
System Properties	
Demo	

- 5.5.2 This function is used to adjust how the monitor will react when its data memory is full. Press the ▲ or ▼ arrows on the Menu Data Logging Options screen until **Memory Wrap/Stop** is highlighted. Press **enter**. If you want the monitor to overwrite the oldest sensor readings when the memory is full, select **Wrap**. Select **Stop** to prevent the old information from being overwritten. Press **enter** to save your choice. If finished, press **esc** to return to the Main Menu.

NOTE: There are approximately 25,000 data storage points in a monitor. Generally, this is large enough to hold one-years' worth of measurements.

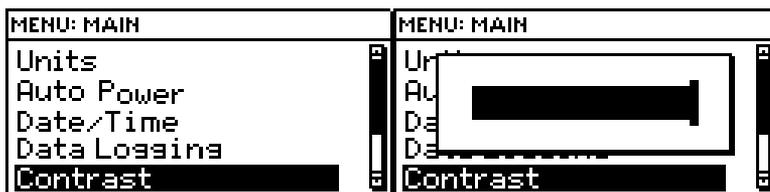
- 5.5.3 To remove all the data that has been logged in the monitor's memory, press the ▲ or ▼ arrows on the Menu Data Logging Options screen until **Reset Memory** is highlighted. Press **enter**. Select **YES** to clear the monitor's memory. Select **NO** to leave the data in memory. Press **enter**. The Menu Data Logging Options screen will re-appear. Press **esc** to return to the Main Menu.

IMPORTANT! Do not erase the unit's memory unless you are absolutely sure you want to erase all the data. This process is non-reversible.

- 5.5.4 To reset the memory for a specific group or cable, see Section 8.3, Deleting Group and Cable Data.

5.6 Contrast

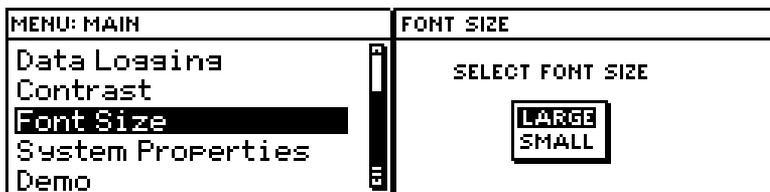
- 5.6.1 Press the ▲ or ▼ arrows on the Main Menu until **Contrast** is highlighted. Press **enter**. Press the ◀ or ▶ arrow to adjust the contrast on the screen. Press **enter** to save your selection. The Main Menu will re-appear.



5.7 Font Size

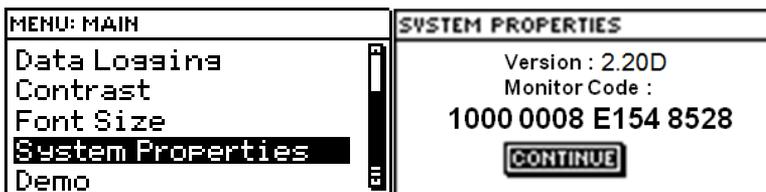
The size of the font for the latest sensor readings screen can be adjusted. When large font is selected, three columns and five rows will be shown on the display screen without having to scroll. For the small font, four columns and eight rows are displayed.

- 5.7.1 Press the ▲ or ▼ arrows on the Main Menu until **Font Size** is highlighted. Press **enter**. Press the ▲ or ▼ arrow to select either **LARGE** or **SMALL** font. Press **enter** to save your selection. The Main Menu will re-appear.



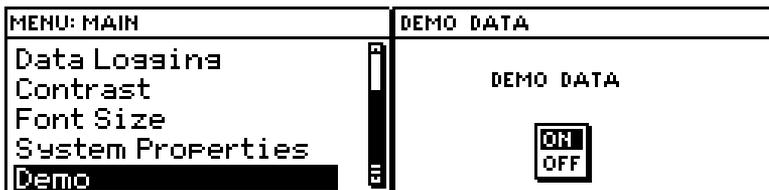
5.8 System Properties

- 5.8.1 Press the ▲ or ▼ arrows until **System Properties** is highlighted. Press . The software version number and the 16-digit monitor code are provided. Press  to return to the Main Menu.



5.9 Demo Mode

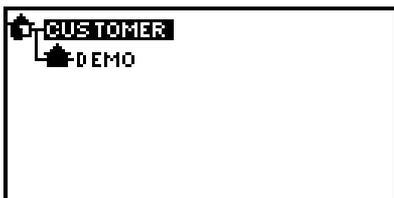
- 5.9.1 To view demonstration data that displays the capabilities of the monitor, press the ▲ or ▼ arrows until **Demo** is highlighted. Press . Press the ▲ or ▼ arrows to select **ON** or **OFF** to display the demonstration data. Press . The Main Menu will re-appear.



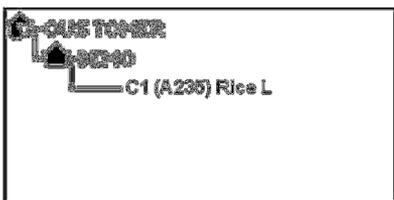
6.0 Working with Demo Mode

6.1 Exploring Sites

- 6.1.1 When the StorMax monitor is first turned on, it will default to the View screen. Press  at anytime to return to the View menu.



- 6.1.2 Press the ▼ arrow to select a group from the list.
- 6.1.3 Press the ► arrow to display all of the cables that have been programmed for the selected group. Press the ▼ arrow to select a cable.



6.2 Viewing the Latest Sensor Results

- 6.2.1 To view the latest sensor results for temperature, relative humidity, and moisture content for a Group, or a cable in a group, press the ▲ or ▼ arrows until the Group Name or Cable Name is highlighted. Press .



6.2.2 A table showing the latest sensor results will appear.

TEMP		RH%RH		MC%MC	
20	51.5	12.8	S 4		
3.0	52.5	13.7	S 3		
2.0	54.0	13.9	S 2		
9.0	54.5	14.1	S 1		

NOTE: When only temperature cables are used and the font size is set at large, up to three different cables will appear on the screen for the selected group. When moisture cables are used and the font size is large, the temperature, relative humidity, and moisture content *for only one cable* is displayed on the screen.

6.2.3 Arrows at the bottom of the screen indicate that there are additional cables for the group not displayed on the screen. Press the ◀ or ▶ arrows to scroll through the various cables. Arrows along the right-hand edge of the screen indicate that additional sensors are not displayed on the screen. Press the ▲ and ▼ arrows to scroll through the different sensors on the cable.

The following are two examples that illustrate the selection of different temperature cables and the viewing of additional sensors. The column with the darker border shows the selected cable (which is BIN2 in the first example and BIN1 in the second).

NORTH ROW		12.FE.04		9:21:04 A			
72.7	72.7	72.7	S 5	72.7	72.7	72.7	S 7
73.0	73.0	73.0	S 4	73.0	73.0	73.0	S 6
73.2	73.2	73.2	S 3	73.2	73.2	73.2	S 5
73.6	73.6	73.6	S 2	73.6	73.6	73.6	S 4
73.2	73.2	73.2	S 1	73.2	73.2	73.2	S 3

IMPORTANT! Sensor readings for a cable that is not shown on the screen may indicate that grain spoilage is occurring. Ensure you scroll through all the sensors and cables to view every result. Failure to do so may result in damaged product.

IMPORTANT! Cables in a group may have been measured at different days and times. Use the ◀ and ▶ arrows to highlight the cable, which allows you to read the time and date that the readings were recorded at the top of the screen. For example, a cable may become disconnected from the group and its results may be significantly older than the other cables. When analyzing data, ensure all measurements are current.

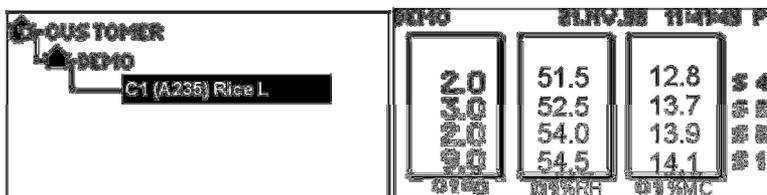
6.2.4 When viewing the latest results, press **menu** to access the data logging and screen display options. Press the **▲** and **▼** arrows to select **Log Bin New Data** or **Log All New Data** to save the latest results. Press **enter**. This automatically adds the captured data to the monitor's memory, which enables it to be used for future analyses.

Press the **▲** and **▼** arrows to select **Show Temp**, **Show RH**, or **Show MC** on the display screen. Press **enter**. All three categories can be selected for viewing on the main display screen. Categories selected for viewing will have an asterisk beside their name.

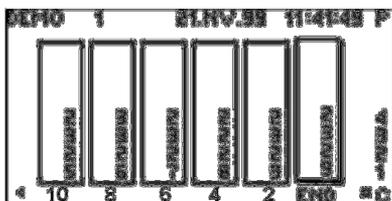


6.3 Comparing Historical Results

6.3.1 Select the latest sensor results for the cable you wish to view (see Step 6.2.1).



6.3.2 Press **page** once to display the historical results screen.



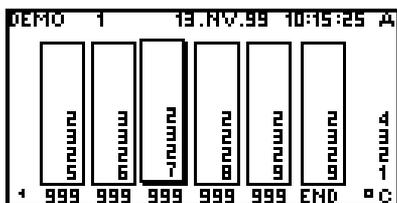
The column called END (far right) shows the latest temperature results, which is the same as those shown in the latest sensor results table (see Step 6.3.1). The other columns show the results from previous readings. The number under the column indicates the time that has elapsed between the last sensor reading and the readings in that column. For example, if the End reading occurred on November 21 (as indicated by the highlighted column and the date on the top of the

screen), then the reading to the immediate left was taken two days earlier on November 19.

Note: All sensor values on this screen have been rounded to even values. This allows more values to be displayed on the screen at one time.

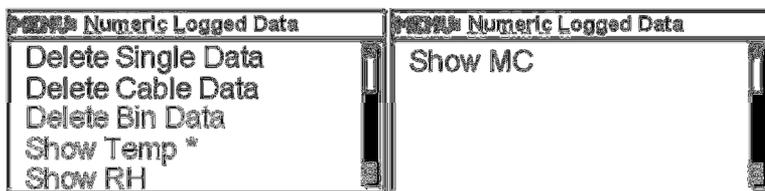
Note: The description of the units that are being displayed is shown on the bottom right corner of the screen.

- 6.3.3 Press the ◀ or ▶ arrows to select an historic cable reading. The time and date that the reading was taken will be display at the top of the screen.



NOTE: Only one cable reading can be selected for display at a time. When a new reading is selected, the previously selected reading is automatically deselected.

- 6.3.4 When viewing historical results, press ^(menu) to access the screen display and data deleting options. Press the ▲ and ▼ arrows to select **Show Temp**, **Show RH**, or **Show MC** on the historical data display screen. Press ^(enter). The category that has been selected for viewing will have an asterisk beside its name.



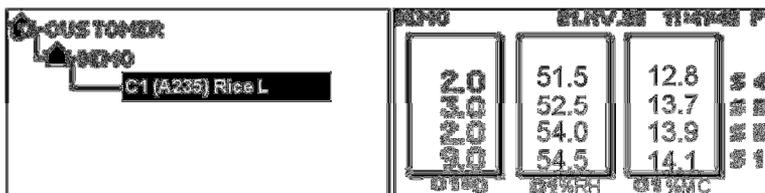
NOTE: Only one category can be selected for display at a time. When a new category is selected, the previously selected category will automatically be deselected.

Press the ▲ and ▼ arrows to select **Delete Single Data**, **Delete Cable Data**, and **Delete Bin Data** to remove the data from the handheld monitor. Press **enter**. The selected data will be automatically removed from the monitor's memory.

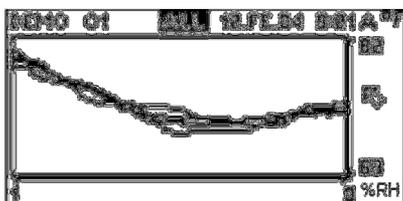
IMPORTANT! Ensure that the correct data is selected for deletion because once it is deleted, it cannot be recovered.

6.4 2D Graph

- 6.4.1 Select the latest sensor results for the cable you wish to view (see Step 6.2.1).

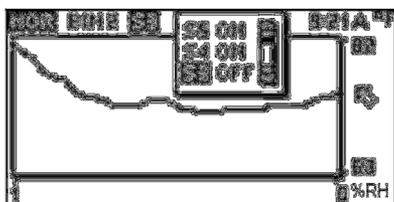


- 6.4.2 Press **page** two times or press **esc** once to display the 2D Graph screen. The Group and cable name will appear in the top left corner of the screen.



Note: The description of the units that are being displayed is shown on the bottom right corner of the screen.

- 6.4.3 To check which sensors are included on the graph (including the line on the graph), press the ◀ or ▶ arrows and select **ALL** at the top of the screen. Press **enter**. Press the ▲ or ▼ arrows to select the desired sensor.

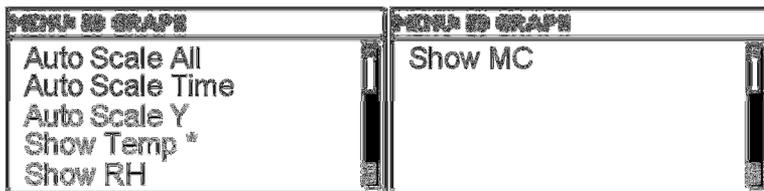


Once the desired sensor is selected, press the ▶ arrow to highlight **ON** or **OFF**. Press **enter** to toggle between **ON** or **OFF**. Press ◀ after your

selection. Repeat the steps for the other sensors. Press **ESC** when finished.

NOTE: When finished reviewing data, always remember to turn the sensors back on because the monitor will remember the last settings.

- 6.4.4 When viewing 2D Graphs, press **menu** to access automatic scaling and to show the different types of sensor categories that can be displayed on the graph. Press the **▲** and **▼** arrows to select **Auto Scale All**, **Auto Scale Time**, or **Auto Scale Y**. Press **enter**. These settings will automatically adjust the display of the graph (the X scale, Y scale, or both) to fit all the data points on the screen.



NOTE: It is also possible to manually scale graphs by moving the cursor to either the number of days on the bottom scale and entering new values, or moving the cursor to the minimum and maximum value on the right hand side of the graph and manually entering new values. The graph will automatically adjust to the values entered.

Press the **▲** and **▼** arrows to select either **Show Temp**, **Show RH**, or **Show MC** on the 2D Graph. Press **enter**. The category that has been selected for viewing on the graph will have an asterisk beside its name.

NOTE: Only one category can be selected for display at a time. When a new category is selected, the previously selected category will automatically be deselected.

NOTE: When selecting the moisture category, it may take a few seconds for the results to display, depending on the number of sensors on the cable and the amount of data stored.

6.5 Disabling Demo Mode

After you are familiar with the features and functionality of Demo Mode, it needs to be disabled so that the Address A1 can be used to configure your site's cable addresses.

- 6.5.1 After you have finished reviewing the Demo Mode and before you turn it off, you may want to compare what you learned in the demo with the *Plan View of Your Site* and *Cable List* that was prepared in Section 4, *Defining Your Site*. Sometimes seeing how the monitor displays and compares results may cause you to re-think how the original site plan and cable list was defined.
- 6.5.2 To disable Demo Mode, follow the instructions provided in Section 5.9.

7.0 Configuring StorMax

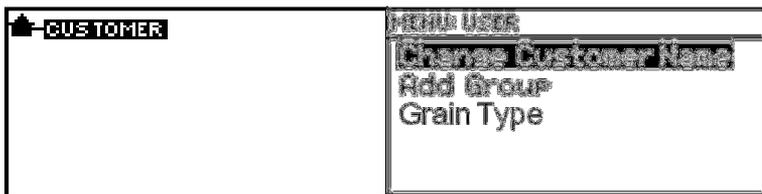
This section of the manual provides the procedures that are required to accurately configure (set up) your StorMax handheld monitor. Ensure you have the *Plan View of Your Site* and *Cable List* that was prepared in Section 4, Defining You Site, handy for completing this section.

IMPORTANT: *It is extremely important that all of the information in this section of the manual be read and completed before any grain monitoring procedures are performed. Failure to do so may cause the monitor to be set up incorrectly, which will prevent you from taking full advantage of the monitor's features to help you protect the quality of your stored grain.*

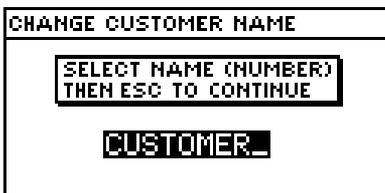
The Configuring StorMax procedures are written as step-by-step instructions that must be followed in the order they appear.

7.1 Change Customer Name

7.1.1 Press  to return to the View screen. Press .



7.1.2 Use the ▲ and ▼ arrows to highlight the **Change Customer Name** option. Press .



7.1.3 Press the ▲ arrow to erase the current name. Press  to create a new Customer Name.

7.1.4 With the cursor highlighted on the first space, use the ▲ and ▼ arrows to select a letter between A and Z. For the first character of the Customer Name, only letters can be used.

7.1.5 When you have finished selecting a letter for the first space, press the ► arrow to move to the next character. Press the ▲ and ▼ arrows to select a letter between A and Z or a number between 0 and 9. If you want a blank space in your Customer Name, select the space character

that is located between the letter A and the number 9. Up to a total of nine characters can be used to create a Customer Name.

Repeat this step until the Customer Name is completely entered.

7.1.6 Press  to save the new name.

7.1.7 Press  to return to the View screen. The new name should appear in the top left corner of the screen.

7.2 Add Group

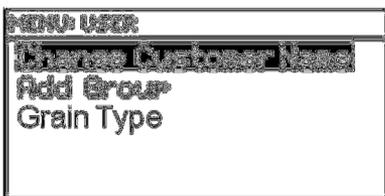
The group, or groups, you defined earlier now need to be entered into the StorMax monitor in the same order as they appear on the *Cable List*.

REMINDER: A group is any number of cables that are connected together.

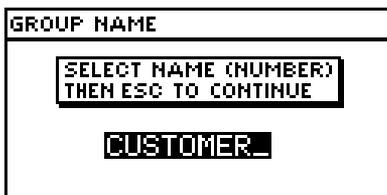
7.2.1 Press  to return to the View screen. The group that will be entered will appear below the Customer Name (if other Group Names have already been added, the new name will appear below the Group Name that was highlighted by using the ▲ and ▼ arrows). Press .



7.2.2 Press the ▲ and ▼ arrows to highlight the **Add Group** option.
Press .



- 7.2.3 Press the ▲ and ▼ arrows to scroll through the Group Names that have already been entered, or select the option with the blank fields to create a new name. By scrolling through the names that have already been entered, you may find a similar name that only requires one or two characters to be changed. Press .

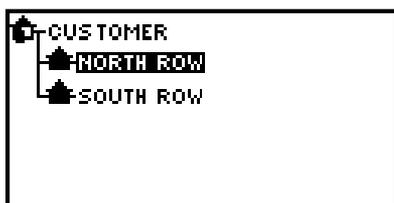


- 7.2.4 With the cursor highlighted on the first space, use the ▲ and ▼ arrows to select a letter between A and Z. For the first character of the Group Name, only letters can be used.
- 7.2.5 When you have finished selecting a letter for the first space, press the ► arrow to move to the next character. Press the ▲ and ▼ arrows to select a letter between A and Z or a number between 0 and 9. If you want a blank space in your group name, select the space character that is located between the letter A and the number 9. Up to a total of nine characters can be used to create a Group Name.

Repeat this step until the Group Name is completely entered.

- 7.2.6 Press  to save the new name.
- 7.2.7 Press  to return to the View screen. The name will appear below Customer Name.
- 7.2.8 Repeat Steps 7.2.1 to 7.2.7 until all the groups on the *Cable List* are entered into the StorMax monitor.

After all of the groups have been added, the View screen will appear similar to the example shown below.



NOTE: If a Group Name was missed when the monitor was configured and its order is important on the View screen, do the following. Press

 to return to the View screen. Press the ▲ or ▼ arrows and

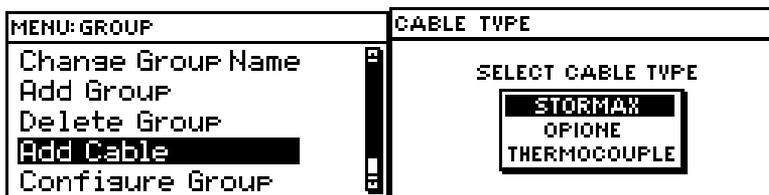
highlight the Group Name that will appear just above the group that is to be added. Press . Complete Steps 7.2.2 through 7.2.7.

NOTE: If a Group Name was entered out of the desired order and the sequence on the View screen is important, the existing Group Name must be deleted (see Section 11.4) and then re-added according to the above instructions.

7.3 Add Cables and Assign Addresses

The Cable Name and its address are now entered into the StorMax monitor in the same order as they appear on the *Cable List*. If you only have OPI-ONE or Thermocouple cables, skip to Section 7.4.

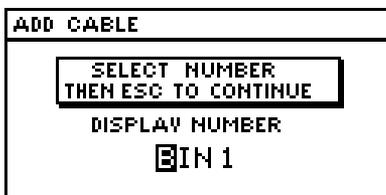
- 7.3.1 Press  to return to the View screen. Press the ▲ or ▼ arrows to highlight the name of the group where you want to add the new cable. If you already have cables added to the group and you highlight a cable other than the last cable on the list, the new cable will appear after the highlighted cable and not at the end of the list (to correct, delete the incorrectly located cable and re-add it properly). Press .
- 7.3.2 Use the ▲ and ▼ arrows to highlight the **Add Cable** option. Press  to access the Cable Type screen.



- 7.3.3 Use the ▲ and ▼ arrows to highlight the type of cable installed in the storage structure. The different types of cable are described as follows:
- StorMax – select for StorMax digital cables (for both temperature and moisture cables)
 - OPI-ONE – select for OPI older-style analog cables
 - Thermocouple – select for use with thermocouple cables.

Highlight **StorMax**. Press .

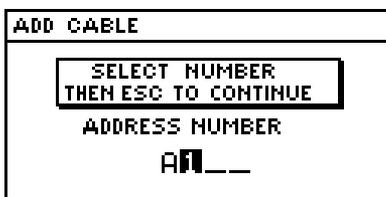
- 7.3.4 Press the ▲ and ▼ arrows to scroll through the available choices (if any), or select the option with the blank fields to create a new Cable Name. Press .



```

ADD CABLE
-----
SELECT NUMBER
THEN ESC TO CONTINUE
-----
DISPLAY NUMBER
BIN 1
    
```

- 7.3.5 With the cursor highlighted on the first space, use the ▲ and ▼ arrows to select a letter between A and Z or a number between 0 and 9 for the first character.
- 7.3.6 Use the ◀ and ▶ arrows to move the cursor left and right between the various characters. Repeat Step 7.3.5 until the Cable Name on the monitor matches the cable name on the *Cable List*.
- 7.3.7 Press  to save the Cable Name.
- 7.3.8 Press . The Addressing screen will appear. If the address that appears on the screen matches the address on your *Cable List*, skip to Step 7.3.9.



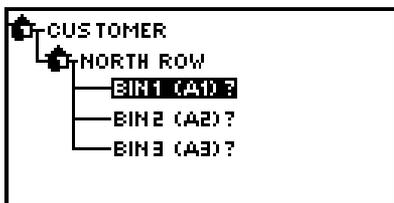
```

ADD CABLE
-----
SELECT NUMBER
THEN ESC TO CONTINUE
-----
ADDRESS NUMBER
A00__
    
```

If the address does not match, press . With the cursor highlighted on the first numeric field, use the ▲ and ▼ arrows to select a new number between 0 and 9 for the first character. Use the ◀ and ▶ arrows to move the cursor left and right between the various numeric values. Continue until the cable address on the monitor matches the address on the *Cable List*. Press  to save the address.

- 7.3.9 Press . A screen will appear asking if you would like to connect the cable now.
- 7.3.10 Press the ▲ and ▼ arrows and highlight the **Later** option. Press . The view screen will appear displaying the cable that was just entered for the Group Name.

The cable will appear as shown in the following example: BIN1 (A1) ? — where BIN1 is the cable name, A1 the Address, and ? means the cable has not been programmed.



- 7.3.11 Repeat Steps 7.3.1 to 7.3.10 for the remaining cables. As mentioned, the new cables will appear below the highlighted cursor position. For example, if highlighting ‘Bin 1 (A1) ?’ as shown in the example above, the next cable will appear between ‘Bin 1 (A1) ?’ and ‘Bin 2 (A2) ?’.

NOTE: If a cable was missed when the monitor was configured and its order is important on the View screen, do the following. Press  to return to the View screen. Press the ▲ or ▼ arrows and highlight the Cable Name that will appear just above the cable that is to be added (see the example in Step 7.3.11). Press . Complete Steps 7.3.2 through 7.3.10.

7.4 Adding OPI-ONE and Thermocouple Cables

The older style OPI-ONE and Thermocouple cables have analog sensors, which means that they cannot be addressed to a specific storage structure and cable name as the newer StorMax cables. Therefore to accurately log data in a StorMax monitor, the name for each type of cable is needed.

To enable logging of an OPI-ONE or Thermocouple cable, the cable must be added to the system. Please follow the instructions below to add these types of cables.

- 7.4.1 Turn the monitor Off.
- 7.4.2 Ensure the OPI-ONE or Thermocouple adapters are disconnected from the handheld monitor.
- 7.4.3 Press  to turn the monitor on. You will now be in View mode.
- 7.4.4 Press the ▲ or ▼ arrows to highlight the name of the group where you want to add the new cable. If you already have cables added to the group and you highlight a cable other than the last cable on the list, the new cable will appear after the highlighted cable and not at the end of the list (to correct, delete the incorrectly located cable and re-add it properly). Press .

7.4.5 Use the ▲ and ▼ arrows to scroll down to **Add Cable**. Press **enter**.
Select cable type as OPI-ONE or Thermocouple. Press **enter**.

7.4.6 Press the ▲ and ▼ arrows to scroll through the available choices (if any), or select the option with the blank fields to create a new Cable Name. Press **enter**.

ADD CABLE

SELECT NUMBER
THEN ESC TO CONTINUE

DISPLAY NUMBER
IN 1

7.4.7 With the cursor highlighted on the first space, use the ▲ and ▼ arrows to select a letter between A and Z or a number between 0 and 9 for the first character.

7.4.8 Use the ◀ and ▶ arrows to move the cursor left and right between the various characters. Repeat Step 7.4.7 until the Cable Name on the monitor matches the cable name on the *Cable List*.

7.4.9 Press **enter** to save the Cable Name.

7.4.10 Press **esc**. The Number of Sensors screen will appear. If the number displayed corresponds to the number of sensors on your cable, skip to Step 7.4.11.

If the number of sensors does not correspond, press **enter**. With the cursor highlighted on the first space, use the ▲ and ▼ arrows to select a number between 0 and 9 for the first character. Use the ◀ and ▶ arrows to move the cursor left and right between the various characters and use the ▲ and ▼ arrows to select a number between 0 and 9 for the required fields. When completed, press **enter** to save the number of sensors for that cable.

7.4.11 Press **esc** to finish adding OPI-ONE or Thermocouple cable to the group. The View screen will re-appear.

7.4.12 The cable appears in the View screen as C1 (ID) or C1 (IT) — where C1 is the cable name, and ID is for OPI-ONE and IT is for a Thermocouple cable.

NOTE: To add additional OPI-ONE or Thermocouple cables, see Section 10.3.

7.5 Grain Type

If only temperature cables are being monitored, skip to Step 7.6.

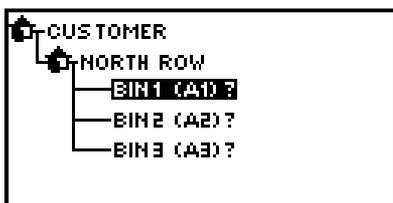
When StorMax moisture cables are used, the type of grain stored in a structure needs to be entered into the monitor to ensure that the correct moisture content is calculated for the grain. Moisture content is determined by the temperature and relative humidity sensor readings, which are then combined with the grain curve that has been entered into the software program. To ensure accurate results, the type of grain is required by the monitor to ensure the correct curve is used when determining the moisture content for the grain. Moisture data can be drastically different depending upon which type of grain is selected.

Different steps can be used to configure the monitor for Grain Type. It can be configured by group, cable, or customer. These options provide simplicity when configuring monitors. For example, multiple cables in a storage structure can be configured at the group level. This makes all the cables in that group the same Grain Type, rather than having to configure each individual cable one at a time.

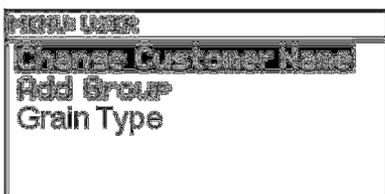
The grain type can be changed any time the grain stored in the bin is changed. Be sure to update the grain type when the grain stored in the bin changes, or the monitor readings will be in error.

To add Grain Type to cables in a group...

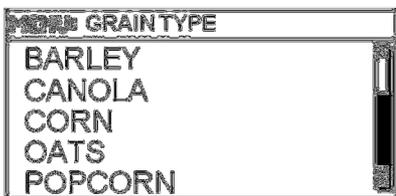
- 7.5.1 Press  to return to the View screen. Press the ▲ or ▼ arrows to highlight the name of the group containing the cables that need to be configured. Press .



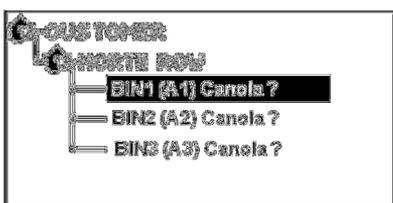
- 7.5.2 Press the ▲ and ▼ arrows to highlight the **Grain Type** option. Press .



- 7.5.3 Press the ▲ and ▼ arrows to scroll through the various types of grain. Highlight the correct Grain Type. Press **enter**.

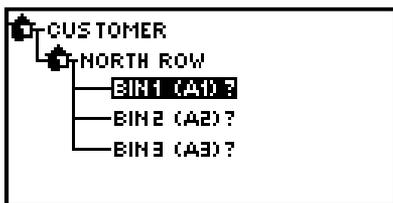


- 7.5.4 The View screen will re-appear. The same Grain Type will be added to all the cables in that Group. The ? remains because the cable still needs to be programmed.

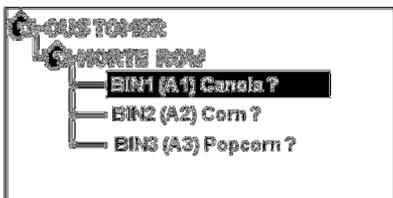


To add Grain Type to a specific cable...

- 7.5.5 Press **view** to return to the View screen. Press the ▲ or ▼ arrows to highlight the cable in the group that needs to have Grain Type added. Press **menu**.

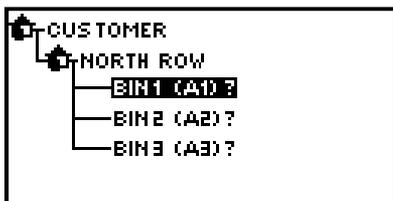


- 7.5.6 Repeat Steps 7.5.2 to 7.5.3. The View screen will re-appear. Grain Types can be added to different cables in a group. The ? remains because the cable still needs to be programmed.



To add Grain Type to cables by customer...

- 7.5.7 Press **view** to return to the View screen. Press the ▲ or ▼ arrows to highlight the Customer Name in the top right corner. Press **menu**.



- 7.5.8 Repeat Steps 7.5.2 to 7.5.3.

- 7.5.9 A warning screen will appear telling you that you are about to change all of the cables for this customer to a new Grain Type. Press the ▲ and ▼ arrows to select either **YES** to proceed with the change or **NO** to return to the View screen. Press **enter**.



7.6 Organizing the Sensing Cables

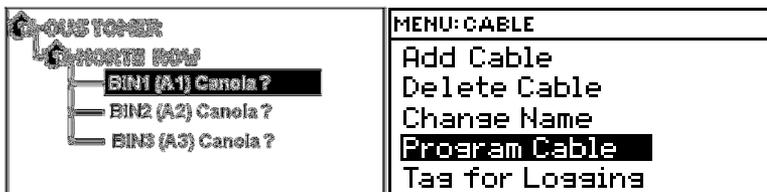
- 7.6.1 Put the StorMax monitor aside.
- 7.6.2 Locate the *Cable List* completed in Step 4.3.
- 7.6.3 Organize the sensing cables into groups in the same order as shown on the *Cable List*.
- 7.6.4 On top of each cable, write the Cable Name and Address using the permanent marker.

7.7 Program Cables

NOTE: OPI-ONE or Thermocouple cables do not need to be programmed.

The cable information you recorded on your *Cable List*, along with the actual cables that you organized in Step 7.6, will now be used to program the addresses of the cables in the StorMax monitor.

- 7.7.1 Press **view** to return to the View screen. Press the ▲ or ▼ arrows to highlight the group containing the cable that needs to be programmed. Use the ► arrow to list the cables assigned to the group. Press the ▲ or ▼ arrows to highlight the cable to be programmed. Press **menu**.



- 7.7.2 Use the ▲ and ▼ arrows to highlight **Program Cable**. Press **enter**.

- 7.7.3 The Connect the Cable screen will appear. Connect the corresponding cable to the top of the monitor.

IMPORTANT! Ensure that the correct sensing cable is connected to the monitor to match the cable that is being programmed.

IMPORTANT! Do not connect more than one cable to the monitor. Cables can only be programmed individually. Failure to do so may make some of the sensor readings inaccessible to the monitor.

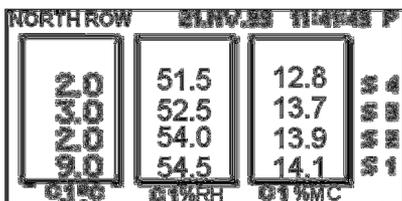
- 7.7.4 Use the ▲ and ▼ arrows to highlight **OK**. Press **enter**.

- 7.7.5 The View screen will re-appear. The cable you just programmed will be highlighted. Before proceeding to program the next cable, verify that the highlighted cable

- is in the correct group.
- has the correct Cable Name.
- has the correct address (in brackets).
- has the correct Grain Type.
- has the letter L beside the address to denote that the cable is set for logging.



- 7.7.6 After a few seconds, a Please Wait message will appear on the screen. Shortly after that, the main sensor reading screen will appear.



Verify that the main sensor screen displays

- the correct group name in the top left corner.
- the correct cable names below each column.
- a complete set of sensor readings that corresponds to the sensor numbers on the cable, with S1 at the bottom of the cable.

If a ▲ symbol appears in the top right corner above the list of sensors, then there are more sensors on the cable than what is visible on the screen. Press the ▲ arrow button on the monitor to view the remaining sensors.

- 7.7.7 When you unplug the cable, a message screen will appear asking if you want to log the data (readings). Logging enables you to store the data in permanent memory for viewing in the historic table and 2-D graph modes for future analyses. To log the data, use the ▲ and ▼ arrows to highlight **LOG**. Press  to store the readings. If you do not want to store the readings, use the ▲ and ▼ arrows to highlight **Cancel**. Press .

NOTE: The 2-D graph screen will look incomplete until there are enough readings over a period of time to create a trend. To see what a trend could look like, refer to Section 6.4, 2D Graph, of this manual.

- 7.7.8 Repeat Steps 7.7.1 to 7.7.7 for the remaining cables that need to be programmed.

7.8 Configuring Cables for Data Logging

Sensor results must be stored in the monitor's memory for use in the 2D graph and historical results screens. To accomplish this, the digital StorMax temperature and moisture cables must be configured for logging. Configuration allows the monitor to recognize each cable according to its individual address, and then automatically stores the data relating to the cable.

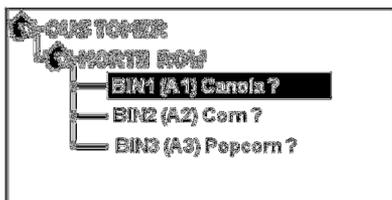
NOTE: OPI-ONE and Thermocouple cables do not need to be pre-configured to allow for data logging. Since these cables are analog and

do not have unique identifying addresses, logging is a manual process that requires users to specify which cable name the logged data is to be associated with.

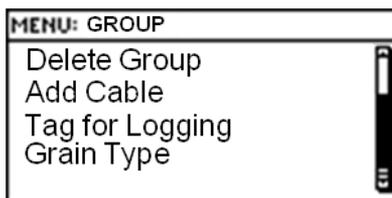
Similar to Grain Type, data logging can be configured as a group or by individual cable.

To add data logging to cables by group...

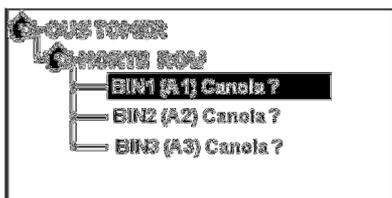
- 7.8.1 Press  to return to the View screen. Press the ▲ or ▼ arrows to highlight the name of the group that contains the cables that you want to add logging. Press .



- 7.8.2 Press the ▲ and ▼ arrows to highlight the **Tag for Logging** option. Press .



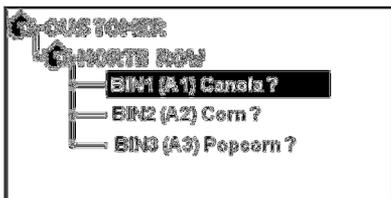
- 7.8.3 A Tag Cable for Logging screen will appear asking you to confirm that you want all the cables in the selected group to be logged. Press the ▲ and ▼ arrows to select either **ON** to proceed with logging or **OFF** to not proceed. Press  to return to the View screen.



NOTE: The ? on the View screen for the cable that was just tagged for logging will not change until the cable has been programmed.

To add data logging to a cable...

- 7.8.4 Press  to return to the View screen. Press the ▲ or ▼ arrows to highlight the cable in the group that you want to add logging. Press .



- 7.8.5 Repeat Steps 7.8.2 to 7.8.3.

7.9 Install Cables and Interconnects

Install the cables and interconnects in the storage structures according to the *Cable List*.

If any physical changes are made to the cables and interconnects during the installation process, those changes must be reflected in the StorMax monitor, the site drawing, and the list of cables to ensure that the monitor is accurately configured.

IMPORTANT: The monitor does not know which cable is installed in which location, so be sure to install the correct cable in its programmed location as identified by the cable names and addresses applied in Section 7.3.

7.10 Backing Up Configuration Data

You can back up the configuration data in the monitor, so that if the memory in your StorMax unit becomes lost or damaged, or if you need to replace the monitor, the settings in the monitor can be restored to a previous setting without having to manually reprogram the complete unit.

The configuration backup is part of the Integris Advance PC software functionality. Please refer to the Integris Advance User manual for instructions on how to backup your configuration. You will also require a KIT-U or KIT-A to connect the monitor to the PC.

8.0 Operating Your Monitor

8.1 Reading StorMax Cables

NOTE: Please see Section 10.0 if you are using OPI-ONE or THERMOCOUPLE cables.

- 8.1.1 To read a StorMax cable, or a string of StorMax cables, simply plug the cable lead into the top of the monitor. Within a few seconds, the monitor will automatically detect the cable and display the readings from all the sensors on the cable(s). Use the ▲ or ▼ arrows to view additional sensors on the cables, as well as use the ◀ or ▶ arrows to view additional cables, if they are present.

IMPORTANT! When reading StorMax cables, it takes approximately twice as long to read moisture cables as it does to read similar-sized temperature cables. It is especially important when the monitor is powered up and the first cable to be read to wait for the cable to be completely read, since the ‘Please Wait’ banner will only be held on the screen for about 10 seconds. If the cable is unplugged immediately after the banner closes (assuming it has finished reading the cable), then moisture data will be lost. After one cable is read, the ‘Please Wait’ banner stays up for as long as it takes to read the sensors on the cable.

- 8.1.2 If reading a three-wire system, simply plug the cable leads into the three-wire adapter cable. See Section 9, Three-Wire Adapter, for more details.

8.2 Logging StorMax Cable Results

NOTE: Please see Section 10.0 if using OPI-ONE or THERMOCOUPLE cables.

- 8.2.1 To log the results from the StorMax cables, ensure that the cables are programmed into the monitor correctly (see the sections Configuring StorMax or Expanding a Site).
- 8.2.2 Connect the lead of the cable/cables into the top of the StorMax monitor. The monitor will automatically recognize the cable and display the sensor results. If connecting with an optional three-wire adapter, connect the lead of the cables into the three-wire adapter.
- 8.2.3 Disconnect the lead of the cable/cables from the monitor. A menu will appear asking you to Confirm Data Logging. If you only plan to read this cable, select **LOG**. If you will be reading more than one cable, select **LOG AND ADVANCE**. Press  to log the data.

NOTE: Data can be logged for a group or cable with having to disconnect the lead from the monitor. When viewing the latest results for a cable's sensors, press . Press the ▲ and ▼ arrows to select **Log Bin New Data** or **Log All New Data**. Press . The Confirm Data Logging screen will appear. Use the ▲ and ▼ arrows to select **OK** to log the data or **CANCEL**. Press .

- 8.2.4 Repeat Steps 8.2.2 and 8.2.3 for all the cables/groups of cables you wish to log.

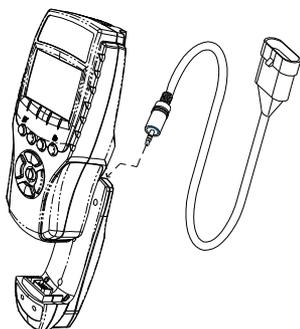
8.3 Deleting Group and Cable Data

- 8.3.1 Press  to return to the View screen. Press the ▲ or ▼ arrows to highlight the group and cable you want to delete the stored data. Press .
- 8.3.2 Press  to access the historical sensor results screen. Select the individual log you wish to delete by pressing the ◀ or ▶ arrows. Press . If you wish to delete all the information for this cable or group, just press .
- 8.3.3 Press the ▲ and ▼ arrows to select **Delete Single Data** if you wish to only delete the one logged data point. If you wish to delete all the logs for the cable, select **Delete Cable Data**. If you wish to delete all the logs for the entire group (multiple cables), select **Delete Bin Data**. Press .
- 8.3.4 Verify that the information on the screen is what you want to delete from the monitor. If it is, press the ▲ and ▼ arrows to select **YES**. If it not, then select **NO**. Press .

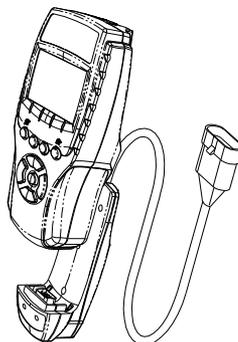
8.4 Deleting All Data from the Monitor

- 8.4.1 Press  twice to access the Main Menu.
- 8.4.2 Press the ▲ or ▼ arrows to highlight the **Data Logging** option. Press .
- 8.4.3 Press the ▲ or ▼ arrows to highlight the **Reset Memory** option. Press .
- 8.4.4 Press the ▲ or ▼ arrows and select **YES** to delete all logged data from the monitor. If you chose not to delete the logged data, select **NO**. Press . The Data Logging Options screen will re-appear.
- 8.4.5 Press  twice to return to your original screen.

9.0 MONI-KITU and MONI-3WIR Three-Wire Adapter



MONI-KITU



MONI-3WIR

9.1 Three-Wire Adapters

The StorMax monitor can connect to a three-wire temperature cable system using the MONI-KITU or the MONI-KITA.

The MONI-KITU contains a 1/8-inch, three-conductor, stereo-type jack at the top when attached to a StorMax monitor. A short lead wire with a three-conductor plug fits into the jack and results in an available 3WIR female connector. This enables customers with three-wire systems to connect to their cable systems without having to exchange adapters.

The MONI-3WIR Three-Wire Adapter connects to the StorMax monitor using the MONI-KITU unit. The adapter contains a hardwired three-conductor female connector in a dedicated adapter.

Either one of these adaptor unit can be fastened to the monitor using a small plastic clip on the back of the monitor and the electronic connector on the bottom. The clip is supplied with the adapter and must be installed on the monitor to securely attach the adapter. To attach the clip, complete the following steps:

- 9.1.1 Remove the screw completely that holds the battery cover in place.
- 9.1.2 Place the new longer screw through the small clip and washer, and then through the battery cover.
- 9.1.3 Press down against the monitor and align the tab on the clip into the recess in the back of the monitor.
- 9.1.4 Tighten the screw to securely fasten the battery cover and plastic clip.
- 9.1.5 Attach the adapter to the monitor by sliding the adapter onto the monitor by aligning the adapter with both the plastic clip and electronic connector on the monitor. Press together firmly to seat the adapter.

9.2 Viewing Cables with the Three-Wire Adapter

9.2.1 Three-wire cables are read exactly the same way as normal StorMax cables. The main difference is that three-wire systems usually have many cables connected together at one time and use a three-wire interconnection system.

In a three-wire system, StorMax cables are brought together in groups that may total over the CAP 100 rule, but if split into smaller groups, each group will be less than CAP100. These smaller groups are then connected in channels, such as INT3-0xLE, where the x equals the number of channels or groups. Common devices are INT3-01LE, INT3-02LE, and INT3-04LE.

The INT3-0xLE's are connected together, and then connected to the monitor using the three-wire interconnect, INT3. The INT3 has a three-wire male plug that fits into the Three-Wire Adapter's female plug.

9.2.2 To view temperature information for a three-wire system, just plug in the three-wire interconnect into the Three-Wire Adapter that is connected to the monitor. In a few seconds, the sensor readings for the cables will appear.

9.3 Adding a Cable in a Three-Wire System

Please refer to the regular StorMax adding a cable procedures outlined in Section 11.2, Expanding a Site.

NOTE: The programming must be completed for each cable individually using the StorMax two-wire port on the top of the monitor, even though the system will be connected using the Three-Wire Adapter.

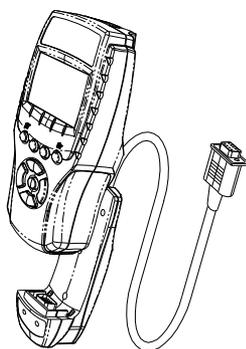
9.4 Logging Sensor Results

Please refer to the regular StorMax logging sensor results procedures included in Section 8.2, Logging StorMax Cable Results.

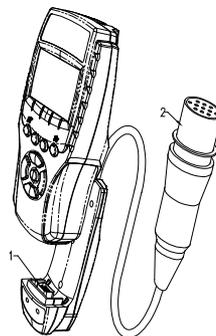
NOTE: The logging request screen will appear after the three-wire cable interconnect is disconnected from the monitor. Select to **LOG** the sensor results or **CANCEL** the logging.

NOTE: When disconnecting a three-wire connection, sensor data may change. To avoid this from happening, cancel the log data option prior to disconnecting the cable.

10.0 OPI-ONE and Thermocouple Adapters



OPI-ONE Adapter



Thermocouple Adapter

10.1 Connecting the OPI-ONE and Thermocouple Adapters

The OPI-ONE and thermocouple adapters connect to the StorMax monitor using the MONI-KITU unit. The unit fastens to the monitor using a small plastic clip on the back of the monitor and the electronic connector on the bottom. The clip is supplied with the adapter and must be installed on the monitor to securely attach the adapter. To attach the clip, use the following steps:

- 10.1.1 Remove the screw completely that holds the battery cover in place.
- 10.1.2 Place the new longer screw through the small clip and washer, and then through the battery cover.
- 10.1.3 Press down against the monitor and align the tab on the clip into the recess in the back of the monitor.
- 10.1.4 Tighten the screw to securely fasten the battery cover and plastic clip.
- 10.1.5 Attach the adapter to the monitor by sliding the adapter onto the monitor by aligning the adapter with both the plastic clip and electronic connector on the monitor. Press together firmly to seat the adapter.

10.2 Viewing OPI-ONE and Thermocouple Cable Results

The purpose of the StorMax monitor is to track all the cables in a system and organize them according to bins or structures. When a new monitor is first used, the customer has to set up the system. This is necessary to organize and log sensor information, but it is not necessary if the customer is only interested in viewing current information on a cable. Please see the section called Configuring StorMax for more information on how to set up a system.

To view sensor information for OPI-ONE or Thermocouple cables without having to set up the monitor to log data, perform the following steps.

- 10.2.1 Turn the monitor **ON**.
- 10.2.2 Plug the OPI-ONE or Thermocouple adapter into the monitor. The green data light on the adapter should start flashing.
- 10.2.3 Plug the OPI-ONE or Thermocouple adapter lead into the cable that is to be measured.
- 10.2.4 The monitor will show ‘OPI-ONE CABLE, Please Wait...’ or ‘Thermocouple CABLE, Please Wait...’ as it determines the sensor results for the cable. Once it is finished, it will show the results on the screen. Use the ▲ or ▼ arrows to view all the sensors.
- 10.2.5 If you want to perform an ohms check on the cable, press . Use the ▲ or ▼ arrows to highlight the **Ohm Check** option. Press . The monitor will show ‘Ohm Check, Please Wait...’ while the measurement is being performed. When completed, the ohms results will show immediately beside the sensor readings. Use the ▲ or ▼ arrows to view more sensors, sensor results, and ohms readings.

10.3 Adding OPI-ONE or Thermocouple Cables to the System

The older-style OPI-ONE and Thermocouple cables have analog sensors, which can be assigned to a specific bin and cable name. Unfortunately the monitor cannot identify the cables when they are connected. You will need to remember the name that was assigned to each cable to accurately log the data into the StorMax monitor.

To enable logging of an OPI-ONE cable, the cable must be added into the system. Please follow the instructions below.

- 10.3.1 Disconnect the OPI-ONE adapter from the monitor.
- 10.3.2 Turn the monitor **ON**. You will be in View mode.
- 10.3.3 Press the ▲ or ▼ arrows to highlight the group that you want to add the OPI-ONE cable. If adding the cable to a new group, first see Section 7.2, Add Group.
- 10.3.4 Proceed to add the cable as detailed in Section 7.4, Adding OPI-ONE and Thermocouple Cables, to the monitor.

10.4 Logging Sensor Results

If the cable has been configured properly in the system, sensor reading can be logged into the monitor as follows.

- 10.4.1 Turn the monitor **ON**.
- 10.4.2 Plug the OPI-ONE or Thermocouple adapter into the monitor. The green data light on the adapter should start flashing.
- 10.4.3 Plug in OPI-ONE or Thermocouple adapter lead into the cable that is to be measured.
- 10.4.4 The monitor will show ‘OPI-ONE CABLE, Please Wait...’ or ‘Thermocouple CABLE, Please Wait...’ as it determines the sensor results for the cable. Once it is finished, it will show the results on the screen.
- 10.4.5 When displaying the results for a cable, you can view additional sensors by moving the cursor to highlight the S in the bottom right of the screen, then press the ▲ and ▼ arrows to view the other sensors.
- 10.4.6 At the bottom of the screen, press the ◀ or ▶ arrows to highlight the Cable Name. For example, press the ◀ or ▶ arrows and highlight C1, then press . A menu will appear that lists all the cables in that group. Highlight the cable that is being measured.
IMPORTANT: It is extremely important that the cable that is being measured is the same one that is displayed at the bottom of the screen.
- 10.4.7 To log the data for the cable, press ◀ to move the cursor to **LOG**. Press . You have three choices. Select **LOG AND ADVANCE** to log the sensor readings for this cable and be prompted to connect the next cable or bin. This is a useful feature after the system has been set up and the user has established a standard sequence for monitoring cables. Select **LOG** to enter the sensor readings for the cable and bin and return to the measurement screen. Select **CANCEL** to not log the data. Press .
- 10.4.8 To view the logged data, see the section on Comparing Historical Results and 2D Graph.
- 10.4.9 If you want to perform an ohms check on the cable, press . Use the ▲ or ▼ arrows to highlight the **Ohm Check** option. Press . The monitor will show ‘Ohm Check, Please Wait...’ while the measurement is being performed. When completed, the ohms results will show immediately beside the sensor readings. Use the ▲ or ▼ arrows to view more sensors, sensor results, and ohms readings.

11.0 Maintaining the Monitor

11.1 Keeping the Monitor Current

It is very important that the quality of your grain be maintained at all times to protect your investment. Keeping the monitor's software and grain curves as current as possible is one step in achieving that goal. New enhancements, updated grain curves, and various other system updates (e.g., firmware) are periodically released to keep the software as current as possible. These updates as they become available can be downloaded on our website: www.advancedgrainmanagement.com.

It is best to check the website periodically to see if updates have become available. Updates to various grain curve files are the most common update and can greatly enhance your ability to read your moisture cables. The updates can be downloaded into the IntegrisAdvance software installed on the PC and then transferred onto the StorMax monitor.

- The files will be available for downloading from the OPIsystems website. Again, follow the instructions in the note to download the files onto your computer.

Please refer to the IntegrisAdvance User manual for instructions on these update procedures.

Note: Very important as this monitor comes with 3.1v hardware it is only compatible with firmware version 3.00D or newer. Use of firmware earlier than 3.00D will cause the monitor to lock up and become inoperable.

11.2 Expanding a Site

A grain storage site is rarely static. The addition of new groups and cables are two examples of changes that can occur. When this happens, use the following instructions to update the monitor so that it continues to provide you with accurate data for analysis.

- 11.2.1 Update the *Plan View of Your Site* and the *Cable List* that was developed in Step 4.3, Creating a Cable List, by adding any new Groups and/or cables.
- 11.2.2 Add new Groups to the StorMax monitor as instructed in Section 7.2, Add Groups.
- 11.2.3 Add new cables to the StorMax monitor as instructed in Section 7.3, Add Cables and Assign Addresses, and Section 7.4, Adding OPI-ONE and Thermocouple Cables.

- 11.2.4 Assign a grain type to the new Group or cable as instructed in Section 7.5, Grain Type.
- 11.2.5 Program the new cables as instructed in Section 7.7, Program Cables.
- 11.2.6 Assign data logging to the new Group or cable as instructed in Section 7.8, Configuring Cables for Data Logging.
- 11.2.7 Install the new cables as instructed in Section 7.10, Install Cables and Interconnects.

11.3 Changing Group Names

The name of a group can be changed without affecting the information that has been logged for that group.

- 11.3.1 Press  to return to the View screen. Press the ▲ or ▼ arrows to highlight the group that needs its name changed. Press . Use the ▲ and ▼ arrows to highlight the **Change Group Name** option. Press .
- 11.3.2 The name of the group will appear. Press  to modify the existing name. Skip to Step 11.3.4. To completely remove the name, press the ▲ arrow to create blank fields to create the new Group Name. Press .
- 11.3.3 With the cursor highlighted on the first space, use the ▲ and ▼ arrows to select a letter between A and Z. For the first character of the Group Name, only letters can be used.
- 11.3.4 When you have finished selecting a letter for the first space, press the ► arrow to move to the next character. Press the ▲ and ▼ arrows to select a letter between A and Z or a number between 0 and 9. If you want a blank space in your group name, select the space character that is located between the letter A and the number 9. Up to a total of nine characters can be used to create a Group Name.

Repeat this step until the Group Name is completely entered.
- 11.3.5 Press  to save the new name.
- 11.3.6 Press  to return to the View screen. The revised Group Name will be highlighted.

11.4 Deleting Groups

If a group is no longer required and the need for its historical information has passed, the group can be deleted from the StorMax monitor.

- 11.4.1 Erase the data that has been stored for the group. See Section 8.3, Deleting Group and Cable Data, for instructions on how to complete this task.
- 11.4.2 Press  to return to the View screen. Press the ▲ or ▼ arrows to highlight the Group Name that needs to be removed. Press . Use the ▲ and ▼ arrows to highlight the **Delete Group** option. Press . On the warning screen that appears, select **YES** to confirm that the group should be deleted or select **NO**. Press .

NOTE: When a group is deleted from the monitor, all of the cables that were assigned to that group are also deleted.

11.5 Changing Cable Names

The name of a cable can be changed without affecting the information that has been previously logged for that cable.

- 11.5.1 Press  to return to the View screen. Press the ▲ or ▼ arrows to highlight the cable in a group that needs its name changed. Press . Use the ▲ and ▼ arrows to highlight the **Change Name** option. Press .
- 11.5.2 The name of the cable will appear. Press  to modify the existing name. Skip to Step 12.4.4. To completely remove the name, press the ▲ arrow to create blank fields to create the new Cable Name. Press .
- 11.5.3 With the cursor highlighted on the first space, use the ▲ and ▼ arrows to select a letter between A and Z. For the first character of the group name, only letters can be used.
- 11.5.4 When you have finished selecting a letter for the first space, press the ► arrow to move to the next character. Press the ▲ and ▼ arrows to select a letter between A and Z or a number between 0 and 9. If you want a blank space in your group name, select the space character that is located between the letter A and the number 9. Up to a total of four characters can be used to create a Cable Name.
- Repeat this step until the Cable Name is completely entered.
- 11.5.5 Press  to save the new name.
- 11.5.6 Press  to return to the View screen. The revised Cable Name will be highlighted.

11.6 Deleting Cables

If a cable is no longer required and the need for its historical information has passed, the cable can be removed from the StorMax monitor.

- 11.6.1 Erase the data that has been stored for the cable that has to be replaced. See Section 8.3, Deleting Group and Cable Data, for instructions on how to complete this task.
- 11.6.2 Press  to return to the View screen. Press the ▲ or ▼ arrows to highlight the cable that needs to be removed. Press . Use the ▲ and ▼ arrows to highlight the **Delete Cable** option. Press . On the warning screen that appears, select **YES** to confirm the cable should be deleted or select **NO**. Press .

11.7 Replacing StorMax Cables

If a cable becomes inoperative and needs to be replaced in a storage structure, the old cable must be deleted from the StorMax monitor and a new cable added.

- 11.7.1 Complete Steps 11.6.1 and 11.6.2.
- 11.7.2 Add the new cable. See Section 11.2, Expanding a Site, for instructions on how to add new cables into the handheld monitor.

12.0 Detailed Battery Information

12.1 Battery Operation

Each DM StorMax monitor is equipped with 2 x 3.7V Lithium-Ion batteries. These batteries are custom to the DM StorMax monitor and must be used for the monitor to operate. Because of the custom nature of these batteries they cannot be purchased at a retail outlet. It is recommended that 3 x 1.5V AA alkaline batteries be used in the StorMax SM monitor.

NOTE: *The StorMax monitor must be turned off before the batteries are removed from the SM monitor. This ensures that the sensor readings in the monitor's memory are not lost.*

When the batteries are removed from the monitor, they must be replaced within 48 hours to ensure that sensor readings are not lost.

In the event that the StorMax monitor is left on, the Auto Power option will automatically turn the monitor off after a short period of time.

To disable the Auto Power feature, see Section 5.3.

12.2 Rechargeable Batteries

In the event that the 2 pack of Lithium-Ion is no longer able to hold a charge, please contact the dealer in which you purchased the DM StorMax monitor for replacement batteries, or alternatively contact OPIsystems Inc. directly in order to purchase replacements.

NOTE: In the DM StorMax monitor when the backlight is used, the batteries will provide up to 5 to 6 hours of continuous operation on a single charge.

12.3 Recharging the Batteries

A USB port is included on the MONI-KITU, which allows the monitor to be connected to a computer. When connected, the monitor uses the computer's on-board re-charging capability to recharge the batteries.

Although it is difficult to determine the exact lifespan of the batteries, with proper use and due care in storing the monitor within a climate controlled environment it is not unexpected to have them last a few storage seasons.

For older models of the StorMax monitor, an OPI AC adapter was used to recharge the batteries.

NOTE: Regardless of the method used to recharge the batteries in the StorMax unit, the ‘power’ light on the PC / Power Adapter unit will turn red to indicate that the batteries are being recharged. For USB connections, recharging will stop automatically when the batteries are fully charged. For AC Adaptors using MONI-KITA, only charge the batteries for a maximum of 12 hours.

IMPORTANT: *Follow these simple steps to attain the maximum battery life possible.*

- Keep the Auto Power function turned on to save battery life
- Use the monitor for short periods of time and recharge regularly
- Use the KITU to charge the batteries as it will automatically stop charging after 12 hours
- If you choose to use the KITA and DC adaptor the charging will not automatically stop after 12 hours. It is important not to charge the batteries longer than a maximum of 12 hours so you will need to manually stop the charging process
- Ensure the batteries are fully charged, before it is stored for long durations (more than a month). Do not remove the batteries (while in storage), as this may erase the monitor’s logged Temp/Moisture Data
- Keep the StorMax monitor in a temperature controlled environment when not in use.

Troubleshooting

NOTE: DM = Deluxe Monitor, SM = Standard Monitor, Sec = Section in this Manual

Problem	Cause	Solution
Does not turn ON	Low Battery Level	SM—replace batteries, Sec. 12.1 DM—recharge batteries, Sec 12.3
	Cold outside, screen too dim	Warm up monitor and change screen contrast to higher level, Sec 5.6
DM—does not turn ON after batteries recharged	Batteries worn out	Replace with 2 x 3.70 Lithium-Ion rechargeable batteries: Supplied by Dealer or OPIsystems, Sec 12.1
Screen hard to see	Contrast set too dim	Set contrast to a higher level, Sec 5.6
	Insufficient light	DM only—turn backlight on by pushing menu button for two seconds
	Monitor too cold	Keep monitor warm at >0°C, 32°F
Cannot find groups or cables in View screen	View screen explorer is closed	Use ► to open the Customer Name to show groups and use ► to open groups to show cables. Use ◀ to close groups. Use ▲ or ▼ to move up or down, Sec 6.1
Cannot program cable: message says 'Already Exists'	A1 used in Demo Mode	If programming A1, Demo Mode must be shut off, Sec 6.5. Alternatively start cable address at A2.
	The address is already used	Choose another address for the cable.
Cannot read cables: flashes message 'Three-Wire Temperature, Please Wait...'	Cable or interconnect has a short	Connect directly to the lead of several other cables. If at least one cable can be read, check for cable or interconnect damage and a good connection. Return cables for repair, if necessary. If a group of cables are connected together, isolate cables one at a time and check as above. If problem persists, call OPIsystems for support.

Problem	Cause	Solution
Cannot read cables: flashes message 'Three-Wire Temperature, Please Wait...'	Monitor defective	Cannot read any cable, return monitor for repair.
	INT3-0xLE defective	If in three-wire mode, check cables on all channels of INT3-0xLE for a short. In two-wire mode, check as above. If no short and cable works in two-wire mode, return INT3-0xLE for repair.
	Battery low	May have enough power to turn the unit on, but cannot read the cables. SM—replace batteries, Sec 12.1 DM—recharge batteries, Sec 12.3
	Large number of moisture cables connected at once	Please contact OPIsystems for assistance. A free of charge INT2-R cable extension is available which may correct this issue.
	Wrong adapter	Ensure adapter says MONI-OPIA before plugging into OPI-ONE cables
MONI-OPIA not reading	Batteries low	SM—replace batteries, Sec 12.1 DM—recharge batteries, Sec 12.3
Low Battery Warning	Worn or defective button pad	Return for repair
Buttons stick in down position	Using small font	Change to large font, Sec 5.7
Numbers on screen too small	Using large font	Change to small font, Sec 5.7
Would like to see more cables / sensors on the screen at once	Hidden from screen	Use the arrow buttons to access the cables and sensors that are beyond the size of the screen, Sec 6.2
Missing cables / sensors	Sensors or cables damaged	Check cable connected by itself. Repair if necessary.
	Software update available	Launch IntegrisAdvance on computer, attached monitor to USB or serial port on computer, and load program updates onto monitor.
	Cable not programmed into StorMax	??? will show as Bin display. Program the cable into a group, Sec 7.8

Problem	Cause	Solution
Cable will not log sensor results	Needs to be aligned	Ensure proper alignment of back clip and bottom connector. Press on firmly.
PC \ Power Adapter hard to put on monitor	Tight fit	Hold monitor upside down with bottom of adapter facing away from you. Place thumbs on upper corners of adapter and push firmly.
Adapter hard to get off monitor	Locking clip in place	Slide locking clip to free adapter
	Moisture mode not selected	Select moisture content mode, Sec 6.2.4.
Moisture Content not displayed	Moisture operation not activated	Obtain an MCODE from your dealer to activate your monitor for moisture operation. An MCODE charge will apply. See Section 5.1, Activate.
	Cable not programmed and grain type not selected	Ensure cable is programmed into a group and the proper grain type is selected. See Sections 7.0 Configuring StorMax and 7.5 Grain Type.



OPIsystems

Grain Quality Management

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