SD50

User's Guide

DOC-UG-SD50-00001

McCoy Global Austin - Tech Support:
TECHSUPPORTMG@MCCOYGLOBAL.COM
1.512.610.5204

McCoy Global Sales:
SALES@MCCOYGLOBAL.COM
1.512.610.5200

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WARNING!

This equipment must be operated by trained personnel. ALL safety related functions are the responsibility of the user. This equipment is NOT intended to replace personal responsibility for any safety related function.

This product must be used as specified in this manual. Using the product in any manor not specified in this manual or as specified by McCoy Global may negatively impact the protection capability of the product

1 Introduction

The SD50 is the next generation of the intelligent displays used in the McCoy Global product portfolio. It is integrated into product lines including the bridge crane load monitoring system, the boom crane load monitoring system and a variety of winch monitoring applications. The new display is highly configurable and can be used to monitor payloads and alarm the system level controller. The SD50 is a feature rich display and below are some of the features of the system.

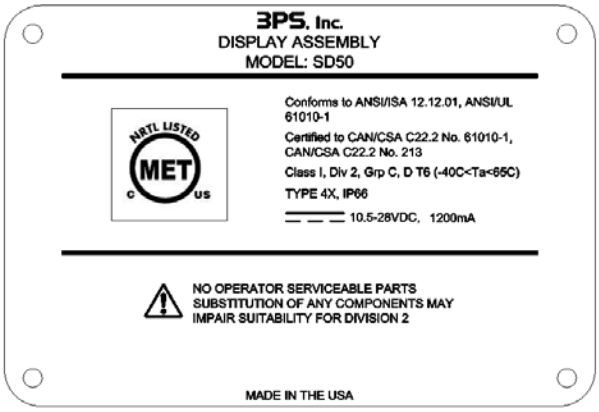
Features:

- Rugged enclosure.
- Daylight readable display
- 24/12 volt power supply
- Error proof connectivity using 5 pin Turk sealed cabling
- Simple menu driven display
- USB and Ethernet connectivity for field upgrades and data extraction
- Internal SD Card for data logging
- Two MGNet data interfaces for fast data monitoring
- NEMA 4X controller (316 Stainless sealed enclosure)
- Sonic Alarm
- Fifteen key data entry using stainless sealed buttons with tactile response overlay
- Four navigation stainless sealed buttons with tactile response overlay
- Industrial sealed Ethernet port available
- Industrial sealed USB port
- Indicators for alarm, power and warning
- No need for internal access

This product is intended for industrial application where it is installed only by trained personnel. It is not intended for commercial or private use. The product is designed for industrial use.

2 Area/Equipment Classification

A Hazardous Area version of this product is available as an option of this product. The hazardous area model is suitable for use in the following areas:



3 Definitions & Acronyms

- MGNet – Is a proprietary protocol on a CAN bus message that allow for simple communications between devices on a network.

4 Device Installation

The system will arrive in one or more packages. Remove all the contents and lay the system out per the system drawing. Prior to beginning installation remove all system components from its shipping container(s) and review components to ensure that all are undamaged and correct according to the order placed. All cable connections are installed by hand with no tools needed. Once the system layout is complete mount all modules in applicable locations being sure to adequately protect the devices from extreme conditions. The individual section for each module will provide additional information needed for installation.

The SD50 is mounted by installing a properly sized bolt through the mounting hole and securing it to a fixed point on the machine. Care should be taken to ensure that the SD50 is mounted in a safe location to prevent the unit from being damaged.

WARNING – Hazardous area rated SD50s does not contain a removable cover. No user serviceable parts exist. Do NOT open the unit or try to troubleshoot in the field. The unit must be returned to McCoy Global for evaluation / repair.

AVERTISSEMENT - Zone dangereuse classé SD50s ne contient pas un couvercle amovible . Aucune pièce réparable par l'utilisateur existent . Ne pas ouvrir l'appareil ou d'essayer de résoudre les problèmes dans le domaine . L'appareil doit être retourné à McCoy Global pour l'évaluation / réparation.

5 Quick Start Guide

The SD50 arrives from the factory with the customer application preconfigured per application requested. This quick start guide serves a general startup procedure though actual application may vary. See the addendum for specific application types for additional information.

Prior to beginning installation remove all system components from its shipping container(s) and review components to ensure that all are undamaged and correct according to the order placed.

Along with the system order, a systems level schematic should be provided. Before beginning installation, lay out all pieces in the system and follow the instruction below.

1. Layout the system components per system drawing and validate all part numbers.
2. Connect all connectors and cables per the system drawing
3. Connect all power connectors
4. Ensure that the system boots properly. Boot time is normally 10-20 seconds and you will see a McCoy Global splash screen with a progress bar.
5. Once booted, screen will default to the main application window. The system should ship with all sensors preconfigured. If not, you will see “NA” for the data value.
6. Check the sensor configuration
7. Review and modify all range setting preferences

8. Review all alarm settings.
9. Ensure that all data and sensors are correct.
10. Power down the system
11. Remove all cabling
12. Mount all system components in permanent locations including the SD50
13. Connect all cables ensuring that there are no tight bend radiuses, pinch or crush points and that the cable is secured properly for the application
14. Power up the system
15. Verify that all devices are functioning
16. Verify all system settings and values are correct
17. Calibrate the system per recommended calibration requirements
18. System is now in service

6 Mechanical

The SD50 is fully sealed and self-contained. The mechanical section of this manual will outline the physical dimensions, mounting and connections schemes for the SD50.

6.1 Control Box

The enclosure for the SD50 is designed to meet sealed NEMA 4X, IP66 requirements with the electronics accessible from the rear of the panel. The enclosure may use U-brackets for mounting. The front panel display is shown in Figure 1.

Figure 1: Front View Of the SD50

The depth of the enclosure is approximately 4 inches. From the side, there is a reset button and U bracket mount shown in figure 2 below.

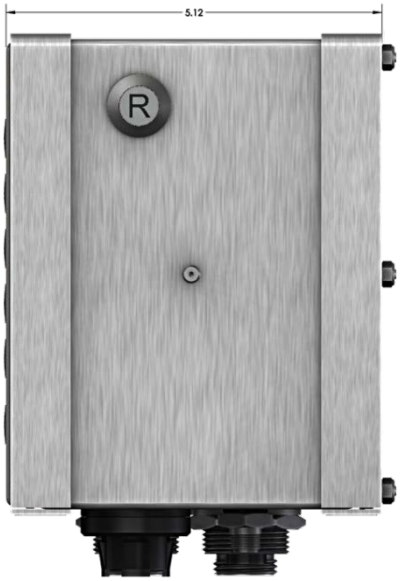


Figure 2 Side Profile of the SD50

The Back of the enclosure provides nylon nuts that can be used to secure the removable panel to the enclosure shown in figure 3. The rear of the enclosure should not be removed except by trained personnel. Removal of the rear panel may compromise the seal integrity of the unit.

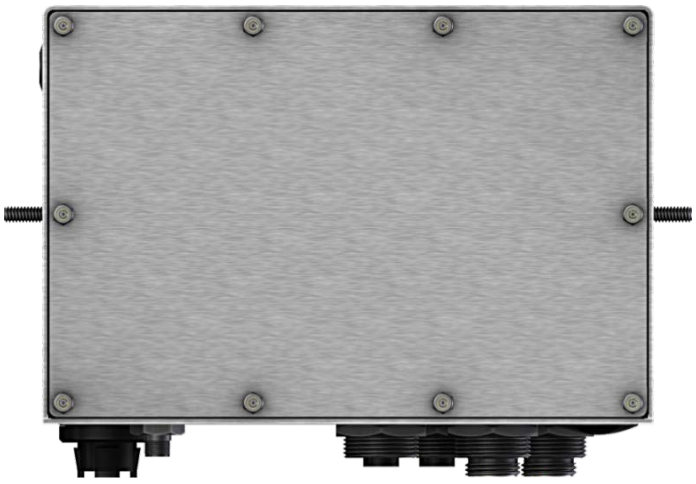


Figure 3 Rear Profile of the SD50

6.2 Connections

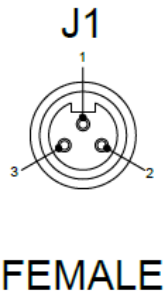
The Connector for the new system is designed to provide for extreme rugged connectivity that is simple and robust. Figure 4 outlines the individual connections. Connectors may vary based on actual unit ordered.

Figure 4 I/O Connectors

6.2.1 Power

The SD50 is generally powered from a 12 or 24vdc source. The actual range is 10.5-30vdc. The power connector is a 3 Pin McCoy Global Turk style connector represented as part number CBL7009-M35-01-05. The pinout for the connector is shown in the table below. The incoming power is 10.5 to 28 VDC or optionally 120 volts AC.

Table 1 Power Connector

Pin	DC Option	AC Option	Wire Color	Location
1	Chassis Ground	Chassis Ground	Green	
2	GND	Neutral	White	
3	VDC	Line	Black	

Note: Ensure that the chassis ground is connected to the chassis of the system or another earth ground reference.

Note: Ensure that the bare shield wire is connected to the chassis of the system or another earth ground reference.

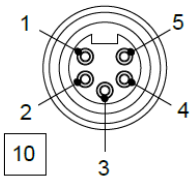
6.2.2 Sonic

The Sonic will be the McCoy Global standard sonic with an 85 DB level outputs continuous tone. The sonic is tied to Alarm outputs can be silenced. During power up the sonic will sound for approximately 10 seconds to test the audible device. This is normal operation.

6.2.3 RS485

The RS485 connector is a 5 Pin McCoy Global Turk style connector. The part number for the connector on the SD50 is CBL7009-M55-22-05. The pinout for the connector is shown in the table below.

Table 2 RS485 Connector

Pin	Signal	Wire Color	Location
1	RS485_A	Green	P1  MALE
2	RS485_B	White	
3	GND	Black	
4	NC	Red	
5	Shield	White/Black Stripe	

Note: Only pins 1-3 are connected internally. The shield connection is to be made at the scoreboard or terminating device.

Note: The RS485 had built in termination.

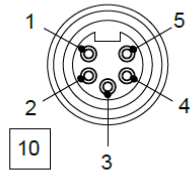
Note: In some instances is may be acceptable to not connect the ground connection in general it should be connected.

6.2.4 MGNet Ports 1&2

The MGNet connector is a 5 Pin McCoy Global Turk style connector. The part number for the connector on the SD50 is CBL7009-M55-22-05. The pinout for the connector is shown in the table below.

MGNet signals must be connected in a "Trunk and Branch" configuration; they should never be connected in a "star" or "hub" configuration. Also, any nonstandard stubs off of the "Trunk" will adversely affect the signal integrity and can cause faults in the system. Therefore, the devices must be connected in a series (one after the other) connection and there must be a "terminator" at each end of the network (and only at the ends). In other words, the first and last device must have a 150 ohm resistor connected between CAN-H and CAN-L. Again these resistors must be only at each end. Failure to properly install these MGNet terminators will have an adverse effect on signal integrity and can cause communication failure.

Table 3 MGNet Connector

Pin	Signal	Conductor Color	Location
1	VDC	Red	P1  MALE
2	GND	Black	
3	MGNet+	Green	
4	MGNet-	White	
5	Shield	White/Black Stripe	

Note: The second MGNet port is optional and generally not installed.

Note: The VDC and shield connection are only installed if the unit set up for the internally power network option.

Note: Excessively noise environments will require and isolated power supply for the network.

6.2.5 Ethernet Port

The Ethernet port will utilize a standard RJ45 socket. The pinouts of the industrial Ethernet port are shown in figure 5.

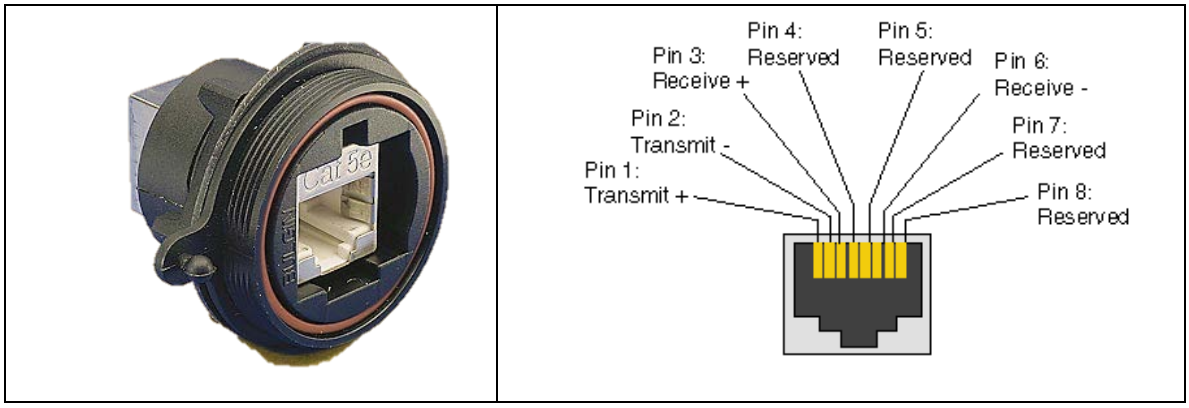


Figure 5 Standard Industrial Port

Note: Standard Ethernet connection is not supported for hazardous area location rated SD50.

The pinouts for the M12 Ethernet port are shown in figure 6.

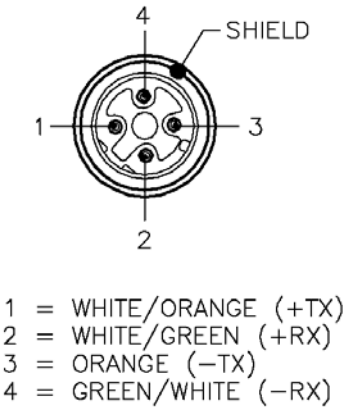


Figure 6 M12 Connector Style

6.2.6 USB Port

The SD50 is equipped with an optional USB port. The port can be used to extract log file information. See the software section for more details on how to use the USB functions. The USB Port is a Type A connector and will support most memory sticks.

Note: USB option is not supported for hazardous area location rated SD50.

7 Electrical

The SD50 operates on a wide voltage range from 10.5 volts to 28 volts DC. Common applications are 12 and 24 volt DC. There are no setting or adjustments for this device.

Wiring Products includes a connector that is made to be not "normally arcing" by use of the "lokfast" product family. This product can be installed in Class 1 Div 2 environments when local codes and regulations allow. This sensor must be powered by an approved certified limited power supply/source. McCoy Global recommends the use of a PULS ML60.242 power supply that has an input range of 100-240VAC and an output adjustable output range of 24-28VDC with a maximum current output of 2.5A. This is a UL listed power supply and it is also certified for use in a Class I Div 2 hazardous area.

WARNING – EXPLOSION HAZARD – DO NOT CONNECT OR DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NON-HAZARDOUS

AVERTISSEMNT - EXPOSION DANGER - AVANT DE VOUS CONNECTER OU DE DÉCONNECTER L'ÉQUIPEMENT, COUPEZ L'ALIMENTATION OU VÉRIFIER QUE LE SITE EST DÉSIGNÉ NON DANGEREUX.

8 Operational Description

The display utilizes embedded technology implementing a Linux operating system on ARM 9 processor.

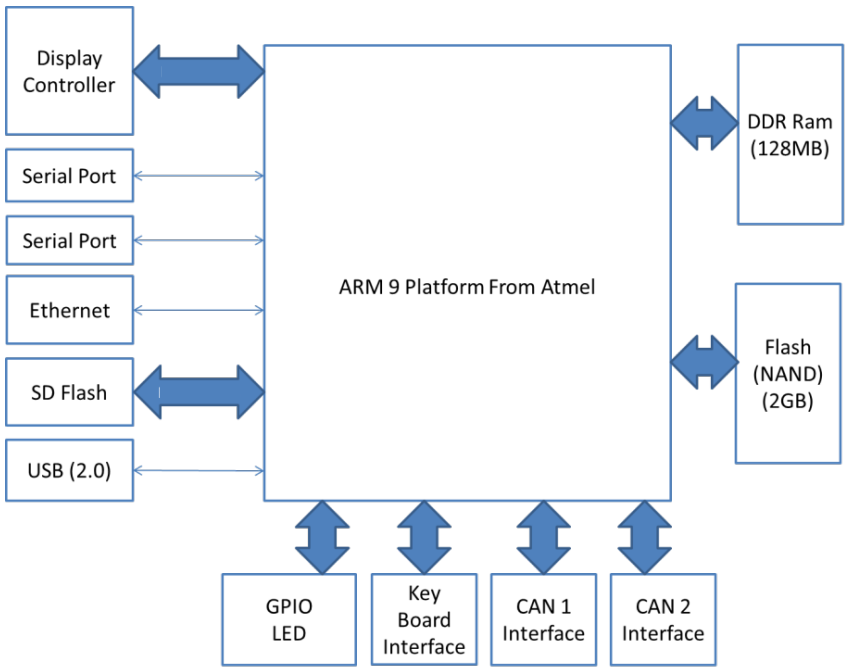


Figure 7 System Block Diagram

8.1 Processor Platform

The processer used to control the SD50 platform is the Arm series. It supports wide variety of peripheral that closely match the requirements for the product.

The SD Platform supports DDR ram for executing applications and NAND based flash for file storage.

8.2 MGNet Interface

The card provides dual isolated can ports. The hardware provides input protection and can optionally provide bus power for limited applications.

8.3 Keyboard Interfaces

The keyboard interfaces consist of a 15 key keypad for menu and setup navigation and a 4 key keypad of hotkeys that enable operators to quickly navigate to critical or often used screens. The buttons have a membrane cover for tactile response but are actually pressure based piezo buttons. This means that in the event that the Lexan button cover is damaged the button can continue to operate correctly.

Keys Functions:

"0-9"	Numeric inputs for data entry and list selection
"."	Decimal for floating point data entry
Menu	Use to enter the menu. Once in the menu it's also used as an escape.
Enter	Used to select or store changes.
Up Arrow	Used to scroll up lists. Also used to select fields on a screen.
Down Arrow	Used to scroll down lists. Also used to select fields on a screen.

Figure 8 15 Key Data Entry and Selection

The 4 key, keypad provides menu navigation. The button's functionality is identified directly above it on the screen. Typical functions for these buttons include Tare, Alarm Silence and Screen Change.

Figure 9 Menu Navigation Key Panel

8.4 Display

The display is an electro luminescent display. The display technology is tough and reliable with a wide temperature range and bright display for daylight visibility.

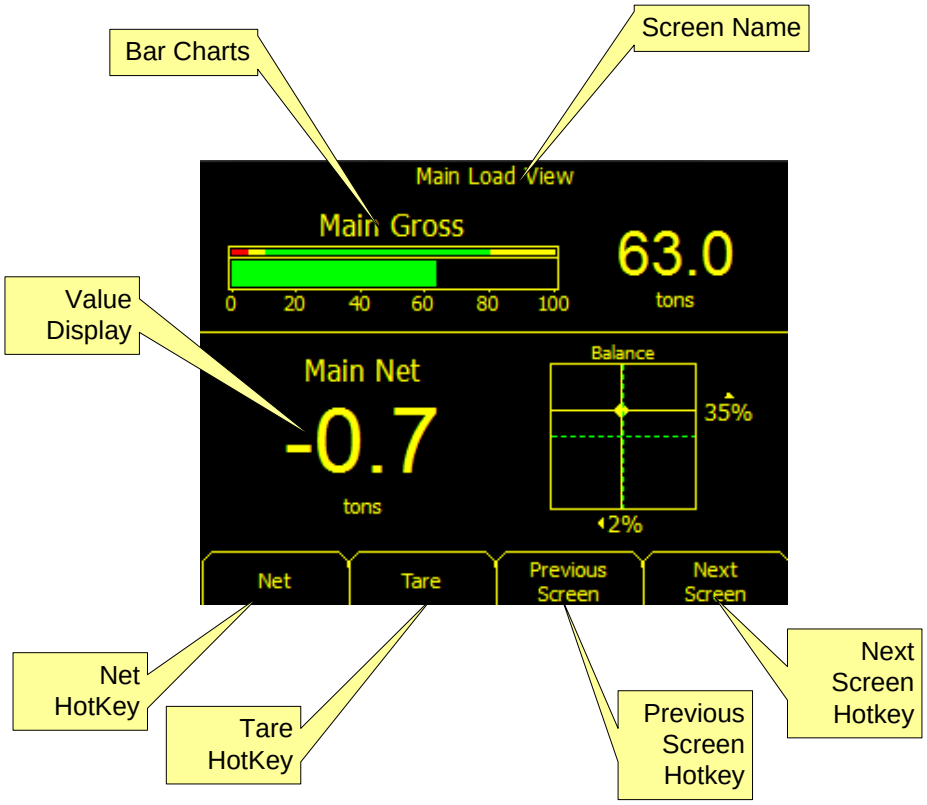


Figure 10 Sample Display

8.5 LED's

During power up, the LEDs will all illuminate as a test. There are three LEDs on the system listed in the table below.

LED	Color	Description
Power	Green	System is powered up and process is running the application
Warning	Yellow	A device has flagged a warning
Alarm	Red	A device has flagged an alarm

8.6 Ethernet

The Ethernet port uses a standard driver and supports TCP/IP. The SD50 can support ASCII or binary strings based on application requirements. The Ethernet address setting can be modified from the network setup screen. The Ethernet port can be either an industrial connector or an M12 style.

Note: The Ethernet does not natively support protocols such as Modbus, but commercially available gateways may be used to convert the output of the SD50 into the desired protocol.

8.7 SD Flash

The SD50 has an integrated SD Card that contains data logging, and a backup system configuration and user settings is created. The optional SD card is mounted inside of the system and should be removed by trained personnel. In the event of an SD50 failure, the SD Card can be moved to a new system and a system recovery may be performed to minimize downtime.

Note: Commercially rated SD cards may be used but may not meet the environmental requirements.

9 Display Functions

The SD50 can be configured to display a numerous devices for several applications. The core of the display's configurability is around its unique software architecture. The applications for several load monitoring applications share a common set of menus and screens that allow the user to install and setup the system more easily once familiar with they system.

The display can be configured to have multiple data display screens to allow the user to select what and how information is presented. These can include an application specific screen for applications such as a winch or crane as well as detailed screens that allow the users to see individual data elements and trending. All of the data screens are accessible through the 4 hotkey buttons below the display.

Additionally, the SD50 has an advanced user menu that can be used to configure the system. The menu is easily entered and easily navigated.

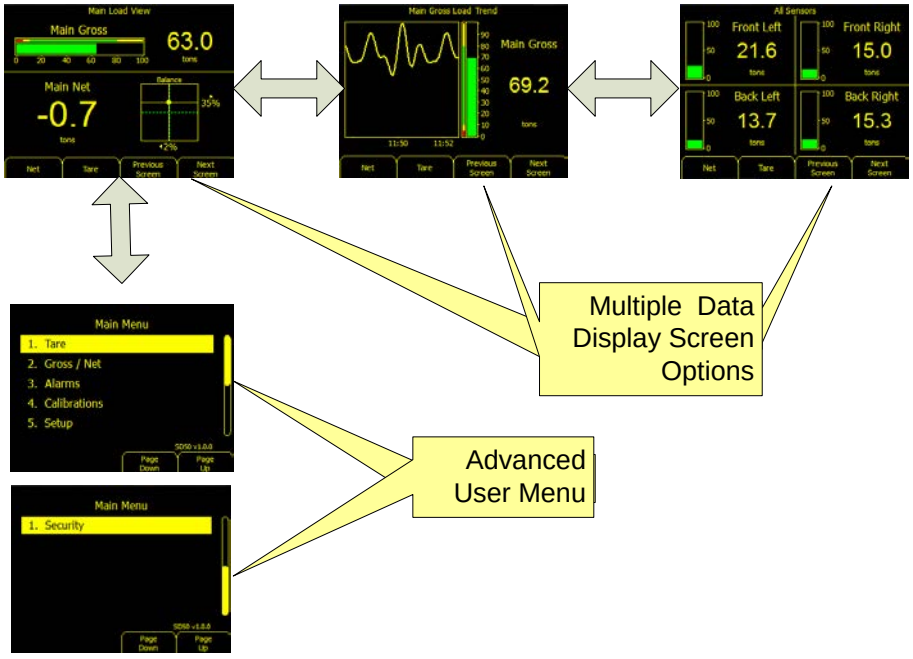


Figure 11 Software Architecture

9.1 Screen Details

This section identified some of the critical screens for the user interface. It provides a device centric display that provides application specific information. Because the display is device type specific it allows for simple configurability of the system and minimizes collateral information not normally associated with the application.

9.1.1 Main Screen

The following provides an example of the screen types that are available for the SD50. The SD50 may have one or more main screens. The features included on the screen include battery life for wireless devices, bar graphs that shows the where the load is in the range of the sensor, gross and net values and other critical application elements. From the main screen, critical functions like Tare, Payout Resets, and Alarm Acknowledge are easily accessible if configured. The SD50 shows on-screen alarm notifications, but ensures that alarm popups don't cover any critical data.

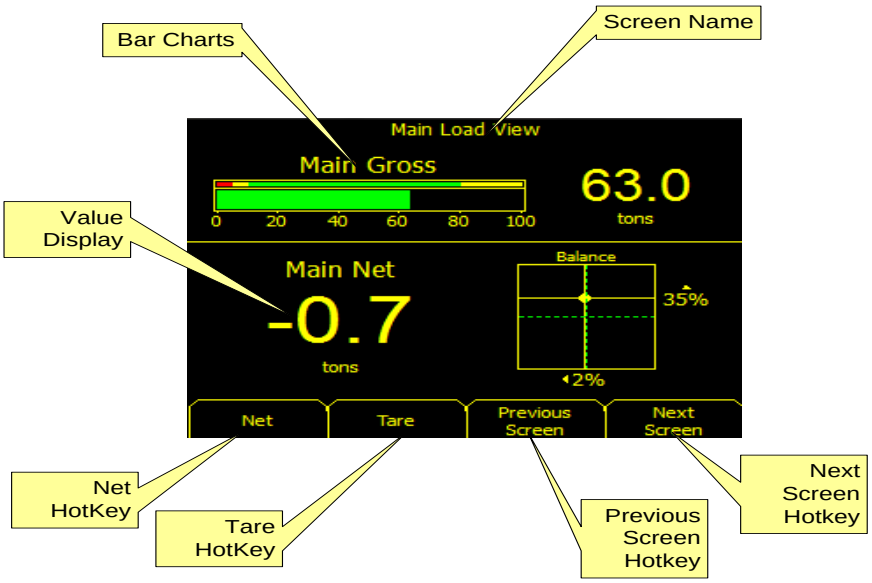


Figure 12 Main Screens Bridge Example

Feature	Description
Screen Name	Shows the screen title and can be used to reference different system elements

Bar Charts	Bar charts have settable ranges, alarm indication and color changing status.
Value Display	Values are displayed with large fonts that show critical information. The values auto scale.
Net Hotkey	The Net hotkey is used to toggle between net and gross values. If the button indicates "Net" the values are displayed as net values. If the button indicates "Gross" the values are displayed as gross values.
Tare Hotkey	The Tare Hotkey is used to Tare information on the current screen. The user is prompted to confirm
Previous Screen	The Previous Screen Hotkey reverts to the previous data screen.
Next Screen	The Next Screen Hotkey moves to the next data screen.

9.1.2 Display Details

Along with the overview screen, the SD50 also provides detailed screens. The detailed screen similar to that of Figure 14 provides an in depth look at an individual data point. The detailed view provides the current value, a bar chart to quickly identify the load with respect to the range, and a graph that shows the trend over the last five minutes of operation.

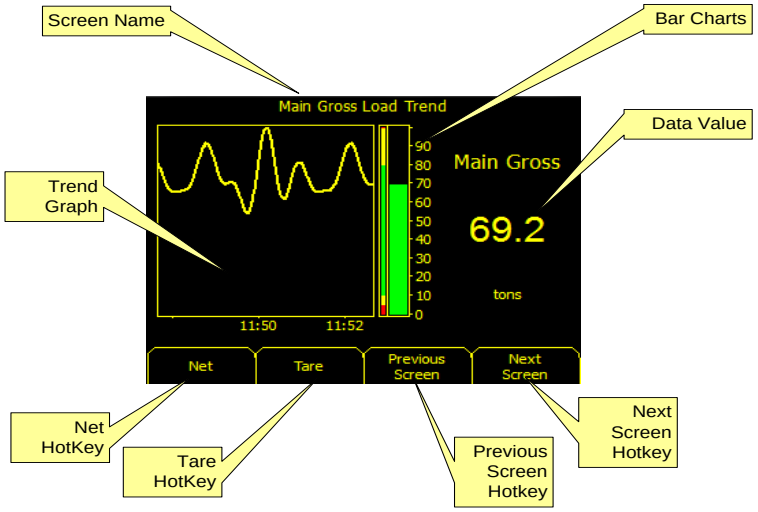


Figure 13 Individual sensor extended information

Feature	Description

Screen Name	Shows the screen title and can be used to reference different system elements
Bar Charts	Bar charts have settable ranges, alarm indication and color changing status.
Data Value	Values are displayed with large fonts that show critical information the values auto scale.
Trend Graph	The Trend Graph shows the last few minutes of data for the data value that is being monitored.
Net Hotkey	The net hotkey is used to toggle between net and gross values. If the button indicates net values are displayed as net values. If the button indicates gross values are displayed as gross values
Tare Hotkey	The Tare Hotkey is used to Tare information on the current string. The user is prompted to confirm
Previous Screen	The Previous Screen Hotkey reverts to the previous data screen
Next Screen	The Next Screen Hotkey moves to the next data screen.

Another Detailed screen that is often available is a multiple view of up to 4 devices on the network as shown in Figure 15. In this configuration the user can see each 4 load cells in the system

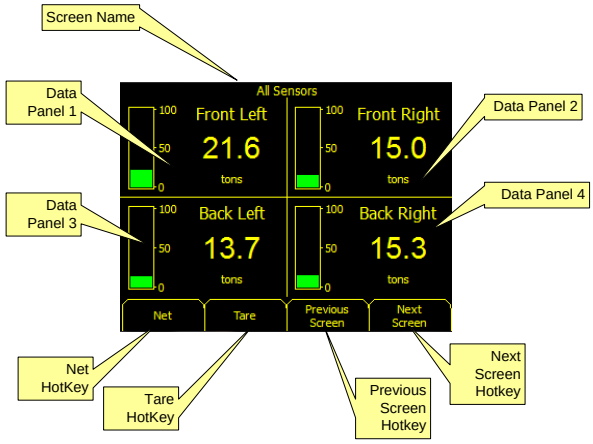


Figure 14 Discrete Input View

Feature	Description
Screen Name	Shows the screen title and can be used to reference different system elements

Data Panel (1-4)	Displays a factory configured data value for the operator.
Net Hotkey	The net hotkey is used to toggle between net and gross values. If the button indicates net values are displayed as net values. If the button indicates gross values are displayed as gross values
Tare Hotkey	The Tare Hotkey is used to Tare information on the current string. The user is prompted to confirm
Previous Screen	The Previous Screen Hotkey reverts to the previous data screen
Next Screen	The Next Screen Hotkey moves to the next data screen.

Program Menu Description

This section provides a description and general usage information for the various program menu items. These features include: Tare, Gross/Net, Payout, Alarms, Setup, Security and others based on specific configuration requirements. The menu is accessed by pressing the "Menu" button on the keypad. Pressing the "Menu" button again will back out of the menu tree.

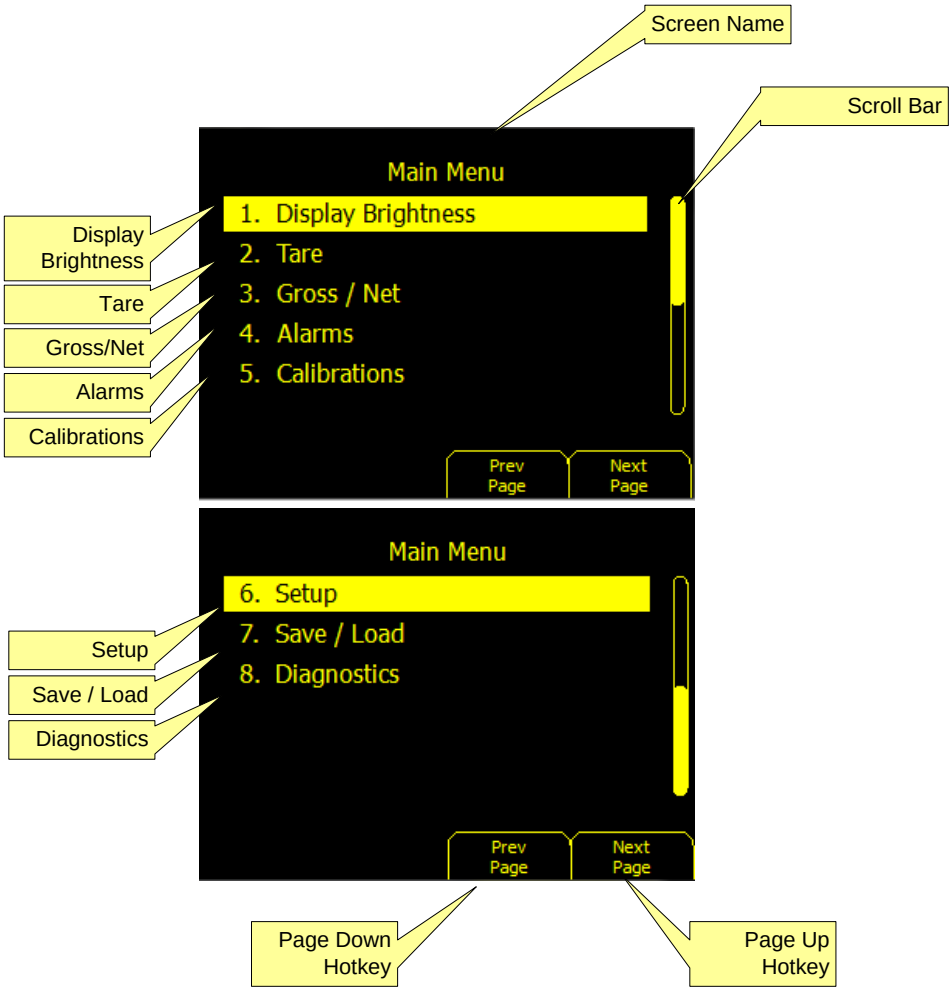


Figure 15 Menu Screen Description

Feature	Description
Scroll Bar	The scroll bar is used to show that there are multiple screens of data.
Display	In this menu example the operator can push 1 to initiate the Display

Brightness	Brightness operation. Once in this menu the user may select from different brightness settings.
Tare	In this menu example the operator would push 2 to initiate a Tare operation. If the Tare operation is highlighted pressing enter will also initiate a tare operation.
Gross Net	In this menu example the operator would push 2 to initiate a Gross/Net operation. If the Gross/Net operation is highlighted pressing enter will also initiate the operation. If there is more than one data value the user will be prompted to make a selection.
Alarms	In this menu example the operator would push 3 to enter the alarm options. If Alarms is highlighted, pressing enter will also enter the menu.
Calibration	In this menu example the operator would push 4 to enter the Calibration options. If Calibration is highlighted, pressing enter will also enter the menu.
Setup	In this menu example the operator would push 5 to enter the Setup options. If Setup is highlighted, pressing enter will also enter the menu.
Save / Load	The Save/Load menu item allows the user to move data on and off of the SD50. The data can be moved to the on board SD Card or to a USB Stick.
Diagnostics	The diagnostics screen provides system software information as well as raw sensor data.
Previous Screen	The Previous Screen Hotkey reverts to the previous data screen
Next Screen	The Next Screen Hotkey moves to the next data screen.

9.1.3 Display Brightness

The Display Brightness Screen allows the user to select the screen brightness. There are three typical brightness's for the user: Low, Medium, and High as illustrated in the figure below.

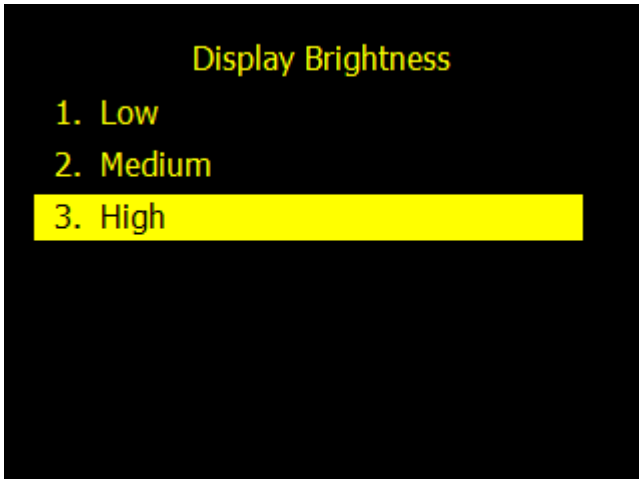


Figure 16 Display Brightness Screen

9.1.4 Tare Functions

The Tare function is setup to allow individual sensors to be Tared. Figure 18 illustrates the tare operation. This menu item is omitted from applications that don't have tare weights. The Tare function is used to provide a Zero function to the system. This function is used in conjunction with the Gross / Net function as the Net value is equal to the Gross value minus the Tare offset.

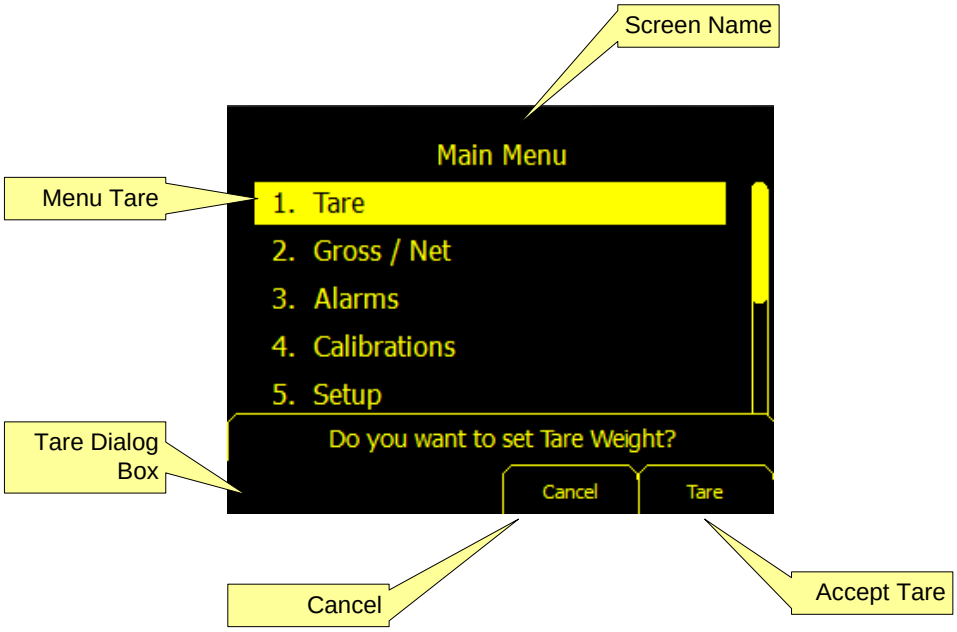


Figure 17 Menu Tare Function

Feature	Description
Screen Name	Shows the screen title and can be used to reference different system elements
Menu Tare	Allows the user to set tare weight from the menu.
Tare Dialog	The Tare Dialog Box pops up to confirm the Tare operation.
Accept Tare	Press the Tare hotkey to confirm that a tare is wanted.
Cancel	Press Cancel to escape without performing a tare.

9.1.5 Gross/Net Functions

The Gross/Net function toggles between net and gross values on a screen. This function is accessible from either a hotkey or through the menu as indicated in figure 19.

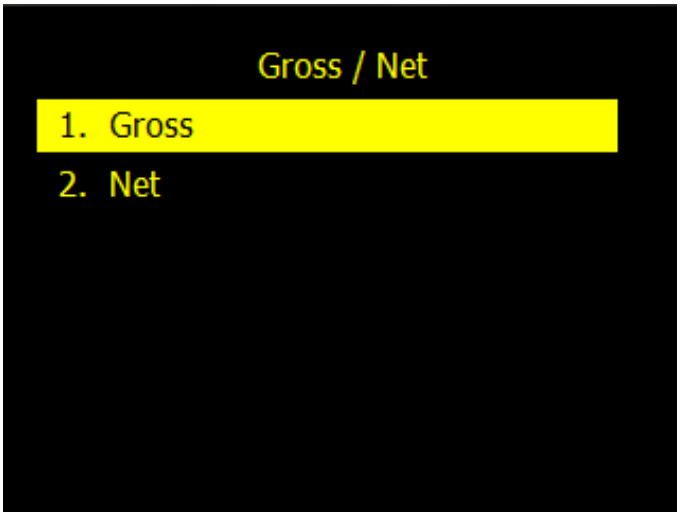


Figure 18 Gross/Net Selection

9.1.6 Alarms

The SD50 is highly configurable and can provide alarm notifications for the system. The available alarms will vary depending on the application. For each alarm, the user can access parameters like alarm thresholds and triggering delays.

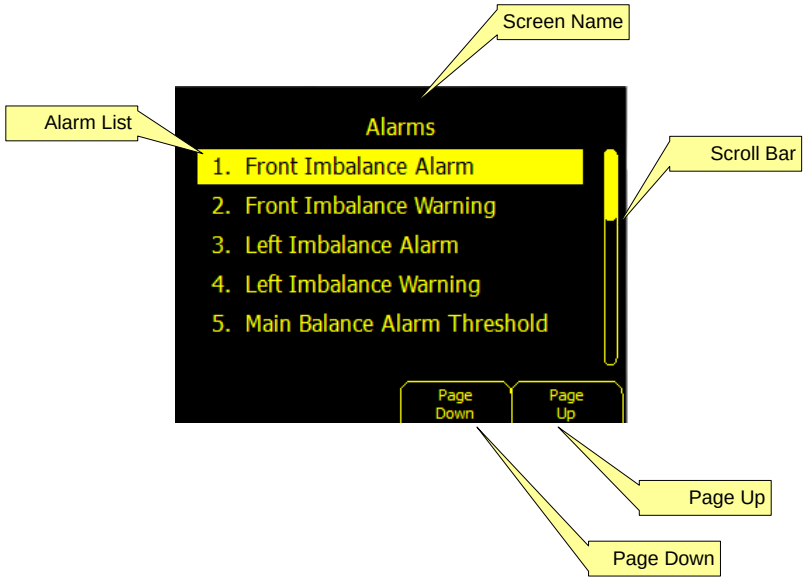


Figure 19 Available Alarms

Feature	Description
Screen Name	Shows the screen title and can be used to reference different system elements
Alarm List	Provides a list of available alarms that can be used with the system.
Scroll Bar	The scroll bar is used to show that there are multiple screens of data.
Page Up	The Page Up Hotkey function is used to scroll through the menu option. This has the same function as the up and down arrow keys on the keypad.
Page Down	The Page Down Hotkey function is used to scroll through the menu option. This has the same function as the up and down arrow keys on the keypad.

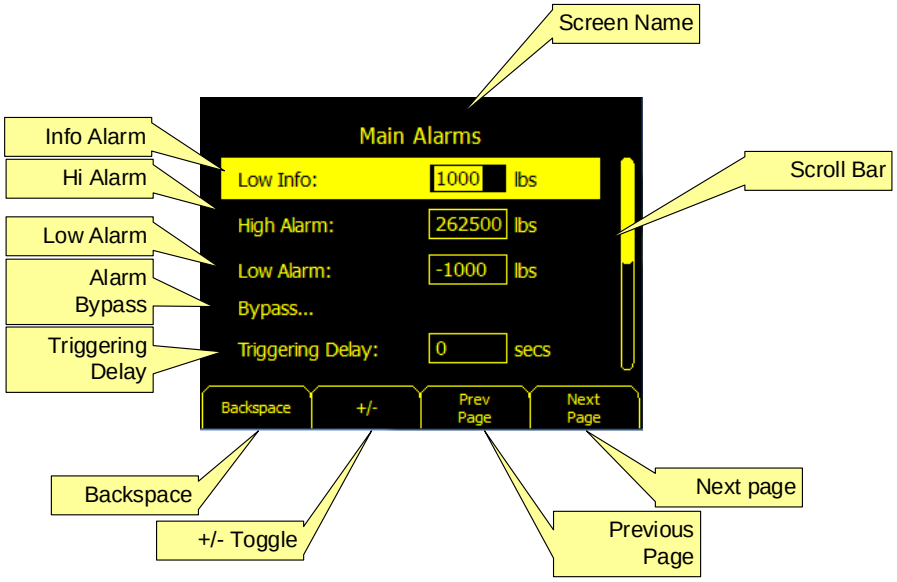


Figure 20 Alarm Setup

Feature	Description
Screen Name	Shows the screen title and can be used to reference different system elements
Scroll Bar	The scroll bar is used to show that there are multiple screens of data.
Previous Page	The Previous Page Hotkey reverts to the previous data screen
Next Page	The Next Page Hotkey moves to the next data screen.
+/- Value	+/- Value toggle.
Backspace	The Backspace is used to delete the last character entered.
Info Alarm	Informational alarms provide information and can be assigned to relays but do not generate on screen alarms or sound the sonic.
High Alarm	The High alarm classification is an example of an upper alarm condition. It can be tied to relays and generates on screen notification and sounds the sonic alarm.
Low Alarm	The Low alarm classification is an example of a lower alarm condition. It can be tied to relays and generates on screen

	notification and sounds the sonic alarm.
Alarm Bypass	The alarm bypass function turns alarms on or off.
Triggering Delay	Used to eliminate alarm events caused by short spikes in value. Prevents the alarm from triggering until the value has remained past the threshold continuously for the amount of time set.
Hysteresis	Hysteresis provided in percent is provided on the lower side of the alarm. This provides for a condition that forces the value being monitored to drop below the alarm set point by the hysteresis amount before the alarm is removed.

Figure 22 illustrates alarm notification.

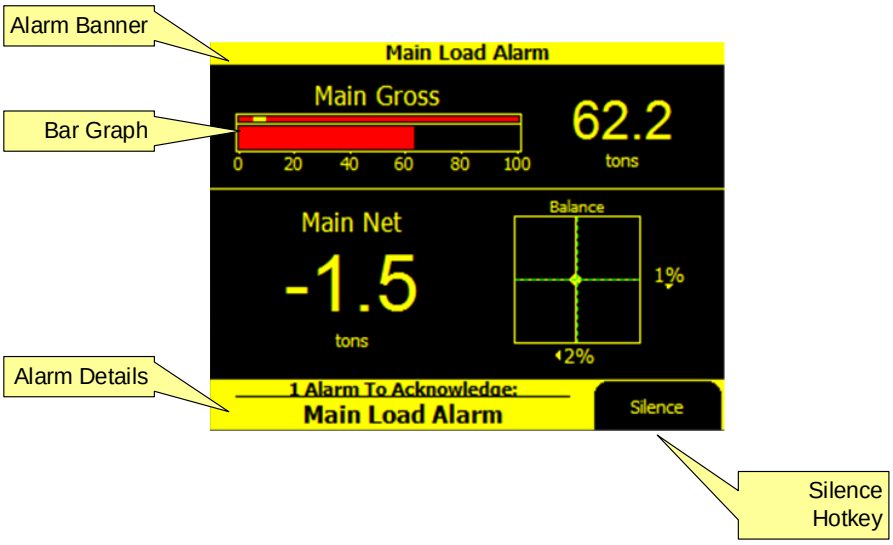


Figure 21 Alarm Notification

Feature	Description
Alarm Banner	The alarm banner shows the alarm condition.
Bar Graph	The bar graph illustrates the current value in relation the display range. The bar graph also shows the alarm status
Alarm Details	The Alarm Details banner shows the alarms in more detail,

	and allows the user to silence the alarm condition.
Silence Hotkey	The silence hotkey will silence the alarm buzzer and remove the lower banner.

9.1.7 Calibration

The calibration menu shows a list of all calibrations in the system. An individual calibration can be selected from this menu and edited. Figure 23 illustrates the calibration menu pages. This section will outline the basic qualification steps for a multi-step calibration.

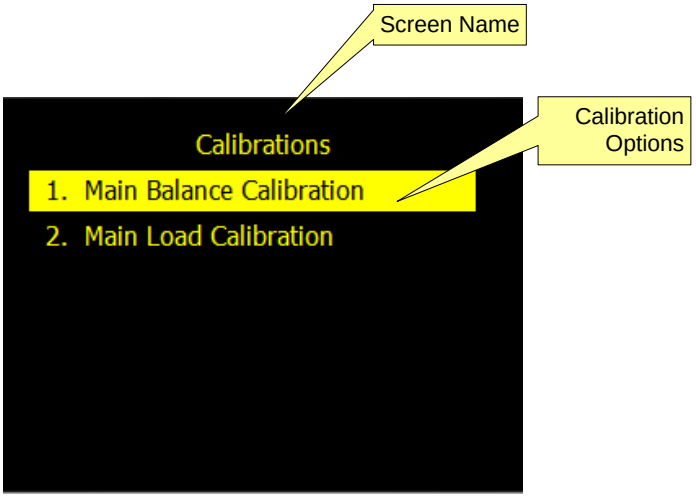


Figure 22 Calibration Menu

Feature	Description
Screen Name	Shows the screen title and can be used to reference different system elements
Calibration Options	Page options for calibration. Use the up and down arrows to highlight options and select the option using "Enter" key on the keypad. There will typically be a calibration for each set of sensor values including inputs such as loads, angle, and boom length.

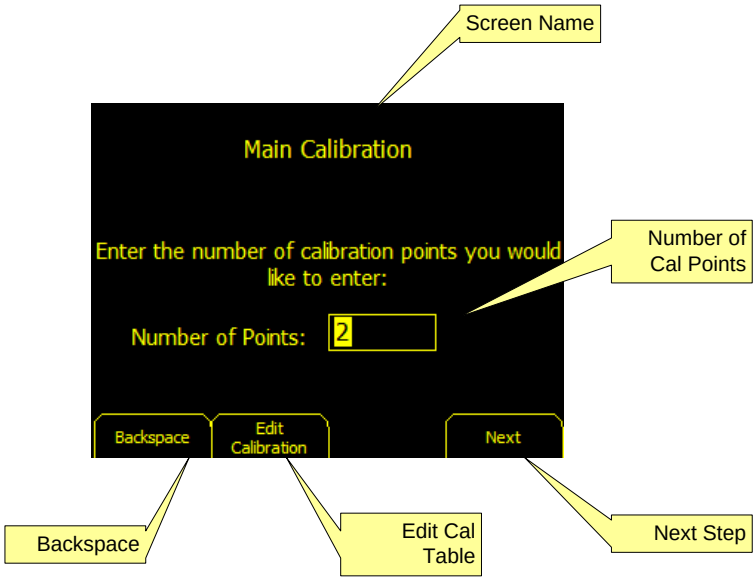


Figure 23 Calibration

Feature	Description
Screen Name	Shows the screen title and can be used to reference different system elements
Number of Cal Points	Enter the number of calibration points desired. Zero is always the first point. System supports up to 20 calibration points
Next Step	The Next Step button
Edit Cal Table	The Edit Calibration Table hot function button will pull up the calibration table and allow the calibration to be manually edited.
Backspace	The Backspace is used to delete the character entered in reverse order

Figure 25 illustrates the first step in a multistep calibration.

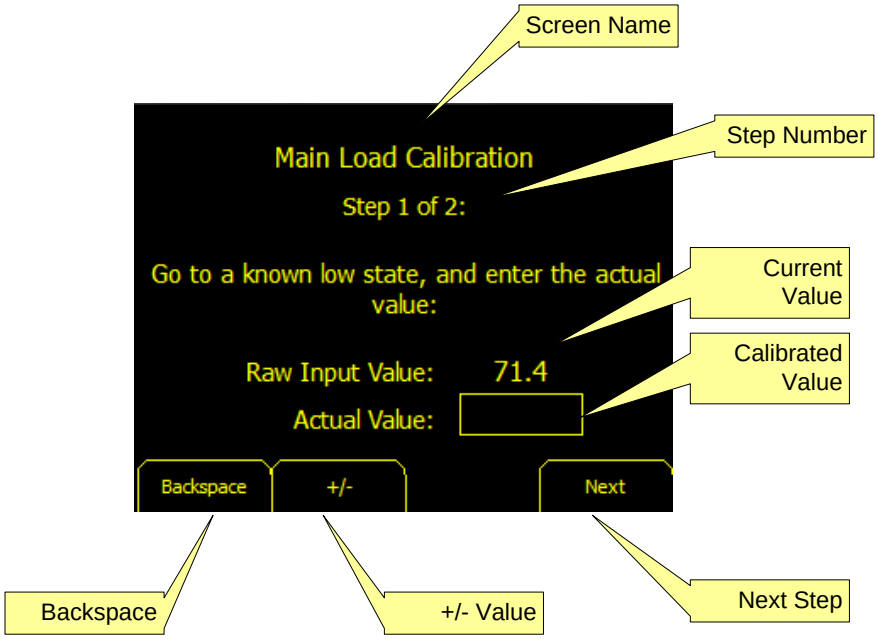


Figure 24 Calibration Step 1

Note: The software is limited to 20 points for calibration.
Note: The First calibration point should always be taken in a no load Condition.

Feature	Description
Screen Name	Shows the screen title and can be used to reference different system elements
Step Number	The step number identifies which step in the calibration the user is at.
Raw Value	Displays the current value of the sensor device in its base units as selected in the System Units Setting.
Actual Value	The Actual Value field is set to the value that is displayed in the main screens.
Next Step	Proceed to the next step of the calibration.

+/- Value	+/- Value toggle.
Backspace	The Backspace is used to delete the character entered in reverse order

Figure 32 shows the final step of calibration as indicated by the step number.

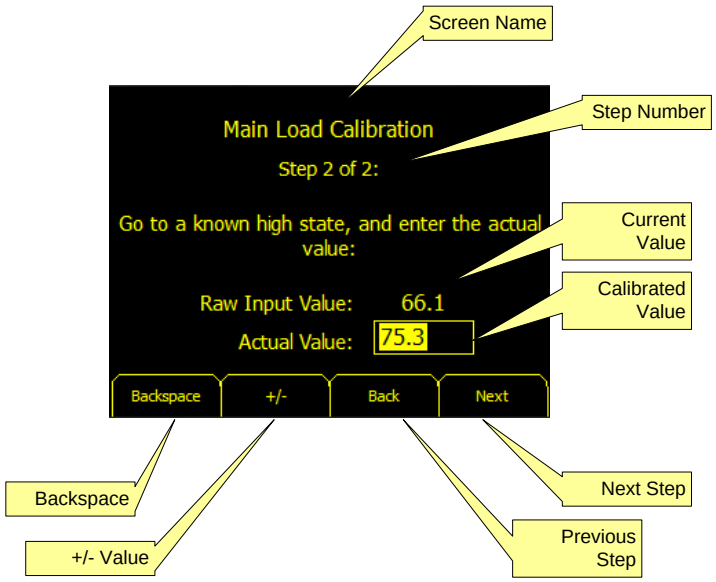


Figure 25 End Calibration

Feature	Description
Screen Name	Shows the screen title and can be used to reference different system elements
Step Number	The step number identifies which step in the calibration the user is at.
Raw Value	Displays the current value of the sensor device in its base units as selected in the System Units Setting.
Actual Value	The Actual Value field is set to the value that is displayed in the user display in relation to the raw value.
Next Step	Proceed to the next step of the calibration.
Previous Step	Go back to the previous step of the calibration.
+/- Value	+/- Value toggle.

Backspace	The Backspace is used to delete the character entered in reverse order

Figure 27 is the calibration review chart that shows raw data vs. calibrated values are used to identify the adjusted slope for the load. Once the user selects "Apply" the calibration is complete.

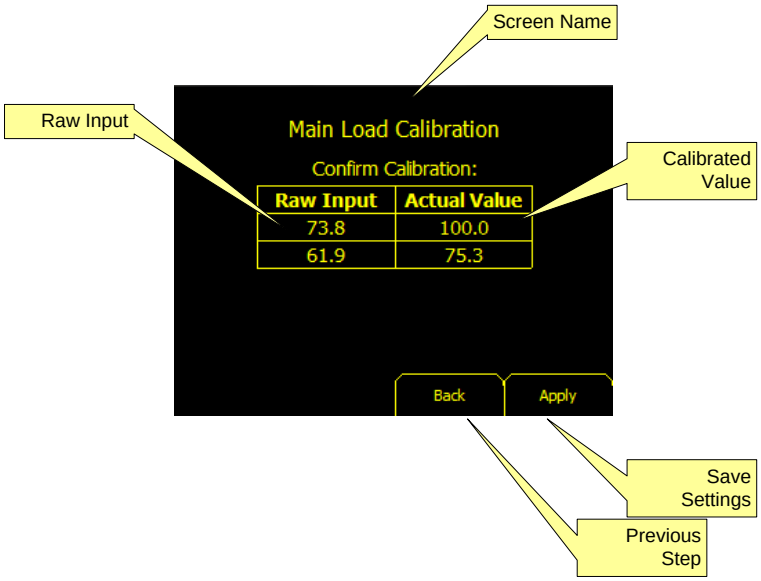


Figure 26 Calibration Review

Feature	Description
Screen Name	Shows the screen title and can be used to reference different system elements
Raw Value	Displays the current value of the sensor device in its base units as selected in the System Units Setting.
Actual Value	The Actual Value field is set to the value that is displayed in the user display in relation to the raw value.
Save settings	Applies the settings to the system
Previous Step	Return to previous screen.

If the calibration is successful the page shown is figure 28 is displayed.

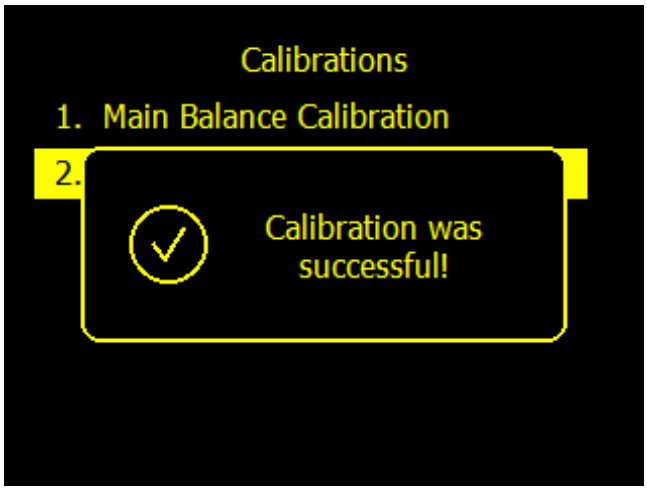


Figure 27 Calibration Complete

In certain situations running, a calibration sequence may not be the best option for modifying a calibration table. The calibration table may be accessed from the Edit Calibration hot function button. Once pressed the calibration table will be displayed as shown in figure 29. The values may be edited using the up and down arrow buttons and the selected cell will be highlighted.

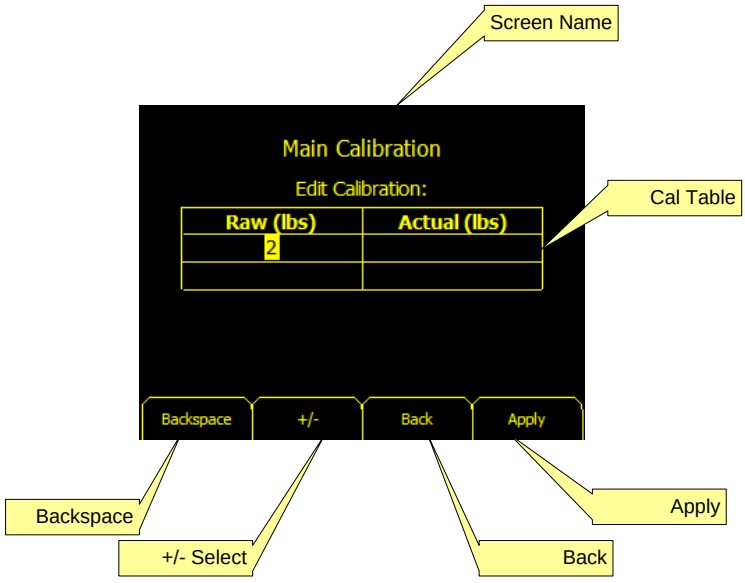


Figure 28 Edit Calibration Table

Feature	Description
Screen Name	Shows the screen title and can be used to reference different system elements
Raw Value	Displays the current value of the sensor device in its base units as selected in the System Units Setting.
Actual Value	The Actual Value field is set to the value that is displayed in the user display in relation to the raw value.
Save settings	Applies the settings to the system
Previous Step	Return to previous screen.

9.1.8 System Setup

The Setup menu provides access setup and change system settings. These settings including elements such as Ranges, Units, Sensor Address, and other setup features that shape the operation and appearance of the SD50 screen. The menu can be navigated by using the up and down arrows or simply selecting the corresponding numeric value. Some configurations may have minor variations in the menu format that are not covered in this document. If there are question about any features, contact McCoy Global Support.

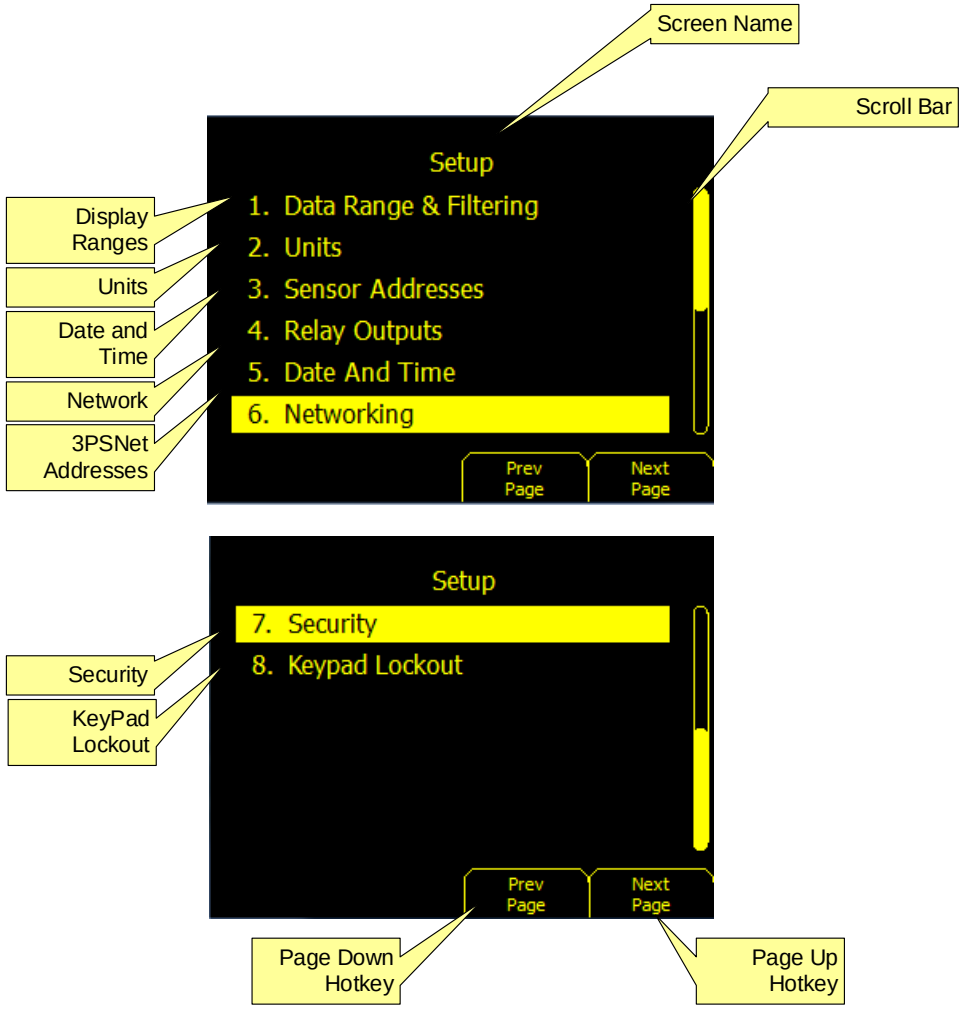


Figure 29 System Setup

Feature	Description
Screen Name	Shows the screen title and can be used to reference different system elements
Scroll Bar	The scroll bar is used to show that there are multiple screens of data.
Display Ranges	Pressing 1 enters the Display ranges page. If highlighted pressing enter performs the same function. Sets the display range for bar charts
Units	Used to select units for the system data values.
Date and Time	Pressing 3 enters the Date and Time page. If highlighted pressing enter performs the same function. Sets the System

	Time and Date. The Time and Date are used for system logging.
Network	Pressing 4 enters the Network page. If highlighted the pressing enter performs the same function. Used to set the network settings.
Sensor Addresses	Pressing 5 enters the Sensor Address page. If highlighted the pressing enter performs the same function. This screen is used to configure network devices to communicate to the SD50.
Application Specific Choices	Depending on the application, other menu options may be present. Selecting the number or highlighting the option will enter the pages for the options. See application notes of manual addendums for additional information.
Previous Screen	The Previous Screen Hotkey reverts to the previous data screen
Next Screen	The Next Screen Hotkey moves to the next data screen.

9.1.8.1 Display Range & Filtering

The SD50 allows display ranges and filtering to be configured for each channel. Figure 31 shows the range and filtering screen for a single channel. Figure 31 describes the Display Range setup page.

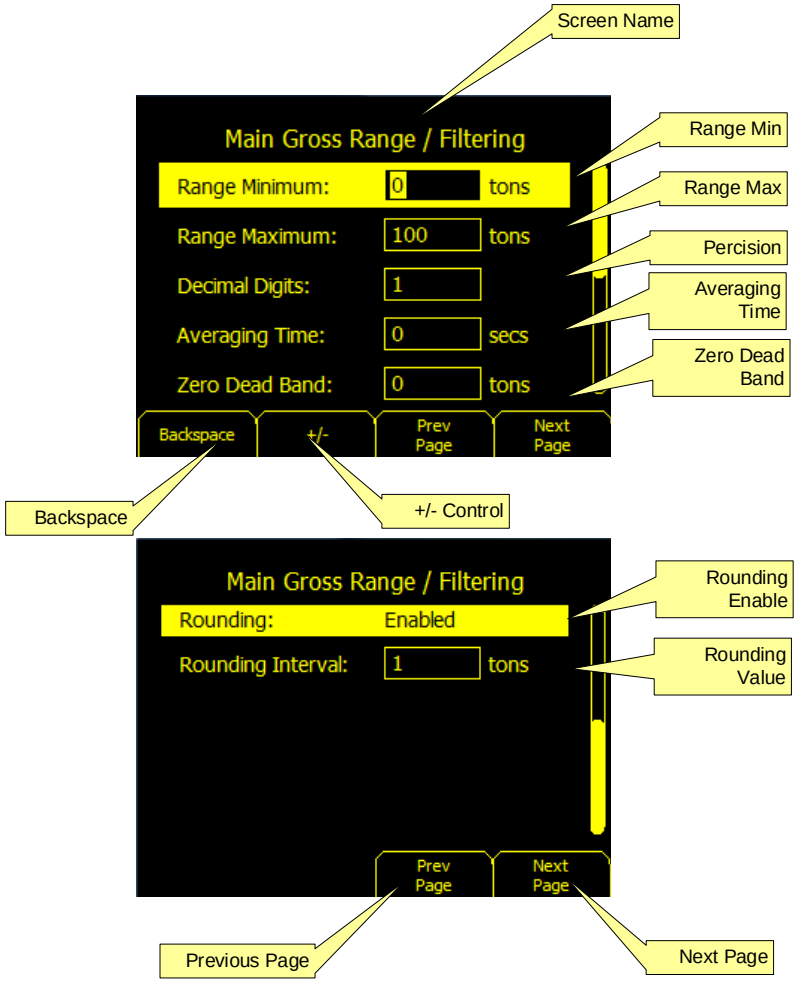


Figure 30 Display Range Setup

Feature	Description
Screen Name	Shows the screen title and can be used to reference different system elements
Range Min	Sets the minimum range for the data value of interest. The value is in the base units for the data value.
Range Max	Sets the minimum range for the data value of interest. The value is in the base units for the data value.
Display Precision	Display precision is used to set the number of decimal points shown in the data values.
Averaging Time	Averaging Time is in seconds. This function provides a recursive (rolling) average of the data base on the Time and

	data rage of the input.
Zero Dead Band	The Zero Dead Band value defines a positive and negative limit in which the load must exceed before the value registers on the screen.
Rounding Enable	Rounding Enable enables or bypasses the rounding feature.
Rounding Value	If rounding is enabled the associated Rounding Value is applied to the output value.
Backspace	The Backspace is used to delete the character entered in reverse order
+/- Control	Toggles the value between positive and negative values.
Previous Screen	The Previous Screen Hotkey reverts to the previous data screen
Next Screen	The Next Screen Hotkey moves to the next data screen.

9.1.8.2 Units

The SD50 Base Units can be setup to allow to any desired base units to allow data to be display in a form factor of preference. Figure 32 illustrates the Units Selection Page accessible from the menu. Some SD50 software configurations may have more or less selections based on customer requirements. The up and down arrows can be used to select the desired units. After highlighted pressing the Enter key will select the units. Additionally, the units may be selected by directly pressing the number associated with the desired units.

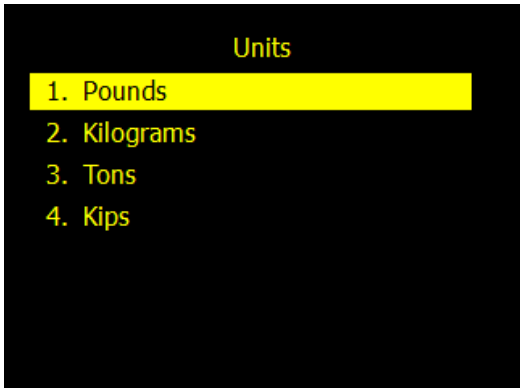


Figure 31 Units Selection

9.1.8.3 Sensor Addresses

The SD50 sensors communicate over a communications network and are connected in a trunk and branch style network. Each sensor must have a unique address or conflicts may impact the device's ability to communicate correctly on the network. All sensors have the network ID stamped or labeled directly on the sensor.

The device may be selected using the up and down arrow keys. Once highlighted the keypad can be used to enter the ID. Once the network ID is entered pressing the enter key accepts the address.

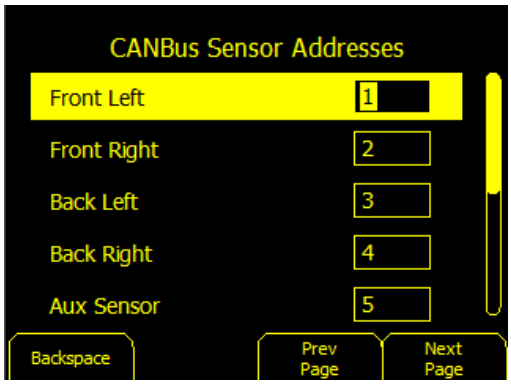


Figure 32 MGNet addresses.

9.1.8.4 Date and Time Setup

The Menu Date and Time Setup page is used to set the data and time for the system. The date and time information is used for data and event logging. The date and time needs to be setup after each power cycle. The Date and Time page are described in figure 34.

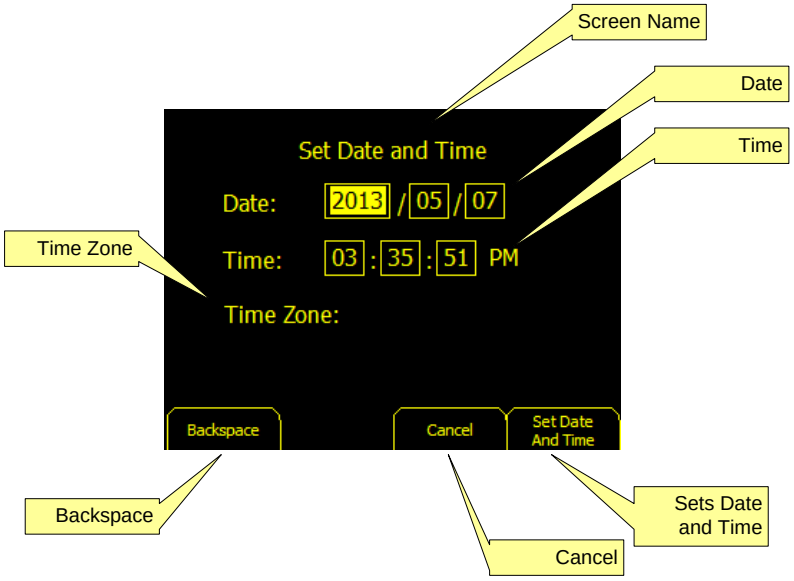


Figure 33 Date and Time

Feature	Description
Screen Name	Shows the screen title and can be used to reference different system elements
Date	The date fields are used to set the date for the system.
Time	The time field is used to enter the time for the system.
Time Zone	The time zone field allows the user to select a time zone based on a list of available options.
Set Time and Date	The Set Time and Date Hotkey are used to set the current time and date for the system.
Cancel	Cancel back the user out of the Time and Date Set up preserving the previously entered data.
Backspace	The Backspace is used to delete the character entered in reverse order

Ethernet Address Settings

The Ethernet Address Settings sets the Ethernet port settings for the SD50. The up and down arrow keys are used to select the desired field to change. The selected item that is modified will be highlighted. Pressing the Menu key clears the entire field. Pressing the Enter key accepts the value in the text box. If the Menu Key is pressed while not modifying a field the screen will move up one level in the menu.

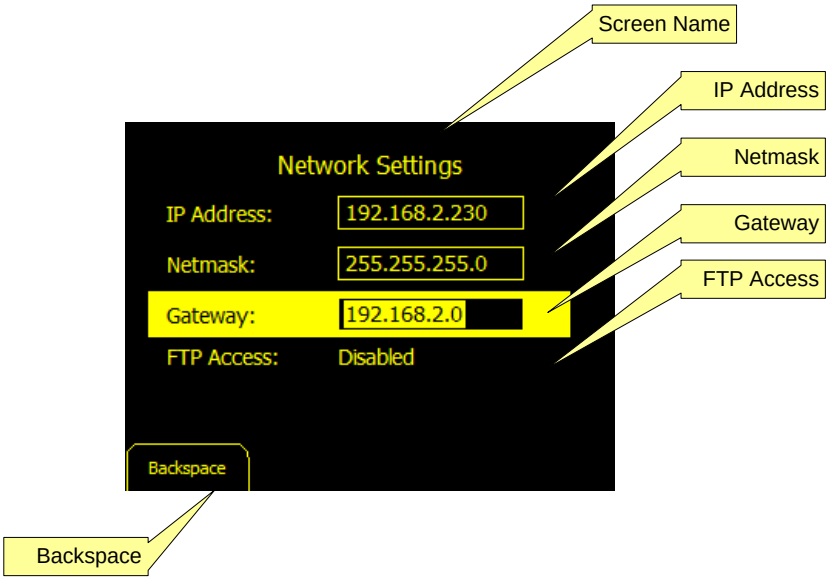


Figure 34 Ethernet Settings

Feature	Description
Screen Name	Shows the screen title and can be used to reference different system elements
IP Address	Displays the network address
Netmask	Displays the Netmask
Gateway	Displays the Gateway
FTP Access	The FTP Access function is an enable or disable for the FTP server access. The FTP server allows for read only access of the system configuration and log file information.

Backspace	The Backspace is used to delete the character entered in reverse order

9.1.8.5 Relay Setup

The Relay Setup Page is used to configure the relay module to communicate with the SD50. The relays can be configured to several preconfigured events and alarms.

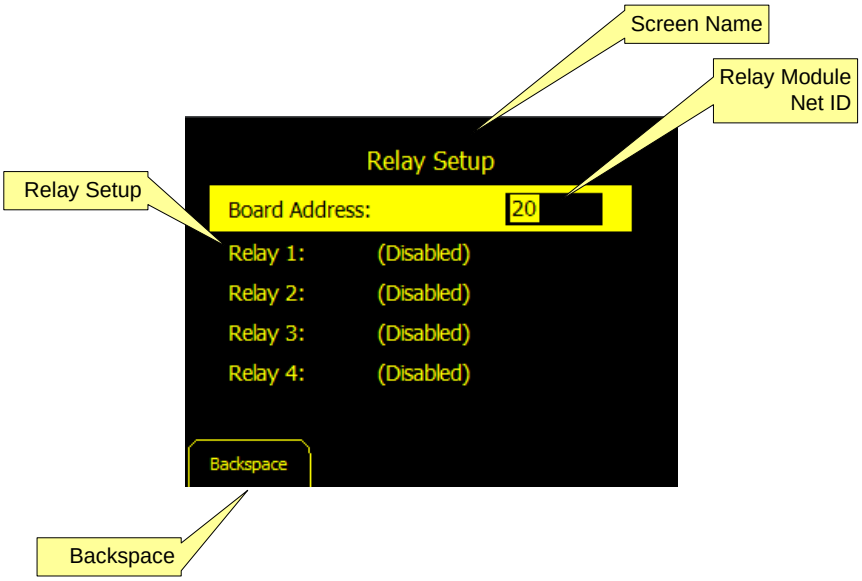


Figure 35 Relay Module Setup

Feature	Description
Screen Name	Shows the screen title and can be used to reference different system elements
Relay Module ID	The Relay Module ID is used to setup the Relay modules Net ID.
Relay Setup	The Relay Setup is used to connect a Relay port to a system event. When selected system event page opens and an event is selected.
Backspace	The Backspace is used to delete the character entered in reverse order

When the relay number is selected the Select Relay Output screen is opened and an alarm can be mapped to the relay number. The alarm conditions that are available will vary depending on the configuration and application. The options are navigated using the up and down arrows using the enter key to select an alarm condition. An example of the Relay Outputs conditions is illustrated in figure 37.

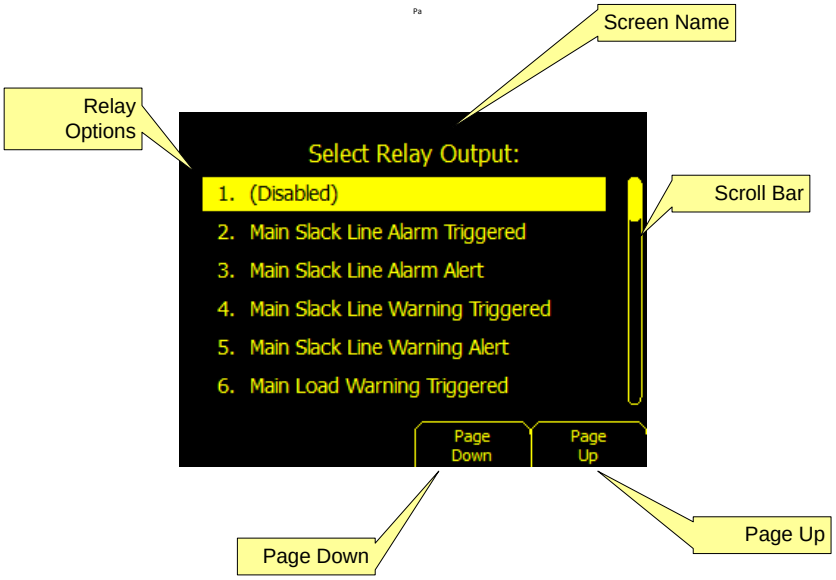


Figure 36 Relay Event Setup

Feature	Description
Screen Name	Shows the screen title and can be used to reference different system elements
Scroll Bar	The scroll bar is used to show that there are multiple screens of data.
Page Up	The Page Up Hotkey function is used to scroll through the menu option. This has the same function as the up and down arrow keys on the keypad.
Page Down	The Page Down Hotkey function is used to scroll through the menu option. This has the same function as the up and down arrow keys on the keypad.
Relay Options	The Relay Options list shows the list of events that the relay can be connected to. The Options can be selected by pressing the list number of scrolling through the list and selecting enter on the keypad.

9.1.8.6 Security Settings

The SD50 has a robust security system to protect the configuration of the unit. The SD50 supports a single user password that allows the user to log into the system critical pages such as Alarms, Calibration and systems Setup. Figure 24 shows the first security screen seen on a fresh unit. Once enabled the user can configure security options or change passwords.

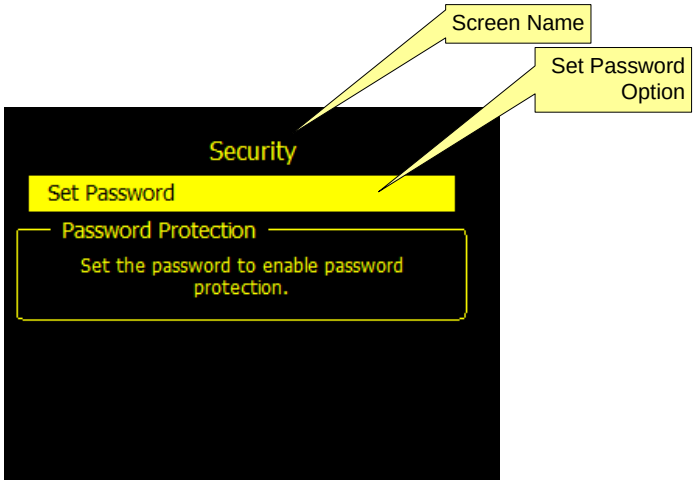


Figure 37 Initial Password Security Screen

Feature	Description
Screen Name	Shows the screen title and can be used to reference different system elements
Set Password	The Tare Dialog Box pops up when the user selects the tare hotkey

When setting a new password for the first time the password must be entered. The password must be a minimum of 4 characters and a maximum of 6 characters. Once the Password is confirmed accepting the password overwrites the existing password.

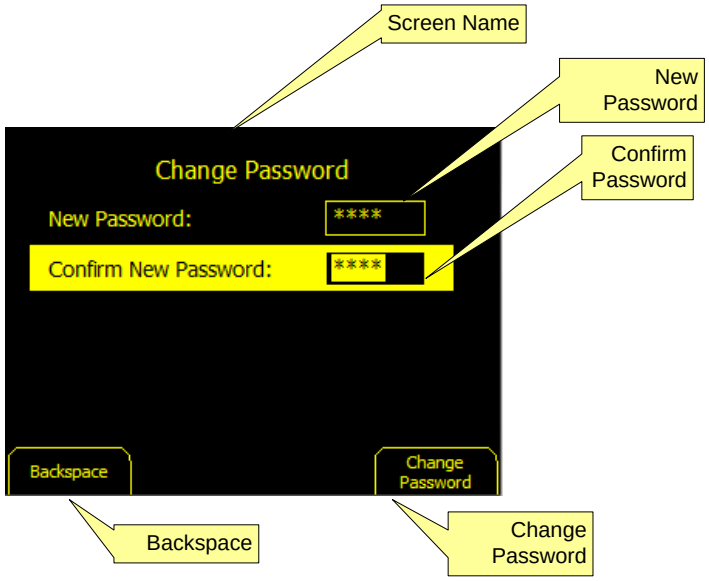


Figure 38 Initial Password Setup

Feature	Description
Screen Name	Shows the screen title and can be used to reference different system elements
New Password	In the Initial Password Setup page the New Password field is used to set the new system password.
Confirm Password	Once a new password had been selected the next step is to confirm the password
Accept	Once the page information is entered the Change Password Hotkey saves the changes.
Backspace	The Backspace is used to delete the character entered in reverse order

When returning to the Security page after initial setup the page will be similar to the image outlined in figure 26. From this page the user can change passwords or set individual security options for the SD50. The options are modified using the up and down arrow keys and the enter key will toggle the setting.

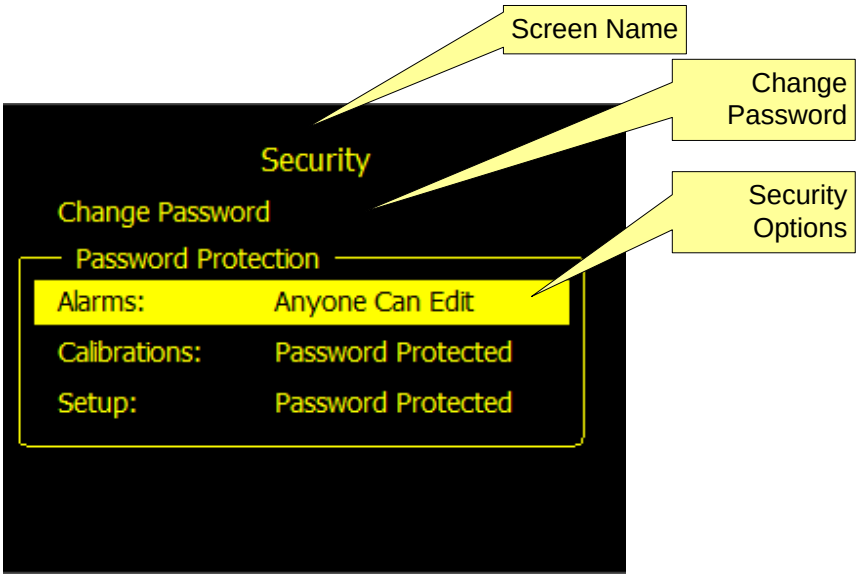


Figure 39 Security Options

Feature	Description
Screen Name	Shows the screen title and can be used to reference different system elements
Change Password	The change option feature allows the user to modify the system password.
Security Options	The alarms, calibration, and setup menus are password protected. The options can open or protect each of these features.

The password must be a minimum of 4 characters and a maximum of 6 characters. Once the Password is accepted, the new password overwrites the existing password. The change password screen is shown in figure 41.

When changing the SD50 password following steps should be followed:

1. Enter the current password
2. Enter the new password
3. Confirm the new password
4. Press change password hotkey.

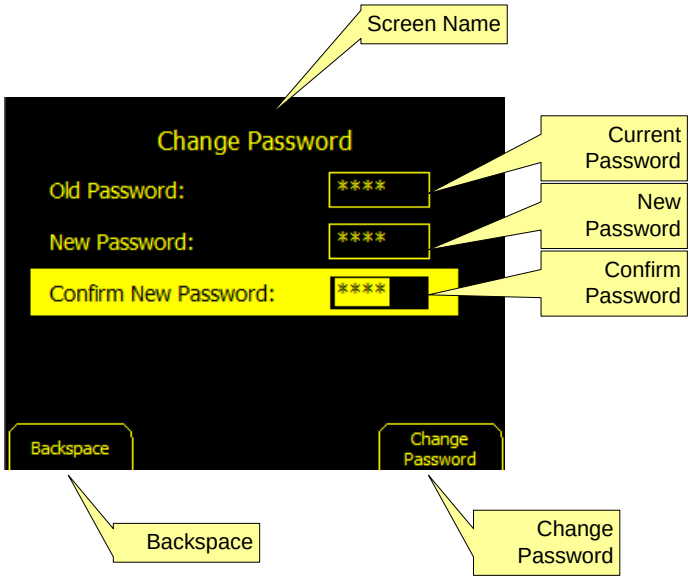


Figure 40 Change Password

Feature	Description
Screen Name	Shows the screen title and can be used to reference different system elements
Current Password	Text field for current password.
New Password	Text field for entering new password.
Confirm Password	Text field for confirming new password
Change Password	Change Password Hotkey to save changes.
Backspace	The Backspace is used to delete the character entered in reverse order

When the password change is successful the following screen will be seen.

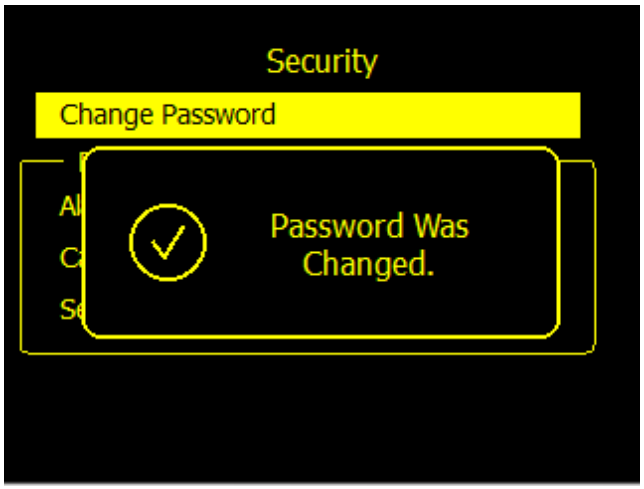


Figure 41 Password Change Successful

If a password is entered that is incorrectly a popup will notify the operator to renter the password.

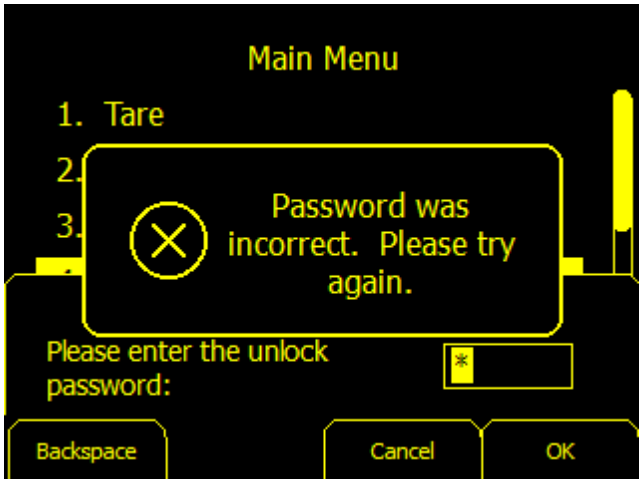


Figure 42 Incorrect Password Entry

9.1.9 Load / Save

The Load / Save menu option allows the user to perform several operations to move information to and from the SD50 including data and programming information.

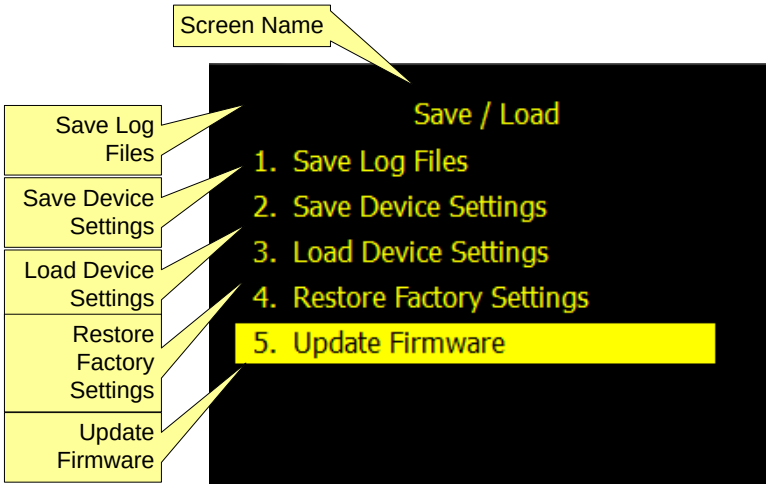


Figure 43 Save / Load Screen

Feature	Description
Screen Name	Shows the screen title and can be used to reference different system elements
Save Log Files	The Save Log Files selection allow the user to select a start and stop period for archiving data to a USB Stick. This option is only available if the USB option is installed on the SD50 and a recognized USB drive is installed.
Save Device Settings	The Save Device Settings Options allows the user to create a backup file of the systems configuration, user settings and calibration data. The data may be backed up to either the internal SD card or an external USB Stick.
Load Device Settings	The Load Device Settings Options allows the user to restore a backup file of the systems configuration, user settings and or calibration data. The data may be loaded from either the internal SD card or an external USB Stick.
Restore Factory Settings	The Restore Factory Settings option clears the Calibration and User setting for the system. Selecting this option will erase all user entered settings and will require the user to reenter the system setup.
Update Firmware	The Update firmware option allows the user to update the SD50 application over USB. The update process is completed using the prompts from the screen.

Note: Utilizing these features may change the operation of the SD50. Caution should be taken when using any of these menu items.

9.1.10 Keypad Lockout

The Keypad Lockout feature is available in some versions of the application. This option can be used to prevent accidental key presses. The keypad lock feature can be explicit or automatic depending on the option selected by the user. The Automatic option lock the keyboard after 3 minutes of nonuse. Figure 45 illustrates the keypad lockout feature.

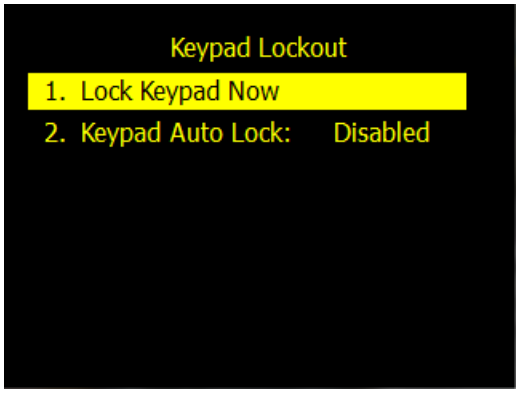


Figure 44 Keypad Lockout Settings

If a key is pressed the screen prompts that the keypad is locked and provides an unlock code that is illustrated in figure 46.

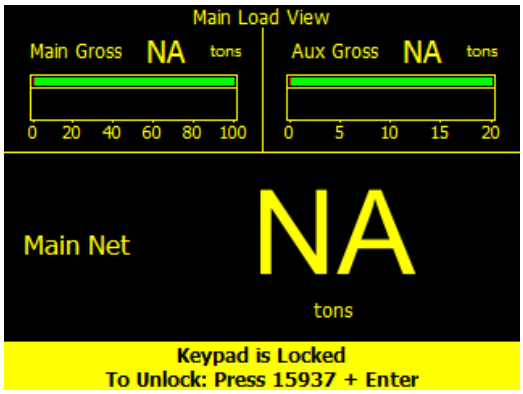


Figure 45 Keypad Unlock

9.1.11 RF Sensor Setup

If your system has supports wireless sensors you will have an RF Sensor Setup. Through the RF Sensor Setup the user can configure the remote antenna device to properly communicate to an RF Sensor. In order to communicate to an RF Sensor the remote antenna must be configured with the correct TXID and RF Channel.

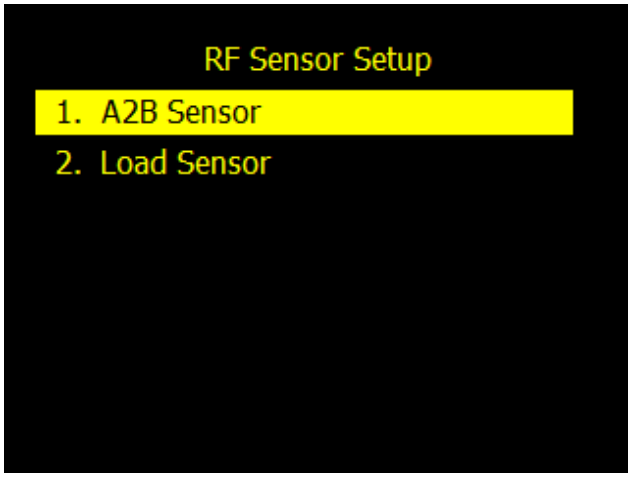


Figure 46 RF Sensor Setup

Note: The TXID is a hexadecimal value. When replacing a sensor the RF Channel does not get changed. Changes are accepted in the SD50 but will not take effect until the Remote Antenna is power cycled.

9.1.12 Diagnostics

The Diagnostics screen provides details that are useful to trouble shoot the SD50. The Version information provides part and serial number information as well as software version information. The View Data Values screen provides sensor input data. Figure 48 is an illustration of the diagnostics screen.

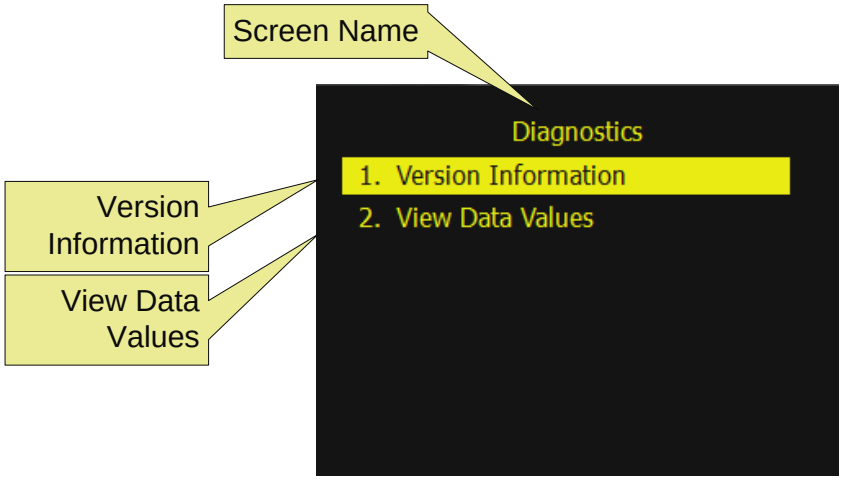


Figure 47 Diagnostic Menu

Feature	Description
Screen Name	Shows the screen title and can be used to reference different system elements
Version Information	The Version Information option provides details on the SD50 product part number and software control.
View Data values.	The View Data Values option provides details on sensor inputs into the SD50.

9.1.12.1 Version Information

The Version Information Screen provides system version information. This may include the operating system version, system part number, SD50 model number, Serial number and a build code. This information is critical to perform upgrades and trouble shooting. Figure 49 illustrates the version screen.

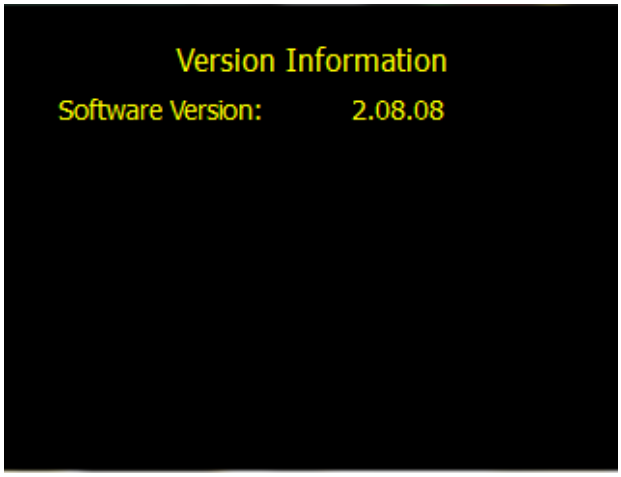


Figure 48 Version Information

9.1.13 View Data Values

The View Date Values Screen displays all of the data values that are available in the configuration. An example of the data values screen is shown in figure 50.

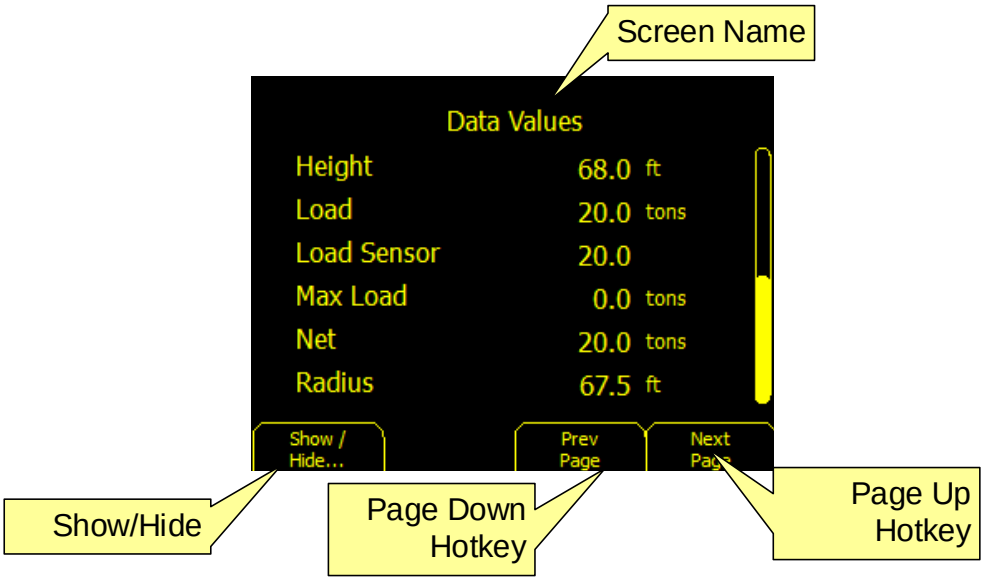


Figure 49 Raw Data Values

Feature	Description
Screen Name	Shows the screen title and can be used to reference different system elements
Show / Hide	The Show Hide Hotkey will either show or hide all data values.
Page Up	The Page Up Hotkey function is used to scroll through the menu option. This has the same function as the up and down arrow keys on the keypad.
Page Down	The Page Down Hotkey function is used to scroll through the menu option. This has the same function as the up and down arrow keys on the keypad.

9.2 Device Modules

The following table provides a list of devices that available for the SD50. The devices connect to the MGNet ports and are displayed based on the software configuration select.

Device Message Type	Message Type	Description
2	Load Sensor (hardwired)	All load and compression sensors with CAN Interface
3	Load Sensor (wireless)	All wireless load and compression sensors with CAN Interface
4	A2B Sensor (Hardwired)	Anti 2 Block collision warning
5	A2B Sensor (Wireless)	Anti 2 Block collision warning
6	Angle Sensor (Hardwired) Boom	Angle detection with table for safe working load compensation
7	Relay Output (qty: 4)(Hardwired)	Relay output module for alarm notification
8	Wind Speed (wireless)	Wind speed monitor
9	Payout (Hardwired)	Rope/Chain includes layer compensation
10	Remote Antenna	
11	Speed (Hardwired)	Rope/Chain using a scaling factor
12	Analog Output (qty: 1) (Hardwired)	Analog out for remote sensor (4-20 ma)
13	Analog Input	
14	Switch Inputs (qty8) hardwired	Input switch module needs to be defined
15	Slew Sensor (Hardwired)	Sum of multiple sensors. Max of 6 sensors
16	2 axis level Sensor (Hardwired)	
17	Wireless Payout (Wireless)	Rope/Chain includes layer compensation
18	Wireless Payout Speed (Wireless)	Rope/Chain includes layer compensation

10 Periodic Maintenance

Perform a visual inspection to verify that enclosure is free from damage. Verify that all mounting hardware is secure. Monitor the output of the sensor and verify that both normal and alarm range provides the correct response.

11 Specifications

Environmental:

Operation Altitude:	≤ 1500M
Operation Temperature:	-40 to +75°C
Storage Temperature:	-40 to +85°C
Enclosure Rating	NEMA 4X, IP66

Electrical:

Supply Voltage (See Note 1.)	10.5 – 28.0 VDC
Supply Current	1.2A max
Transient Voltage Protection	
Reverse Polarity Protection	
RFI Filtered	

Note 1" 120 VAC Option is available but not for hazardous area rated products.

Mechanical:

Enclosure dimensions	8.2"w x5.6"h x 3.8"d
Materials	316 Stainless
Outside Bezel Dimensions:	5.75" (146 mm) High, 7.63" (194 mm) Wide, 0.44" (11 mm) Deep
Panel Cutout Opening:	5.12" (130 mm) High, 7.01" (178 mm) Wide
Polycarbonate Lens	¼" (6.4 mm) Thick
Weight	~13 lbs (~ 17 lbs with mounting bracket)

Reference A – Option Matrix

The part number matrix below outlines the part number configuration for the SD50. It has configurable options that can be selected at the time of ordering and will drive the build configuration.

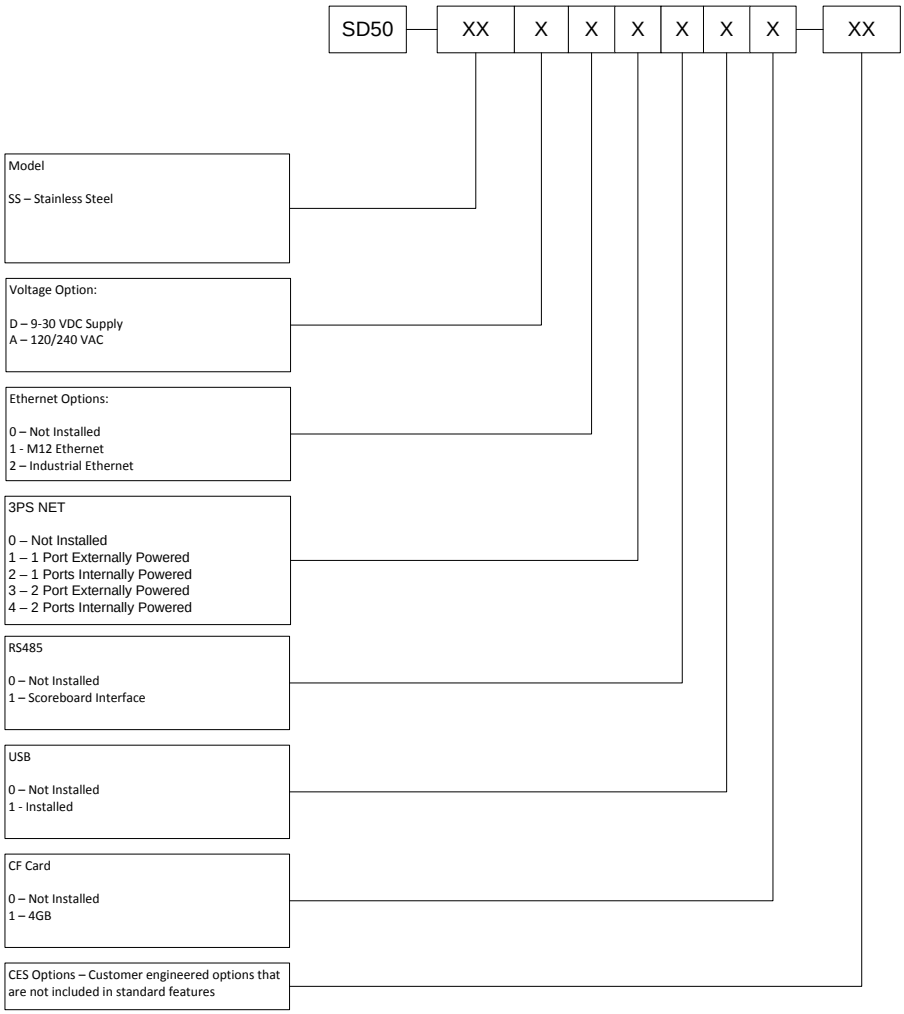


Figure 50 Configuration Options

NOTE: 120 VAC option is not available for Hazardous Area Version of the SD50
NOTE: USB option is not available for Hazardous Area Version of the SD50
NOTE: Ethernet RJ45 option is not available for Hazardous Area Version of the SD50

Reference E – Warranty Requirements

McCoy Global (the "Company") warranties the products or parts it manufactures against defects in materials and workmanship as follows:

- For a period of 18 months from time of shipment, or 12 months from date of installation, whichever comes first and provided the products or parts have been paid for and stored, handled, installed and used under proper conditions.
- The Company's liability under this Warranty Policy shall extend to the repair or replacement of a defective product or part only, at the Company's option.
- All Warranty work is to be performed at the Company's facilities.
- Products or parts being returned under this Warranty Policy are to be returned freight prepaid to the Company, and the Company will return the product or part to the customer freight prepaid.
- No field service is included. Field service work can be performed at the rate published by the Company and in the Company's sole discretion.
- The Company reserves the right, in its sole discretion, to make all determinations as to whether or not work requested is covered by this Warranty Policy.
- The Company's liability will be no more than the amount the customer has paid for the product or part that is the subject of a claim. This is the maximum amount for which the Company is responsible.
- During the Warranty period, the Company will, at its sole discretion, repair or replace defective products or parts for the customer, or refund the amount paid for the product or part less depreciation, upon its return to the Company. The Company reserves the right to refund the purchase price as its exclusive Warranty remedy.
- The Company shall not be liable for and does not assume any responsibility for loss of business or any indirect, incidental, special or consequential damages suffered by the customer or any subsequent buyer.
- TO THE EXTENT PERMITTED BY LAW AND EXCEPT AS SET FORTH IN THIS WARRANTY POLICY, THE COMPANY DOES NOT MAKE, AND SHALL NOT BE DEEMED TO HAVE MADE, ANY OTHER REPRESENTATION OR WARRANTY, EXPRESS OR IMPLIED, TO THE CUSTOMER OR BUYER OR ANY OTHER PERSON OR ENTITY REGARDING THE PRODUCT, PARTS OR ANY OTHER MATTER. THE COMPANY HEREBY SPECIFICALLY DISCLAIMS ANY AND ALL IMPLIED REPRESENTATIONS AND WARRANTIES RELATING TO THE PRODUCT, PARTS OR ANY OTHER MATTER, INCLUDING, WITHOUT LIMITATION, ANY IMPLIED REPRESENTATION OR WARRANTY AS TO THE QUALITY, MERCHANTABILITY, SUITABILITY OR FITNESS FOR A PARTICULAR USE OR PURPOSE, OR NON-INFRINGEMENT OF OR WITH RESPECT TO THE PRODUCT OR PARTS, WHETHER USED ALONE OR IN COMBINATION WITH OTHER MATERIALS, PRODUCTS OR SUBSTANCES.
- The Warranties provided herein are not transferable.