User's Manual

Use this manual for software versions from 1.24 forward

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The Industry Leader in HazMon Technology

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Revision Notes

First Release – October 17, 2010

Revision A – March 24, 2011

- Update for Version 1.20 software release

Revision B – December 1, 2011

- Update for Version 1.22 software release

Revision C – January 20, 2012

- Update for Version 1.25 software release
- Add hour counters screen
- Add Tripper machine type

Revision D – March 22, 2012

- Update for Version 1.27 software release
- Special case low alarms added
- Screen displays updated
-

Revision E – June 03, 2012

- Update for Version 1.27 software release

1. Overview

This manual describes the basic operation of the EZSentinel 128. The EZSentinel 128 is a combination HMI / Controller that provides comprehensive hazard monitoring for small grain facilities. It supports up to 128 field sensors for bearing temperature, belt tracking, belt speed and vibration. The HMI consists of a 6" touch screen display. All operations are undertaken on the touchscreen display. Users of the EZSentinel 128 should read this manual before operating the system.

Documentation for the EZSentinel 128 is contained in the following documents:

11240	EZSentinel 128 Installation and Configuration Manual
11242	EZSentinel 128 User's Manual
11258	Installing HazMon in a Box

The system provides display, alarming and control for conveyors, bucket elevators, drag conveyors, trippers and other machinery in a grain processing facility. The system consists of a field sensing network that collects temperatures of bearings and belt tracking rub blocks, belt speeds and machinery vibration. Sensors are typically installed on all large bearings, belt rub locations. A speed pickup is installed on the conveyor tail pulley.

Alarms are set to indicate over temperature and under speed conditions. Two levels of alarms are typically set, one to warn the operator and a second to stop the machine. A method is provided to test the alarm set points from the touch screen interface.

Alarms and other system events are logged to an alarm event log on the controller's SD card. Logs are maintained in separate files for each day. In addition a log of all sensor values can be maintained on the SD card.

A comprehensive security system is provided. The security system restricts access to the setup and configuration portions of the controller. In addition the security system logs access to critical system events such as alarm silence, alarm test and alarm bypass.

A means is provided to temporarily bypass an alarm should a senor fault. Bypassed alarms will no longer sound the alarm horn or stop the machine. The sensor alarm annunciators will still indicate the alarm and all alarms will be logged to the alarm and event log.

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Caution

Operators of the EZSentinel128 system must read and understand this document before attempting to operate the system or machinery controlled by the system. Failure to read and understand this document may result in damage to machinery, personal injury or loss of life.

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2. Home Screen

The system starts up on the home screen. The home screen displays the machines that are configured on the system beside push buttons to select each machine. A series of buttons at the bottom of the screen allow the selection of further system functions.

The following functions are available:

1. To silence the alarm horn and acknowledge any existing faults press the ***Silence*** button (see Section **2.1 Silencing Alarms**).
2. To view a machine, press the grey button next to the name of the machine (see Section **2.3 Machine Displays**);
3. To view the system status press the ***Status*** button (see Section **2.4 System Status**);
4. To view a list of the sensors, their current values and any current alarms by sensor, press the ***Sensor*** button (see **Section 2.5 Sensors** Display;
5. To view the alarm event log, press the ***Alarms*** button (see **Section 2.6 Alarms Display**);
6. The Silence function is protected by security and you may be asked to select your User name and enter your PIN before the alarm can be silenced (see **Section 2.2 Security Verification**). Alarms that are still active will continue be displayed and stop the machinery after a ***Silence*** operation. The cause of the alarm must be removed before the machinery can be restarted. The horn will be silenced until further alarms are declared;

To enter system setup, press the ***Setup*** button (see Section **2.6 System Setup**).

Two error messages can be displayed on this screen just above the row of buttons. The error messages are:

SD Card Fault:

The controller uses an SD Card to store the alarm and sensor logs. If the controller cannot write to the SD Card a specific error will be displayed.

Remote I/O Fault:

The controller is capable of controlling remote I/O. If remote I/O is enabled in the configuration and not communicating with the controller a "Remote I/O Fault" message will be displayed.

In addition to the error messages to machine state messages can be displayed. The messages are:

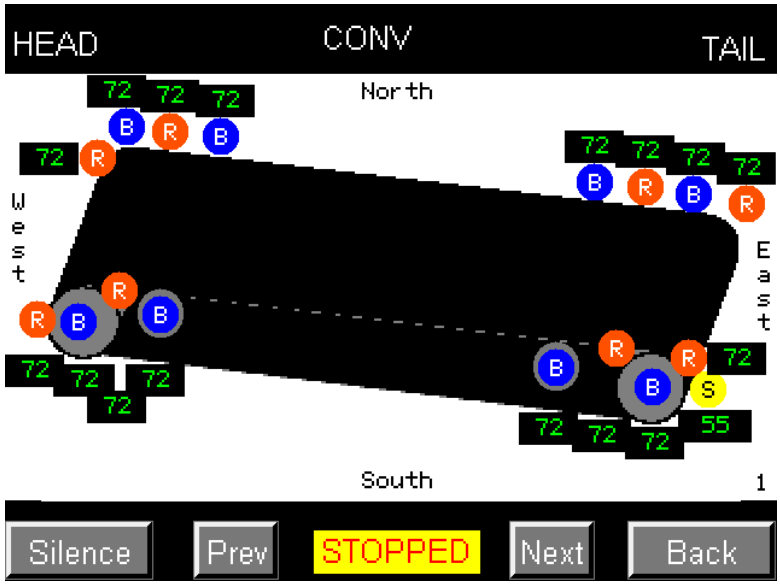
Lockouts Present indicating that a machine has been locked out because more than 5 start attempts have been made in the last 5 minutes;

Night Mode On indicating the system is in Night Mode. In Night Mode all machines and the alarm horn are disabled.

The system may indicate the running status of the equipment. On the main selection screen, if enabled, the machine name will be colored blue if it is not running.

For software version 2.00 and above, the machinery graphics screens a ***STOPPED / RUNNING*** annunciator will be displayed, if programmed, at the bottom of the screen. In addition North, West, South and East annunciators will be displayed to assist in locating sensors on the machinery.

Prev and ***Next*** keys allow the selection of machinery without returning to the Main screen. The machinery screen number is displayed in the bottom right corner of the display.



2.1 Silencing Alarms

Alarms are silenced by pressing the "Silence" key. Pressing the "Silence" key does not clear the alarm condition, it just silences the horn. The temperature will have to be reduced or the speed fault corrected before the machine can be restarted. Once the alarm condition has been corrected, press "Silence" a second time to clear the alarm and allow the machine to restart. The machine name must be displayed in "Blue" or "Green" on the selection screen before the machine can be restarted.

The system will sound the horn and record an alarm event under the following conditions:

1. A high alarm is reached;
2. A high warning is reached;
3. A low alarm is reached;
4. Low warning is reached;
5. A rate of rise is exceeded;
6. A sensor or other field component faults;
7. A fault is found with the machine running input.

Not all of these fault condition will be enabled on your system.

The system can also be programmed to stop machinery when alarm conditions are reached. An alarm condition on a machine may not stop that particular machine, but may stop a machine that feeds the alarmed machine.

Alarms are indicated on the machine selection screen, red for alarms and yellow for warnings. They are also shown in flashing red or yellow on the machine graphics screens.

If the machine stops shortly after starting, and a low speed alarm is indicated, verify the following:

1. Start the machine and observe the "STOPPED / RUNNING" annunciator in the graphics. This feature is programmable and the annunciator may not be present on your system. If programmed the annunciator should turn to "RUNNING" when the machine starts;
2. Verify the speed sensor reading on the graphic screen is increasing to the correct RPM;
3. Monitor the speed to insure it does not fall below the low alarm setpoint;
4. If the speed drops below the setpoint a low speed alarm will be recorded and the machine stropped.

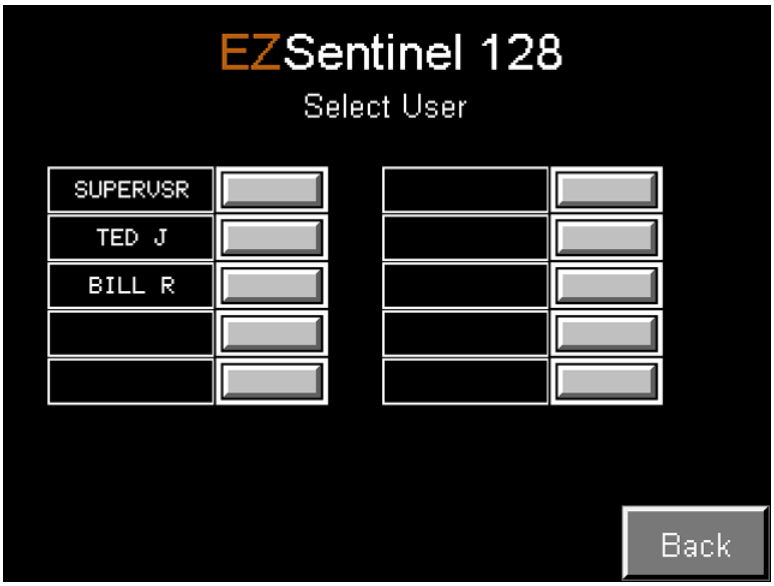
A special case alarm can be programmed that will stop the machine if the machine is moving, but no machine running input signal is present. This alarm will indicate as a low speed alarm. If you attempt to start a machine and the machine name does not change from blue to green, or the "STOPPED / RUNNING" annunciator does change to "RUNNING" on the graphics, the machine running input signal is not being received by the controller. This alarm will also be declared if the running signal is lost while the machine is running. There is an increased delay for the loss of signal alarm to prevent false alarms while the machine stops normally.

2.2 Security Verification

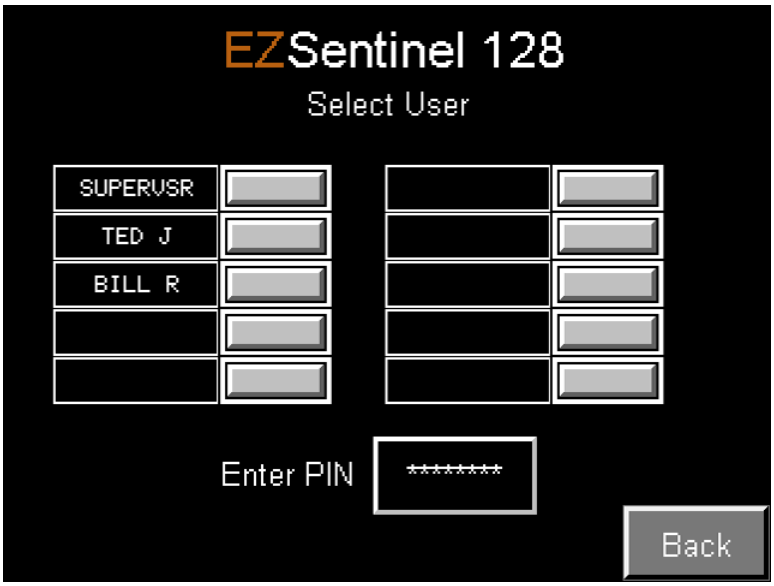
Many functions on the EZSentinel may require user identification before they can be processed. If the system has user security enabled, you will be prompted to select a user and enter a PIN number. Operations that require user identification are:

- Alarm silence and acknowledgment
- System setup
- Sensors setup
- Screens setup
- Alarm Test
- Alarm Disable
- Lock Out Reset

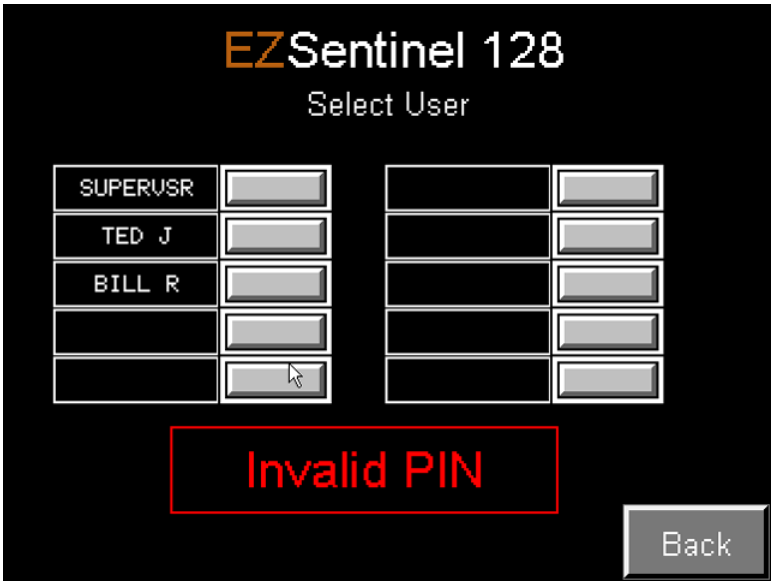
If you select one of these functions with security enabled, the following screen will be displayed:



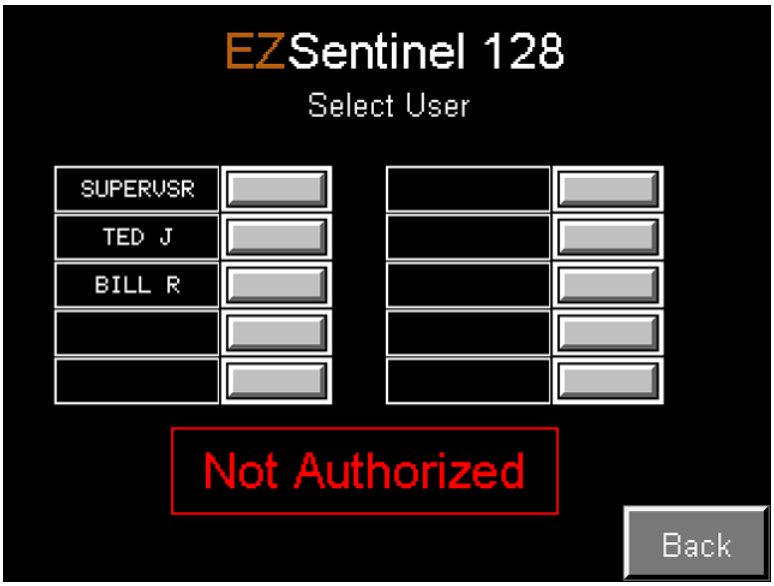
Select your user name by pressing the button beside your name.



Enter your PIN number by touching the entry box. Only numbers are permitted for the PIN. If you enter an invalid PIN the display will indicate:



You can start again by re-selecting the user and then re-entering the PIN. If you do not have a PIN or cannot remember it, you can return to the last page by pressing ***Back***. If you are not authorized to execute the selected function the screen will indicate:



Select another user and try again or return to the last screen by pressing ***Back***.

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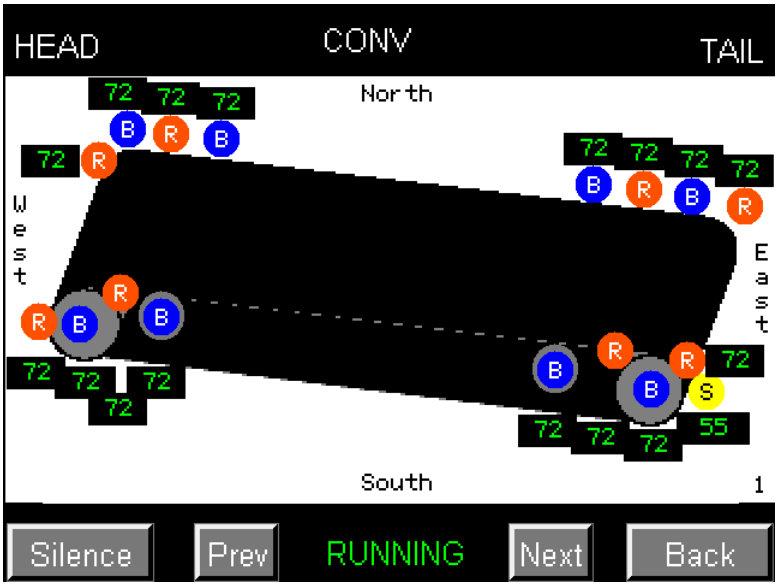
2.3 Machine Displays

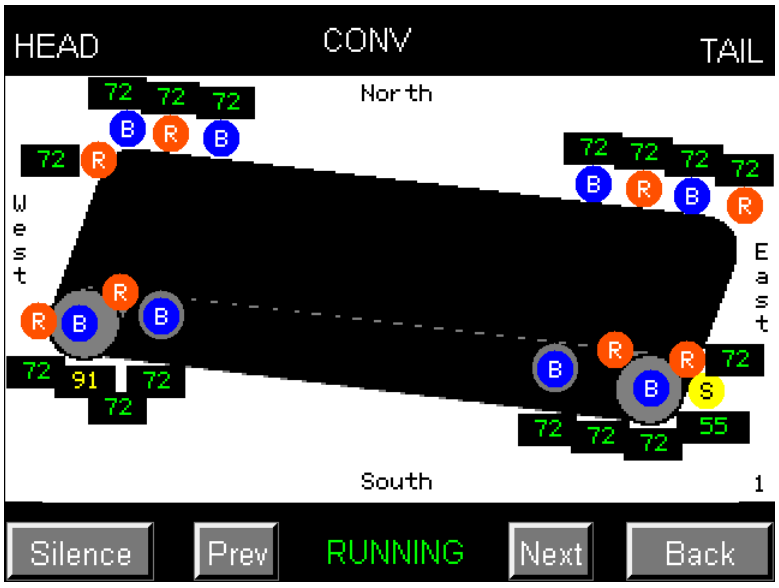
The system can display graphics for up to 15 machines. Six types of machine are supported:

- Conveyors
- Gravity Take Up Conveyors
- Legs / Bucket Elevators
- Drags
- Motor Drives
- Fans

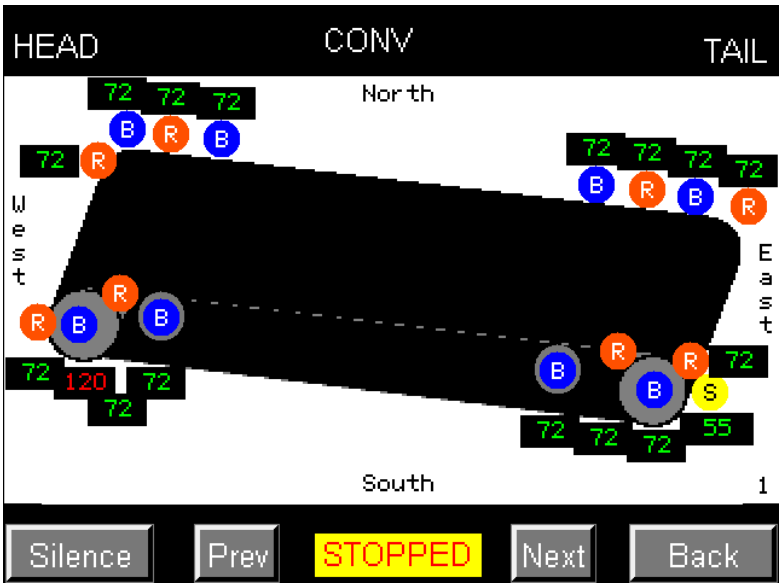
The Home screen can display up to 15 machine names with a selection button beside each name. Pressing the selection button will display that machine. The following graphic is an example of a conveyor.



The graphic illustrates a typical conveyor and indicates the locations where sensors are installed. This conveyor has 4 bearing sensors and 8 rub block sensors and a single speed sensor. The values for all 13 sensors are shown in green indicating the sensors are working normally.



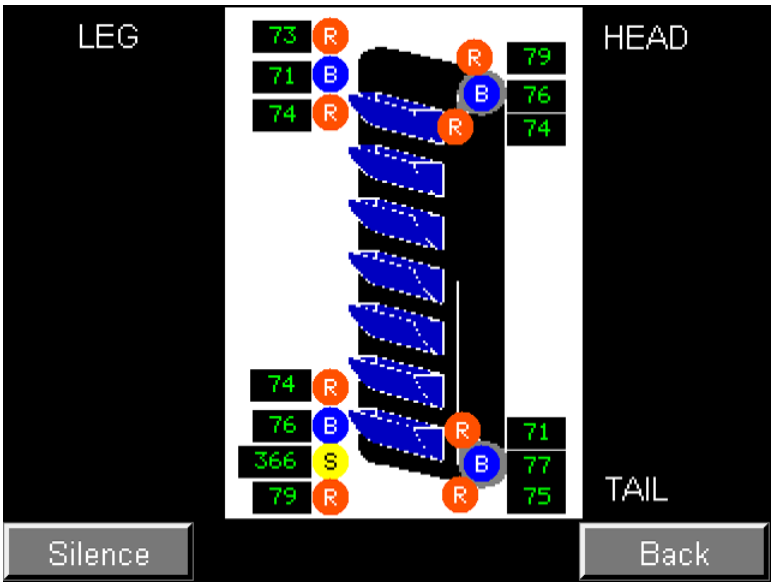
If a sensor on the conveyor exceeds the warning set point, the value display on the graphic will change to flashing yellow. The graphic above displays a bearing sensor (bottom left corner) in warning. If a sensor goes into an alarm state, the sensor value will flash red as shown below:



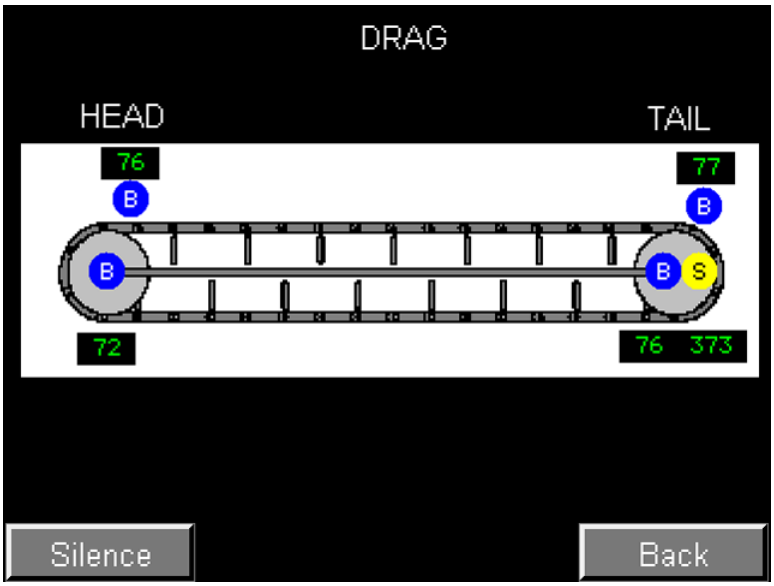
Should an alarm be present, the alarm horn can be silenced by pressing the ***Silence*** button. If the alarm condition is no longer present, the value display will return to green. If the alarm condition is still present the value display will remain yellow or red depending on the alarm. The alarm horn will always be silenced. If machinery control is in use, the machine will be stopped and remain stopped until the alarm condition is removed. Both alarms and warning can be configured to stop the machine.

If the user security is enabled, you will be presented with the Users Log On screen when you press the Silence key. The Users Log On screen is shown below:

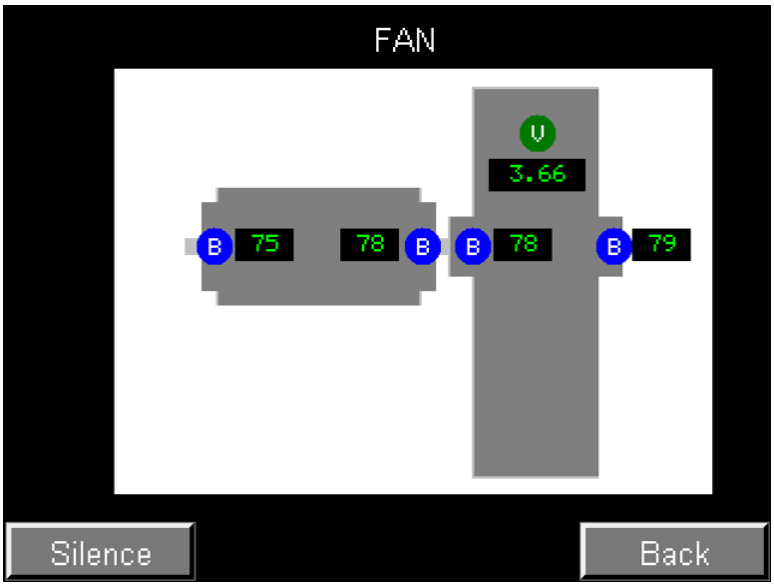
Screens are also available for the following machines:



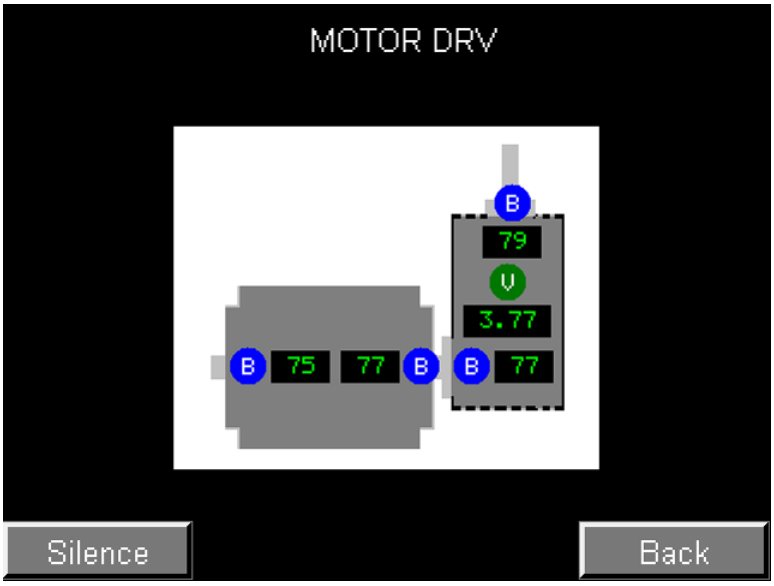
Leg / Bucket Elevator



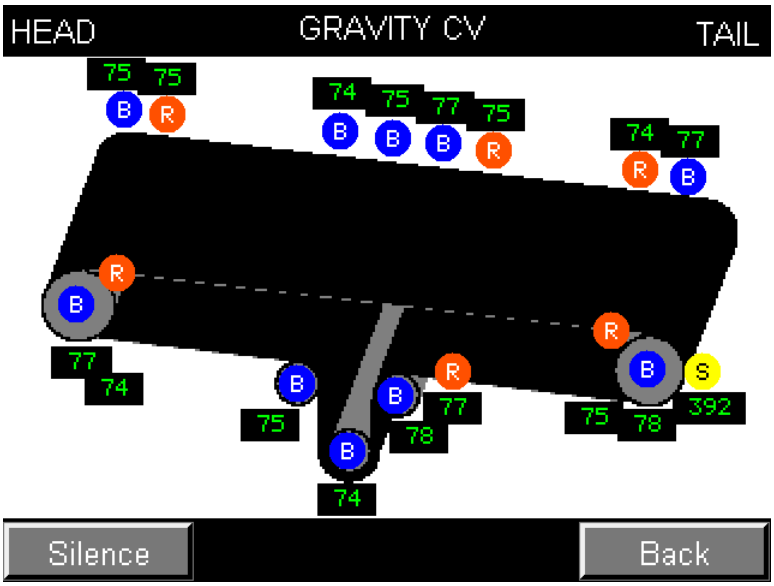
Drag Conveyor



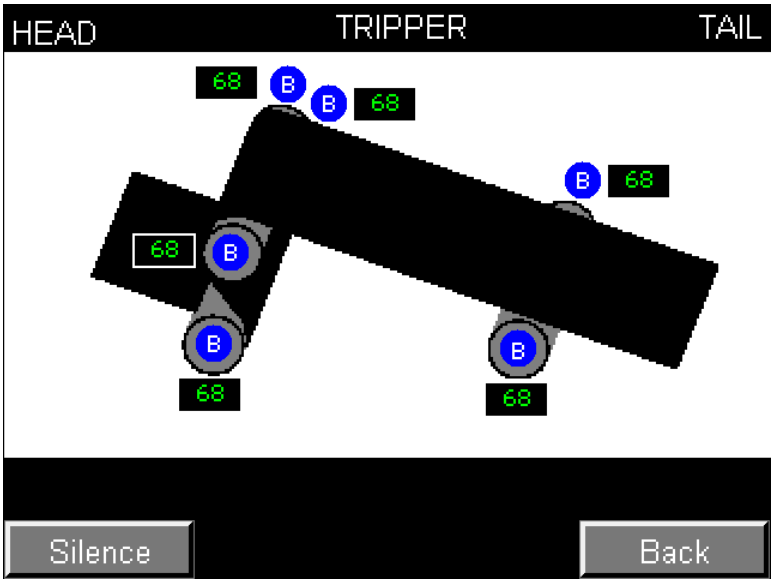
Fan System



Motor Drive System



Gravity Take up Conveyor



Tripper

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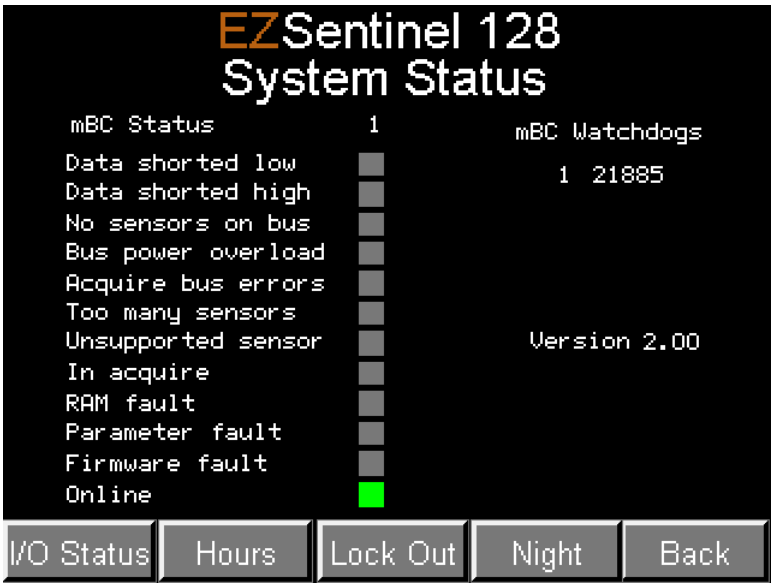
2.4 System Status

The EZSentinel 128 has screen displays for the field sensor network and the machine control inputs and outputs. Enter the diagnostic screens by pressing the ***Status*** key from the ***Main*** screen.



The main status screen will display the status of the systems bus converters and the firmware version. A second button, ***I/O Status*** selects the machine controller inputs and outputs view screen. The third button selects the machinery ***Hours*** counter screen.

The screen is shown in the normal operating condition. If any of the annunciators are red, there is a fault in the field sensor network. The online annunciator will be green if the bus converter is communicating with the EZSentinel 128.There may be up to 4 bus converters on your network depending on the number of field sensors installed. On version 1.22 and above the bus converter watchdog counter is also shown. This counter should increment at a one second rate.

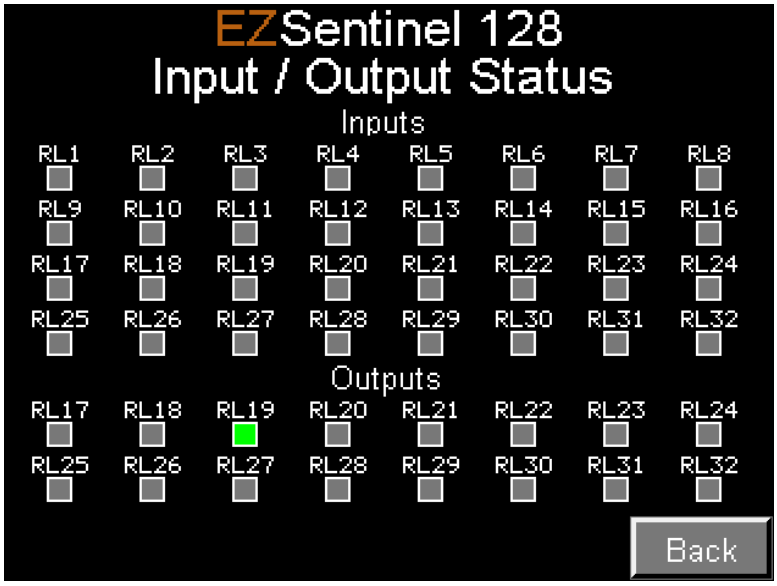
The following is an explanation of the status indicators:

Annunciator	Description	Possible cause
Data shorted low	The bus converters 1-Wire® bus has the data wired shorted to common	The 1-Wire® bus cable is damaged, a field sensor is damaged or the bus cable has not been properly terminated in the field interconnect enclosures
Data shorted high	The bus converters 1-Wire® bus has the data wired shorted to +5VDC	The 1-Wire® bus cable is damaged, a field sensor is damaged or the bus cable has not been properly terminated in the field interconnect enclosures
No sensors on bus	The bus converter cannot detect any sensor on the 1-Wire® bus	The 1-Wire® bus cable is broken or not terminated
Bus power overload	The load on the 1-Wire® bus power wire is too high	The 1-Wire® bus cable is damaged, a field sensor is damaged or the bus cable has not been properly terminated in the field interconnect enclosures
Acquire bus errors	During an attempt to acquire the serial numbers the bus converter encountered communications errors	There is a damaged sensor or the layout of the 1-Wire® bus network cannot be supported
Too many sensors	During an acquire operation more than 32 sensors were located on the 1-Wire® network	More than 32 sensors were connected to the bus converter
Unsupported sensor	The bus converter does not support a sensor located during an acquire	A sensor not supplied or supported by CMC is located on the 1-Wire® network
In acquire	The bus converter is executing an acquire operation to locate all of the sensor serial numbers on the 1-Wire® network.	An acquire operation has been started
RAM fault	The bus converter failed its power on test procedure	The bus converter failed its power on tests; cycle power to determine if the error re-occurs
Parameter fault	The bus converter failed its power on test procedure	The bus converter failed its power on tests; cycle power to determine if the error re-occurs
Firmware fault	The bus converter failed its power on test procedure	The bus converter failed its power on tests; cycle power to determine if the error re-occurs
Online	If red, the bus converter is not communicating with the EZSentinel 128	The cable between the EZSentinel 128 and the bus converter is broken or miss-wired or the bus converter is defective

The system status screen will also show status messages when machinery lockout or night mode are active. The annunciators appear in the bottom right corner of the screen.

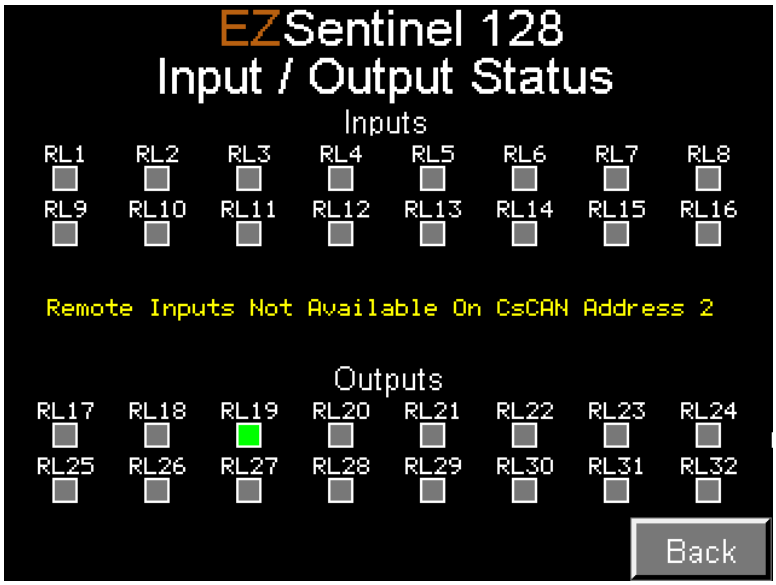
2.4.1 I/O Status

To view the machine control inputs and outputs, press the ***I/O Status*** button.



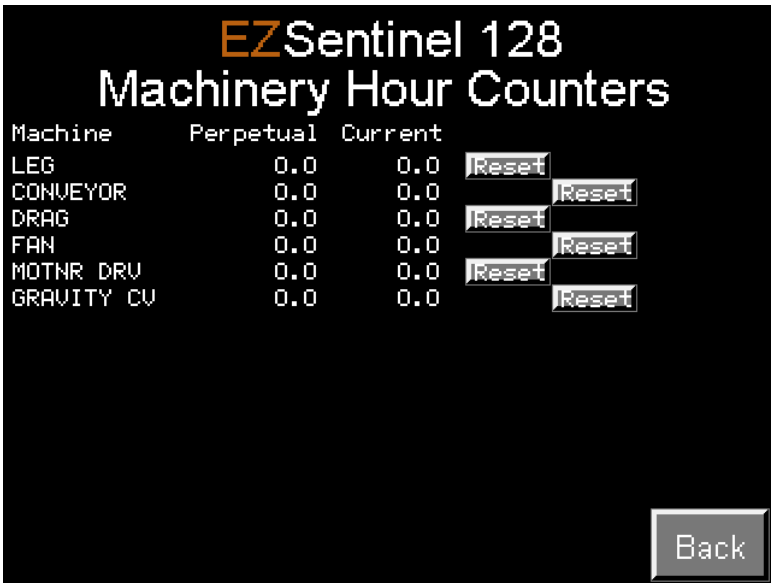
When an input or output is on, the annunciator will be green. When RL16 is green the alarm horn is sounding. The example shows output relay RL19 on.

If the optional remote enclosure is not connected to the EZSentinel128 the status screen will appear as below:



2.4.2 Hours

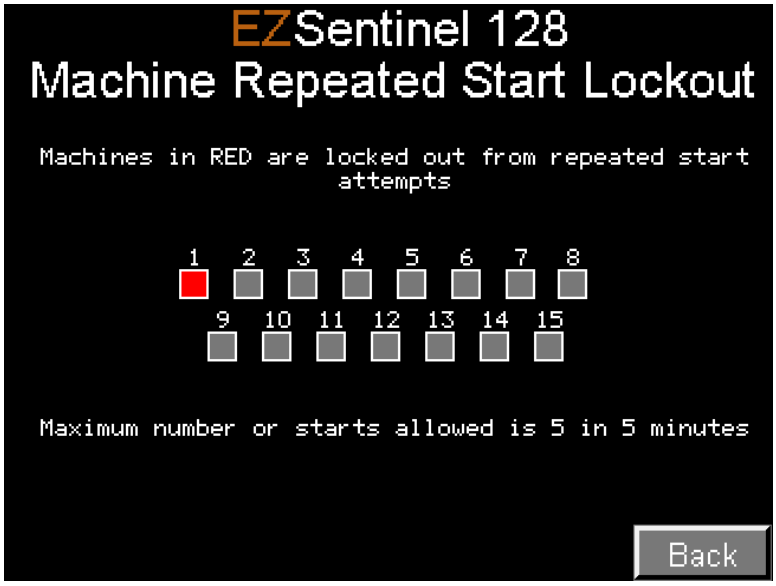
To view the machine running hours, press the ***Hours*** button.



Each machine has two counters. The perpetual counter is the hours the machine has run since the EZSentinel128 was installed. The resettable hours counter is the hours run since the counter was reset using the ***Reset*** button next to the counter.

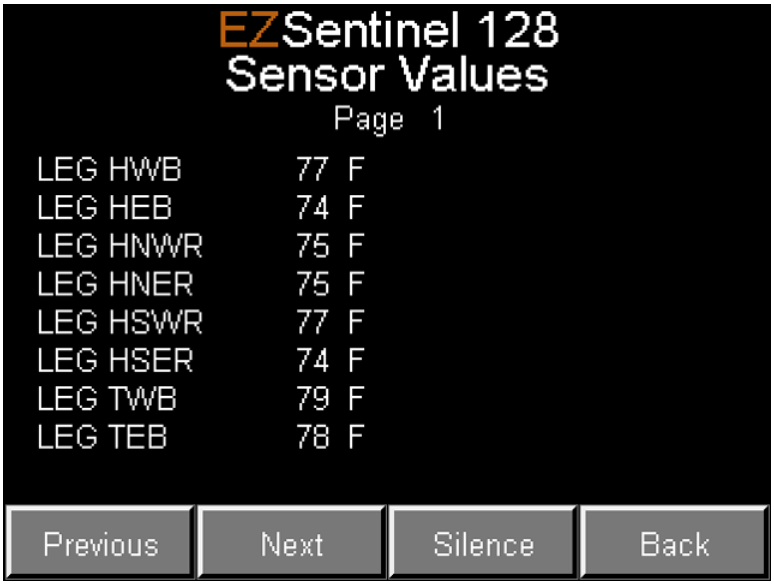
2.4.3 Lockout

The lockout display indicates which machines has been "Locked Out" due to repeated starts. If enabled, the system will lock out any machine that is started more than 5 times in 5 minutes. Locked out machinery cannot be reset from this screen. Lockouts are reset using the ***Lock Out*** screen selected from the ***Setup*** screen.



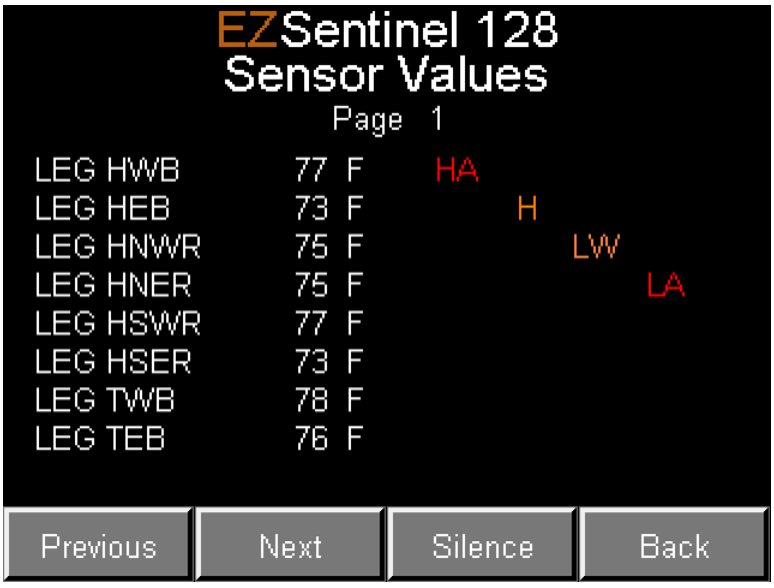
Sensors

Pressing the ***Sensors*** button on the main screen will display a list of the systems sensors. Up to 32 screens of 8 sensors each can be displayed. The screen shows the name, value and alarm status of each sensor. Use the ***Previous*** and ***Next*** buttons to scroll through the list of sensors.



Sensors display no faults

If a sensor is in fault, the faults will be displayed next to the sensor value.



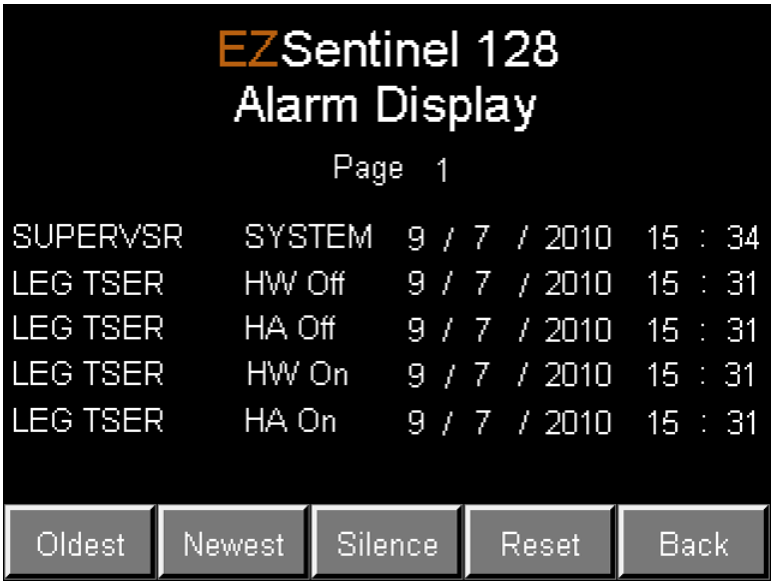
Sensor display with faults

Pressing the ***Silence*** button will clear any alarms no longer present and silence the alarm horn. If an alarm is still present, the alarm status will not clear, however the alarm horn will be silenced. Sensors that do not have a name assigned will not appear in this list.

2.5 Alarms

Pressing the ***Alarms*** button on the main screen will display a list of alarm events. Up to 160 records, 4 events per screen can be displayed. The screen shows the source of the event, the alarm or action and the time and date. Use the ***Previous*** and ***Next*** buttons to scroll through the list of events.

Events can be created by alarms, user access or system events. In the case of access events, the user that obtained access will be listed as the source.



The last 160 alarms are available for display on the Alarms screen. All alarms however are all recorded to the SD card. The alarm event log is located under the /ALM sub-directory and the alarm file names are MMDDYYAL.CSV (ex. 09010AL.CSV). The files can be retrieved by configuring the Ethernet port on the controller. See document 11240 – EZSentinel 128 Installation and Configuration Manual for details on configuring the Ethernet port. The files can be read from the SD card using a standard FTP program such as FileZilla, available on the internet. The FTP login details are:

username: admin
Password: cmciel

The files are in standard Excel ".csv" format and can be viewed, sorted and printed from Excel.

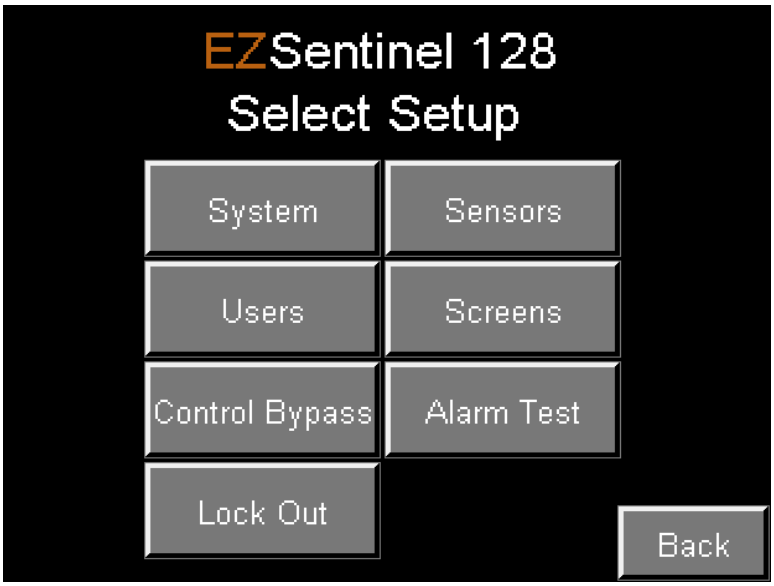
The following is an example of the alarm event log file:

LEG HNWR	HA Off	09/07/2010 12:28
LEG HNWR	HW Off	09/07/2010 12:28
LEG HNWR	LW On	09/07/2010 12:28
LEG TSER	HA On	09/07/2010 12:28
LEG TSER	HW On	09/07/2010 12:28
LEG TSER	HA Off	09/07/2010 12:28
LEG TSER	HW Off	09/07/2010 12:28
SUPERVSR	ACK	09/07/2010 12:29
SUPERVSR	SENSOR	09/07/2010 12:30

This file listing shows 7 alarm events for sensors on the LEG and two screen access events by the supervisor, one to silence the alarms and a second to enter the sensor setup screen.

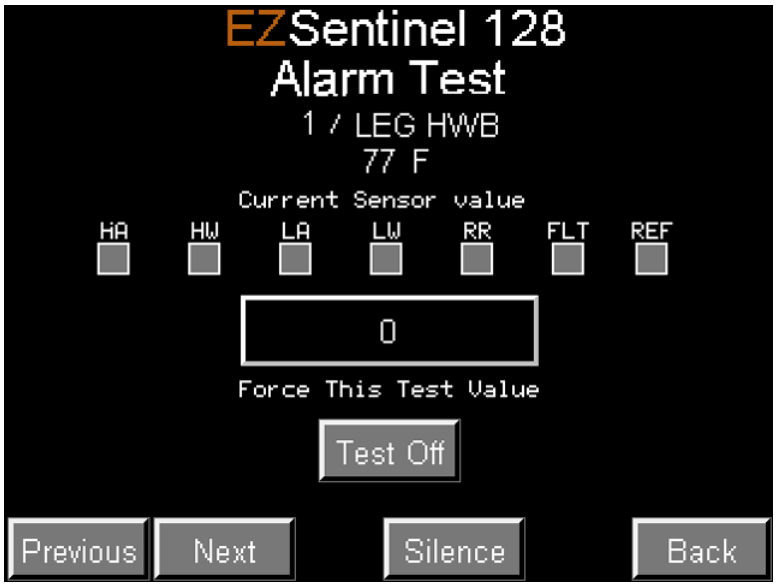
2.6 System Setup

All of the options from the system setup screen are protected under user security. If security is enabled you will be required to select a user and PIN before entering any of the setup screens. The system setup screen is shown below:



Function	Section
System setup	See document 11240 – EZSentinel 128 Installation and Configuration Manual
Sensor setup	See document 11240 – EZSentinel 128 Installation and Configuration Manual
Screen setup	See document 11240 – EZSentinel 128 Installation and Configuration Manual
Using Control Bypass	2.6.1 Alarm Test
Using Alarm Test	2.6.2 Control Bypass
Lock Out	2.6.3 Lock Out

2.6.1 Alarm Test



The alarm test function allows the operator to confirm the operation of high alarm, high warning, low warning, low alarm and rate of rise alarms. Test the alarms for each sensor as follows:

1. Select the sensor using the ***Previous*** and ***Next*** keys. The sensor number and name will be displayed under the title bar.
2. Enter the value required to trigger the alarm in the ***Test Value*** box by touching the box.
3. Press the ***Test*** key to force the test value. The key will be green when the test value is forced. Press the ***Test*** key again to turn of the test value. The screen will display the current value of the sensor. If a machine is wired for machinery control, some alarms may be suppressed if the machine is not running. If an alarm does not declare when tested try the test again with the machine running. Use caution as the machine will stop if the alarm is declared.
4. The alarm status is displayed by the alarm annunciators. Use the ***Silence*** key to turn off the alarm horn and clear the alarm. Alarms are logged to the alarm event log during this operation.

****

Caution

If machinery is operating while the tests are performed, the machinery will stop if a machinery control alarm is triggered. Damage to property, personal injury or loss of life could occur.

****

2.6.2 Control Bypass

This function allows an alarm to be bypassed so it does not sound the horn or stop the machine. Alarms that are bypassed using this function will remain visible on all of the display screens and will be recorded in the alarm event log. This system is typically used to bypass a damaged or faulted sensor. To bypass an alarm:

1. Select the sensor using the ***Previous*** and ***Next*** keys. The sensor number and name will be displayed under the title bar.
2. Press the button for the alarm to be bypassed. When the button is green, the alarm is bypassed.
3. To remove the bypass, press the button again.
4. To remove all bypasses, press the ***Clear All*** button.

Alarms that are bypassed using this function remain bypassed until this screen is re-entered and the bypass is removed.

****

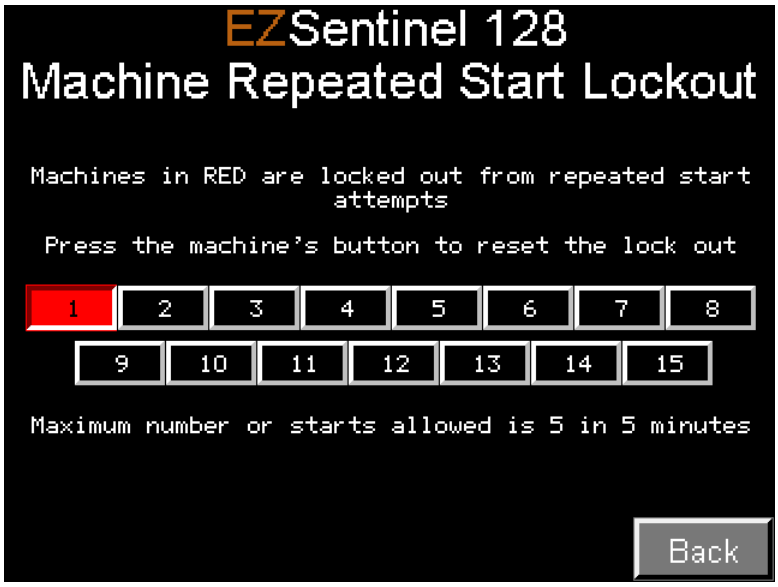
Caution

Machinery control and operator alerting is disabled for the alarms bypassed using this function. Should an alarm condition occur and the machinery not be stopped, damage to property, personal injury or loss of life may occur.

****

2.6.3 Lock Out

The system can be configured to automatically lock out a machine when 5 start attempts are made within a 5 minute period. Once a machine is locked out it will not start and the lock out must be reset from this screen. The screen below shows machine 1 locked out. Press the red pushbutton to reset the lock out.



"Lock Outs Present" indicators are clearly displayed on the main screen and the system status screens.

3. The SD Card

The EZSentinel 128 utilizes a 2GB SD Card to save the alarm and sensor log files. Depending on logging frequency this card needs to be replaced periodically. We recommend the card be replaced once a year. The SD Card format is micro SD as shown below:

The controller supports micro SD Cards up to 2GB capacity, larger cards are not supported.

3.1 Removing the SD Card

To remove the SD Card, loosen the two thumbscrews that hold the inner door of the enclosure in place. Open the door and locate the SD Card. The card is on the side of the controller near the top as shown below:

Push on the edge of the card and then release it to remove the card. A new SD Card can then be installed in the controller. See **Section 3.3 Formatting the SD Card** for information on formatting a new SD Card in the controller. SB Cards cannot be formatted in a PC for use in the controller.

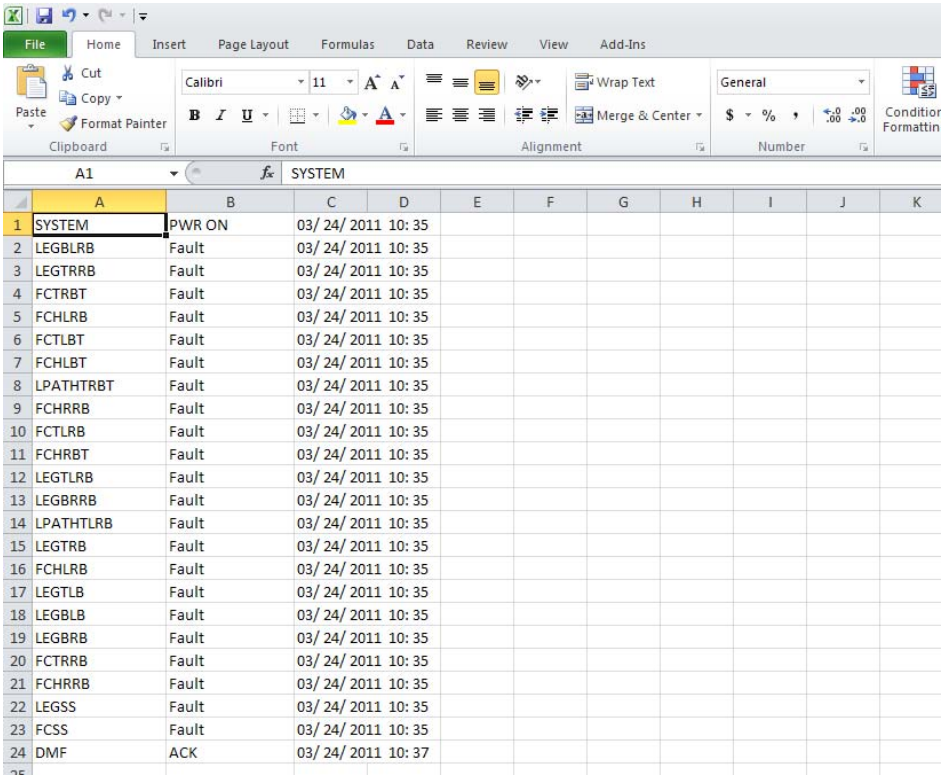
3.2 Reading the SD Card in a PC

The card can be read using a USB connected SD Card reader or computer equipped with and SD Card slot. An adapter is supplied with the controller to physically convert the micro SD Card to the standard sized SD Card format. The SD Card contains the following files:

Directory	Filename	Description
\	BACKUPSY.CSV	A copy of the controllers configuration files
\ALM	DDMMYYAL.CSV	Alarm log files
\DAT	DDMMYYDT.CSV	Sensor log files

The filenames for the log files consist of the day, month and year the file was created.

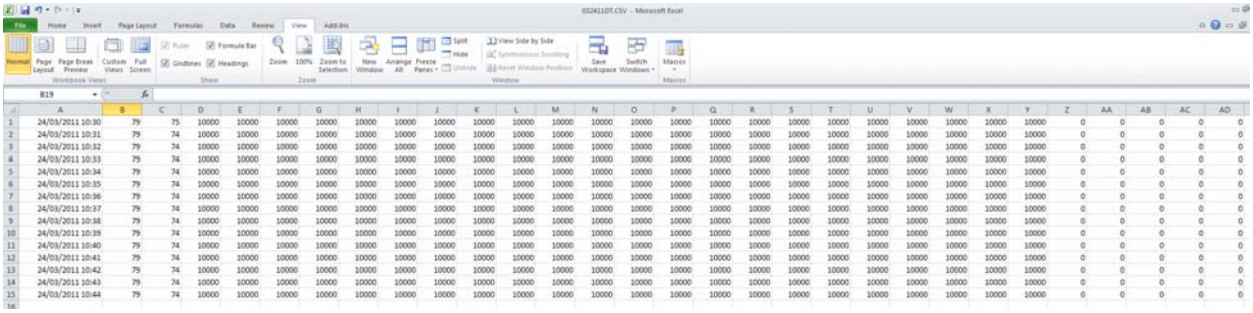
The ".CSV" log files can be opened in Excel directly. An example of the Alarm log file is shown below:



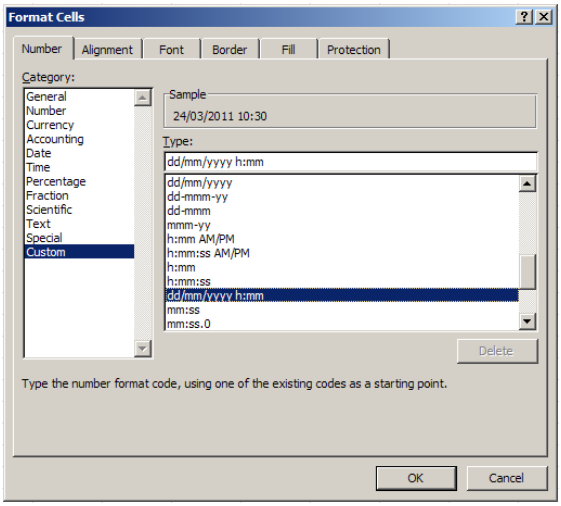
	A	B	C	D	E	F	G	H	I	J	K
1	SYSTEM	PWR ON	03/ 24/ 2011	10: 35							
2	LEGBLRB	Fault	03/ 24/ 2011	10: 35							
3	LEGTRRB	Fault	03/ 24/ 2011	10: 35							
4	FCTRBT	Fault	03/ 24/ 2011	10: 35							
5	FCHLRB	Fault	03/ 24/ 2011	10: 35							
6	FCTLBT	Fault	03/ 24/ 2011	10: 35							
7	FCHLBT	Fault	03/ 24/ 2011	10: 35							
8	LPATHTRBT	Fault	03/ 24/ 2011	10: 35							
9	FCHRRB	Fault	03/ 24/ 2011	10: 35							
10	FCTLRB	Fault	03/ 24/ 2011	10: 35							
11	FCHRBT	Fault	03/ 24/ 2011	10: 35							
12	LEGTLRB	Fault	03/ 24/ 2011	10: 35							
13	LEGBRRB	Fault	03/ 24/ 2011	10: 35							
14	LPATHTLRB	Fault	03/ 24/ 2011	10: 35							
15	LEGTRB	Fault	03/ 24/ 2011	10: 35							
16	FCHLRB	Fault	03/ 24/ 2011	10: 35							
17	LEGTLB	Fault	03/ 24/ 2011	10: 35							
18	LEGBLB	Fault	03/ 24/ 2011	10: 35							
19	LEGBRB	Fault	03/ 24/ 2011	10: 35							
20	FCTRRB	Fault	03/ 24/ 2011	10: 35							
21	FCHRRB	Fault	03/ 24/ 2011	10: 35							
22	LEGSS	Fault	03/ 24/ 2011	10: 35							
23	FCSS	Fault	03/ 24/ 2011	10: 35							
24	DMF	ACK	03/ 24/ 2011	10: 37							

Column A: Equipment; Column B: Fault; Column C: Date and time of fault. The alarm files also contain details of system access as shown in row 24 above, where DMF acknowledged an alarm condition.

The sensor log file contains the actual sensor values recorded at the interval set by the installer. An example of a sensor log file is shown below:



Column A: Date and time of reading; Column B: Sensor 1; Column C: Sensor 2, etc. The date and time column is recorded in standard Excel date format. To display this numeric format as date and time highlight column A and right click on the Column A tab. Open the "Format Cells" dialogue and select as shown below:



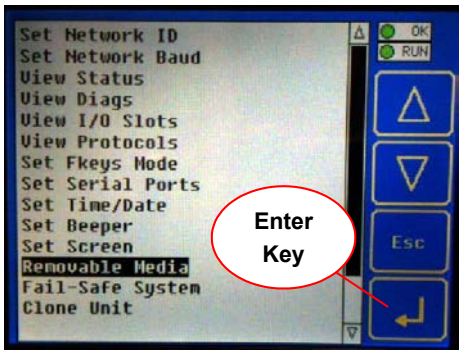
The SD Card can be reused after archiving by deleting the contents of the ALM and DAT directories.

3.3 Formatting a New SD Card

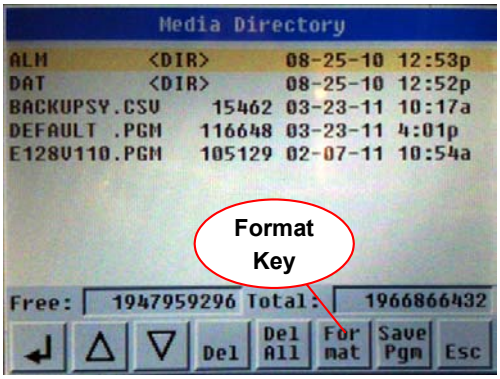
SD Cards cannot be formatted in a PC for use in the EZSetninel128. The card must be formatted in the EZSentinel128 controller. Perform the following steps the format the card:

1. Install a new micro SD Card in the slot on the controller. Note only cards up to 2GB are supported.
2. Access the "System" screen from the "Setup" menu.
3. The "System Setup" screen must be displayed. Press the blue system button on the upper right bezel of the controller as shown below:

4. Touch "Removable Media" in the menu list, then press the "Enter Key" (bottom right hand key) in the menu.



5. Press the "Format" button on the bottom menu. Answer "OK" to the "Are You Sure" prompt. Wait for the hourglass to complete.

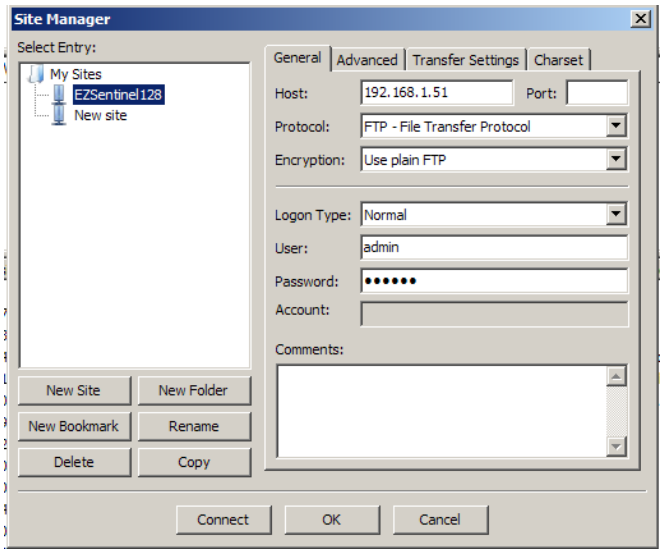


6. Press the "Esc" key twice to exit the System menu. The new SD Card is ready for use.

3.4 Reading the SD Card over the Ethernet port

The PLC has a standard RJ-45 Ethernet port. The port has a fixed IP address that is configured during setup. To read the SD Card over the Ethernet port, follow these steps:

1. Connect the PLC to your computer through a standard Ethernet cable. The connection can be direct (a cross over cable may be required I the computer does not have cross over detection) or through a Ethernet switch or router;
2. Ensure the PC and PLC share the same subnet. For more information on Ethernet addresses and subnets contact the IT department of your company or the installer that setup the system. The PC must have an IP address on the same subnet as the PLC. If the PC is directly connected to the PLC then the PC will have to have a static IP address assigned under the Properties tab of the PC's Ethernet adapter. If you do not know the IP address of the PLC it can be viewed or setup under the TCP/IP section on the System Setup menu. IP addresses must be unique on any one network;
3. Download and install a standard FTP client such as "Filezilla" (available from http://filezilla-project.org for free);
4. Open Filezilla and configure the FTP connect settings as shown. The FTP connect setting icon is shown below (the blue icon under the word File):



   Assign a connection name, enter the IP address of the EZSentinel128, select the protocol, encryption and logon type as shown above, and enter the user name "admin" and password "cmciel".

5. Press the Connect button to establish the connection;
6. The FTP program will attempt to connect to the EZSentinel. If the connection fails insure that the cable, IP address and subnet are correct;

Files can now be dragged and dropped to the directory of your choice.

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