

Installation, Operation & Maintenance Manual

Sentry SBC Controller Sampler Controllers

S-AS-IOM-00409-7 06-23



**Keep for future
reference.**



Do not install, maintain, or operate this equipment without reading, understanding, and following the appropriate Sentry Equipment Corp instructions. Otherwise, injury, damage, or both may result.

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Note

The information contained in this document is subject to change without notice.

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Safety Information

Please read the entire manual before attempting to unpack, set up, or operate this product. Pay careful attention to all Warnings, Cautions, and Notes. Failure to do so could result in serious personal injury and/or equipment damage.

Use of Hazard Information

If multiple hazards exist, the signal word corresponding to the greatest hazard shall be used.

Definitions

DANGER

DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

CAUTION, used with the safety alert symbol, indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to personal injury.

NOTE

Information that requires special emphasis.

TIP

Alternate techniques or clarifying information.

SHALL: This word is understood to be mandatory.

SHOULD: This word is understood to be advisory.

General Safety Precautions

Product Selection, Installation, and Use

WARNING

Improper selection, installation, or use can cause personal injury or property damage. It is solely the responsibility of users, through their own analysis and testing, to select products suitable for their specific application requirements, ensure they are properly maintained, and limit their use to their intended purpose.

Follow proper local, state, and federal regulations for proper installation and operational requirements.

Always use caution and common sense when working with any chemical. Read the product label and Material Safety Data Sheets (MSDS) carefully and follow the instructions exactly.

Potential Equipment Hazards

WARNING

Hot surfaces! This equipment may have very hot surfaces. If an operator contacts a hot surface, injury may occur. Use protective clothing to prevent injury. If other equipment comes in contact with a hot surface, damage to the equipment may occur. Ensure the area around this equipment is kept clear to prevent damage from occurring.

High pressures! This equipment may contain fluids at very high pressures. Prior to installing, removing or maintaining this equipment, ensure that the equipment is isolated from all connecting piping, the equipment is depressurized, the contents have been drained, and the equipment is cool.

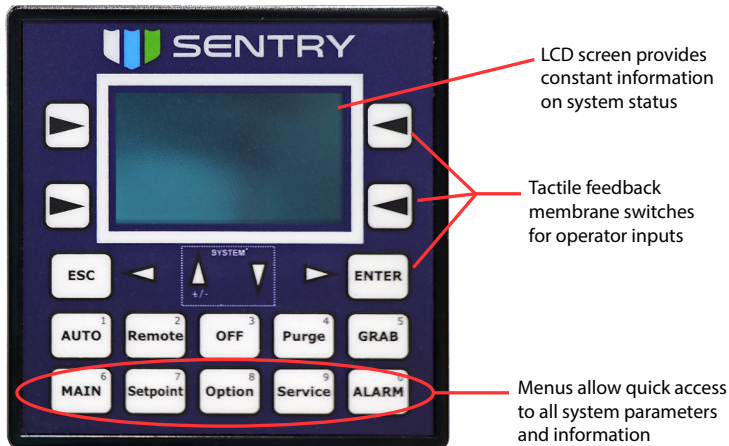
Moving parts! This equipment may contain moving parts. All drive guards and doors must be secured in place when this machine is being operated.

General Description

NOTE

Information provided in this manual covers all standard features of the Model SBC. Certain features do not apply to all applications. The software displays the options that apply to your application.

The Sentry® SBC controller is a dedicated logic control system capable of controlling many automatic samplers in the Sentry product line including liquid, slurry, and bulk solids samplers.



Controller features

- Adjustable timer setpoints for all sampler models
- Standard modes of operation include Batch, Delay Start, and Flow Proportional sampling
- Ability to control an indexing cabinet with a jar sensor in conjunction with your sampler
- Quick Start screen with step-by-step instructions for startup
- Description of the sequence of operation for the programmed sampler
- Current cycle counter to track the number of samples taken
- PLC heaters are available

General Specifications

- Operating temperature: 0°C to +50°C
- Relative humidity: 5 to 95% non-condensing

Installation

Receiving

- Examine the crate and all contents for any shipping damage immediately after receipt.
- Take pictures of any suspected damage.
- Report damages to the delivery company at once. This is the responsibility of the consignee.

Installation

- Installation should be performed by qualified personnel in accordance with state/provincial and local codes and procedures.
- Mount the controller in a location that is easily accessible and within view of the sampler.
- Mount the controller in a vibration-free location and have a qualified electrician wire the controller to the electrical supply.
- Surge suppression and filtering is recommended but not required.
- Hard wire the controller to instrument-quality power using appropriate certified conduit, fittings, and wiring or cable.
- Use a suitable external over-current protection device, such as a fuse or circuit breaker (15 A), and disconnect device.
- The over-current protection and disconnect devices shall be installed on both the hot (L) and neutral (N) leads.
- The disconnect device shall be located near the equipment and marked with appropriate ON(I) OFF(O) markings as specified by local codes.
- When penetrating the controller enclosure, use tubes and fittings that maintain the environmental rating of the enclosure.

Inputs

↩ NOTE

Inputs I3 through I7 are located on the Index Cabinet. Inputs H1 through H4 and A1 are field-mounted devices. The signals are processed in the Sentry SBC Controller.

- I1. REMOTE ENABLE: External contact from customer which, when open, prohibits all operation of the sampler. If not used, leave terminals TB2 1 and 2 wired together.
- I2. REMOTE START: External contact from customer, using terminals TB2 3 and 4, which initiates sampling when in REMOTE mode.
- I3. SAMPLER PROX 1: Proximity sensor input. Used for control of MG and SA/E samplers.
- I4. SAMPLER PROX 2 or IC Jar Sensor: Secondary proximity sensor input or proximity sensor used to sense level of jar fill in the Indexing Cabinet.
- I5. IC DOOR: Proximity sensor input confirming position of door on the Indexing Cabinet. Operation inhibited if door is open.
- I6. IC Carousel: Proximity sensor input confirming the position of the carousel of the Indexing Cabinet.
- I7. IC Manual Pushbutton: Manual advance pushbutton for the Indexing Cabinet.
- I8. Delay Start: Contact closure triggers a time delay. After delay timer expires, sampling will start.
- H1. High Speed Counter: Flow counter input used for flow based sampling (10 kHz max frequency; 100 μ s min pulse resolution).
- H2. Digital or COUNTER Input: Extra digital input or high speed counter input available for future control enhancements.
- H3. Digital or COUNTER Input: Extra digital input or high speed counter input available for future control enhancements.
- H4. Product Backup Sensor: Proximity sensor input used for sample backup indication.
- A1. 4-20 mA INPUT: Flow meter output used for flow based proportional sampling.

Outputs

NOTE

If others provide control, it should follow the minimum requirements of the operating logic outlined in this section

Controller outputs vary by the sampler controlled. Refer to the chart below or the electrical wiring diagram (EWD) to determine output usage.

Sampler	R1	R2	R3	R4	R5	R6
A, MG-Air	Unused	Sample Sol	IC Full	IC Motor	Alarm	Sampler Running
B1	Direction Relay	IC Full	Motor	"	"	"
GE	IC Full	Unused	Motor	"	"	"
ISOLOK	Air Eject Sol	Sample Sol	IC Full	"	"	"
Iso-Park	Sol 2	Sol 1	IC Full	"	"	"
MG Elec	IC Full	Unused	Motor	"	"	"
PR	Purge Sol	Sample Sol	IC Full	"	"	"
R	Solenoid	IC Full	Motor	"	"	"
RB, D2	Solenoid	IC Full	Motor	"	"	"
RX	Purge Sol	Sample Sol	IC Full	"	"	"
RPG	Extend Sol	Rotate Sol	IC Full	"	"	"
SA/A, GA	Solenoid	Unused	IC Full	"	"	"
SA/E	IC Full	Unused	Motor	"	"	"

Operation

Quick Start

The first time power is applied, the controller defaults to Quick Start. Quick Start leads the operator through the controller set-up procedure step-by-step.

To access Quick Start on subsequent power-ups, press the Service key and select Quick Start.

Using the Controller Keys

System Keys

1. **Soft Keys:** The arrow keys on either side of the display correspond to keys programmed on the screen. The rim surrounding the soft key shown on the display will be filled when the option is selected.
2. **ESC:** Returns to previous screen; ends editing session without accepting new value.
3. **Arrow Keys:** The up, down, right and left arrow keys located directly below the display are used to navigate menu selections and change editable values.
4. **ENTER:** Accepts new values; selects menu options; enters editing mode.
5. **Numbers:** In editing mode, all of the function keys can be used to enter numbers, which are shown in gray on the upper right hand corners of the keys

Command Keys

1. **AUTO:** Places the controller in AUTO mode. This mode allows local operation of the controller.
2. **Remote:** Allows remote operation of the controller. Sampling starts when a contact from an external source is closed. Continuous sampling occurs for as long as the contact is closed. Momentarily closing this contact will start a single sample.
3. **OFF:** Takes the sampler out of REMOTE or AUTO mode; will reset the Batch counter.
4. **Purge:** If sampler has a purge/air eject option, this key manually operates the solenoid to purge the unit.
5. **GRAB:** Allows the operator to immediately collect a sample. Sampler must be in the Cycle/Retracted portion of the sampling cycle or in the OFF state.

Menu Keys

1. **MAIN:** Main operating screen displays sampler position, current timer value, current mode, and Batch and IC count.
2. **Setpoint:** Lists all program setpoints.
3. **Option:** Menu of the available program options and routing to pertinent screens.
4. **Service:** Menu of service-related options such as I/O Status, Quick Start, Operation Sequence, Default settings, and Cycle Counter.
5. **Alarm:** System alarm log.

SELECTION INSTRUCTIONS:

ON A MENU SCREEN:

PRESS **ENTER** TO START SELECTION. LINE WILL BE BACKLIT.

USE **SMALL ARROW KEYS** TO NAVIGATE TO DESIRED SELECTION.

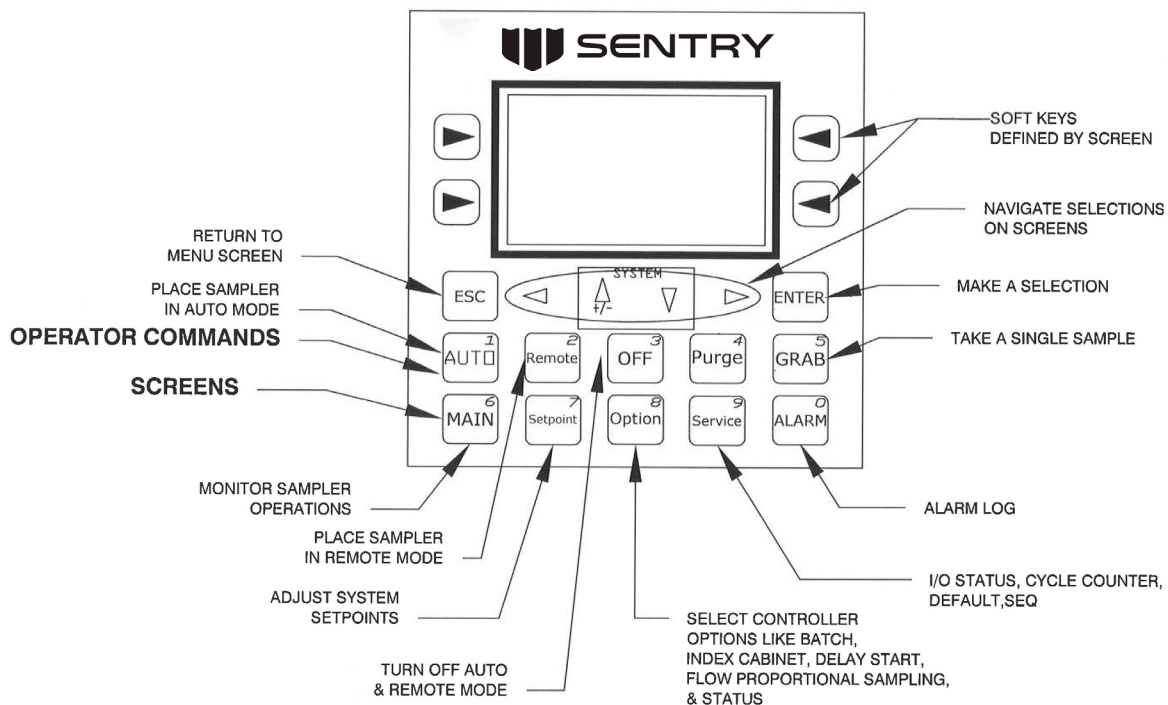
PRESS **ENTER** TO SELECT.

IF NEW VALUE WANTED, USE **KEYS AS NUMBERS**

(SMALL GRAY # IN CORNER) OR USE **ARROW KEYS** TO INCREMENT CURRENT VALUE.

PRESS **ENTER** TO ACCEPT VALUE

PRESS **ESC** TO EXIT SELECTION MODE.



Starting and Operating the Controller

After the sampler and controller are installed, timer setpoints must be verified or changed from the factory preset values.

1. Press the Setpoint menu button to access the Setpoints menu screen.
2. The Setpoints menu screen lists all the setpoints available for adjustment.
3. Refer to the appropriate appendix for information on the setpoints for your sampler model.

Timers

NOTE

Timers used depend on sampler type. See appendix appropriate to your sampler.

1. Extend or Sample time: Determines the time the sampler is in the process stream (max 600 sec).
2. Retract time: (not applicable to all samplers) Determines the duration the sample probe is retracted, allowing the sample to be deposited into the sample container (max 600 sec).
3. Cycle Time: Determines the time between samples (max 17:59:59).
4. Delay Time: (not applicable to all samplers) Determines the time before purge/air eject occurs (max 600 sec).
5. Purge Time: (not applicable to all samplers) Determines the time purge/air eject is active (max 600 sec).
6. Park Time: (not applicable to all samplers) Determines the time the sampler is in the Park position (max 17:59:59).

OPTIONAL - Recipe Configurations

Recipes have been built into the PLC program and offer 10 options. These can be utilized as applicable. Each recipe can contain its own title and each parameter can be edited from an Excel file. It is recommended to keep a backup of recipes, in case they are accidentally overwritten or lost.

NOTE

All recipes are continuously stored on a micro-SD card and this card must remain inserted into the PLC.

Editing from an Excel File:

1. Remove micro-SD card from the PLC and take it to a computer which has Microsoft Excel. (The file extension must remain in a .CSV format with a max filename of 8 characters.)
2. Open the file in Excel and find the table below.

Recipe Name	Sample	Purge	Cycle Sec.	Cycle Min.	Cycle Hr.	Batch
Product 1	5	5	5	0	0	1
Product 2	6	6	6	0	0	2
Product 3	7	7	7	0	0	3
Product 4	8	8	8	0	0	4
Product 5	9	9	9	0	0	5
Product 6	10	10	10	0	0	6
Product 7	11	11	11	0	0	7
Product 8	12	12	12	0	0	8
Product 9	13	13	13	0	0	9
Product 10	14	14	14	0	0	10

3. Each of the recipe names are editable and each one of the parameters can be modified to suit. It is recommended that recipe names be 12 characters or less.

Modes of Operation

The controller operates in two modes, AUTO and REMOTE, with the capability to take a GRAB sample in either mode. AUTO and REMOTE cannot be selected at the same time.

Auto Mode

- Auto mode is the default mode of operation.
- Press the AUTO key to place the controller in Auto mode.
- All operating commands are initiated at the controller panel.
- Refer to the appropriate appendix or the Service Menu of the controller for the sequence of operation specific to your sampler model.

Remote Mode

- Press the REMOTE key to place the controller in Remote mode.

- Start and stop commands are initiated from a remote control system.
- Sampling is started and stopped based on an external contact (Terminals TB2 3, 4).
 - When the contact is closed, sampling starts.
 - When the contact is removed, sampling stops.
 - If contact is removed in the middle of a sampling cycle, the sampler completes the cycle and then stops.
 - A momentary closure of the remote contact results in a single sample being taken.

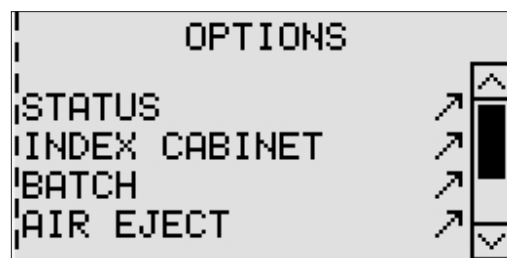
Grab Sample

- Press the GRAB key to take a single manual sample, also known as a grab sample.
- A grab sample can be taken any time the sampler is not actively sampling. The current state of the sampler is displayed on the main screen.
- When the grab sample is complete, the cycle timer resumes counting from the point at which it was interrupted.

Controller Options

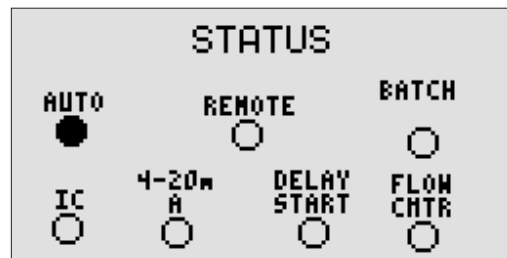
The Options menu lists all of the options available based on your sampler model.

- Press the OPTION key on the controller to view the Options menu.
- Use the small arrow keys to navigate to the desired option, and then press the Enter key to select the menu item.
- Press the ESC key to return to the Options menu.



Status

The STATUS screen is for information only. A filled indicator designates an option that is currently selected for operation of the controller.



Index Cabinet

The Indexing Cabinet screen displays the current status of the indexing cabinet (IC) and allows the operator to enable use of the IC, set the number of jars in the cabinet, and reset the jar counter.

- Enable Use of the Indexing Cabinet
 - To enable the IC software, press the lower soft key to the left of the screen.
 - The screen changes from "IC OFF" to "IC ON."



- Number of Jars
 - The number of jars displayed (# Jars) is equal to the physical number of jars used in the Indexing Cabinet.
 - Cur Jar indicates which jar is currently in use.
- Reset the Jar Counter
 - When all of the jars in the indexing cabinet are full, replace them with empty jars.
 - Reset the jar counter by pressing the lower soft key to the right of the screen.

Batch

The BATCH option allows the sampler to take a specific number of samples and then stop. For example, this option could be used to fill a container and then stop sampling until the container can be replaced.

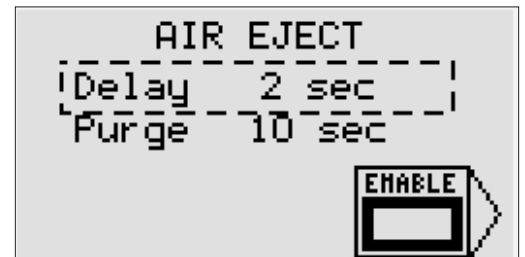
- To enable the BATCH option, press the arrow next to the Enable soft key.
- To change the setpoint :
 - Press the ENTER key to backlight the value.
 - Use the UP and DOWN arrow keys to adjust the value incrementally, or use the number keys to enter a value.
 - When the desired value is displayed, press the ENTER key to accept.
- Once a BATCH is complete, sampling will stop. To reset the batch counter, press the arrow next to the RESET soft key on the above screen or press the OFF key from the Main screen. This action resets the batch counter to zero and sampling resumes.



Air Eject

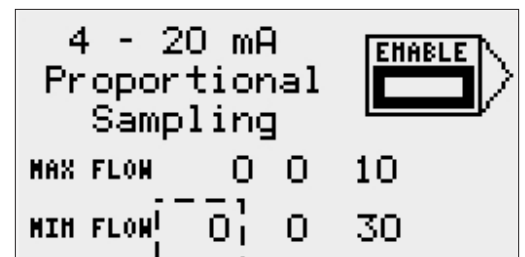
This option is available only on specific samplers. Consult with a Sentry sales representative to see if the air eject option is available for your application.

Air eject allows a shot of air to flow through the sampler after the sample has been taken. After the sample is taken, the delay timer starts. The delay allows some time for the majority of the sample to evacuate the sampler. When the delay expires, the purge solenoid is energized allowing air to flow through the sample chamber, clearing any residual sample.



4-20 mA Flow Proportional Sampling

The controller has a flow proportional sampling option. With this option, a 4-20 mA signal from a flow meter is input into the controller. Setpoints for the sampling time at maximum flow and minimum flow are entered. These setpoints are used to calculate the PARK timer value. The EXTEND and RETRACT times are still based on the operator entered setpoints. Based on the analog input from the flow meter, a sampling rate is determined. This value is a linear interpolation between the minimum and maximum flow setpoints entered.



This option is enabled by pressing the arrow next to the ENABLE soft key. The minimum and maximum flow setpoints are entered using the ENTER, UP and DOWN arrow keys, and ESC key as detailed in the setpoint section of this manual. A dashed box appears around the active selection. The RIGHT and LEFT arrow keys can be used to move between fields.

For example:

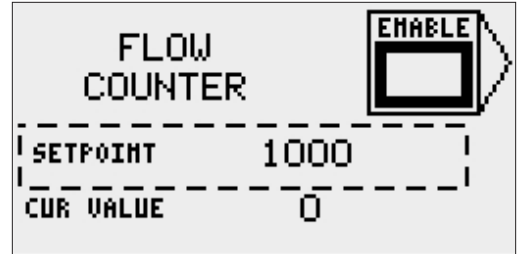
The operator sets the max flow time to 10 seconds and the min flow time to 30 seconds. He enables the option by pressing the soft key. The controller is placed in AUTO using the selector switch. The flow input signal is at 12 mA,

about half of full scale. The controller calculates the park time to be 20 seconds. The sampler will extend and retract at the set values. It will Park for 20 seconds and then start the cycle over again. If the flow input changes to 4.1 mA, the extend and retract values stay the same, but the park value is adjusted to 30 seconds. If the input falls below 4.0 mA, timer operation is suspended. As soon as the input goes above 4.0 mA, the timing will resume, picking up where it left off.

Flow Counter

The controller will accept a square wave input from a flow counter and sample after X number of pulses. X is determined by the flow counter setpoint. The square wave must have an ON time of at least 200 microseconds for the controller to recognize the input.

The Flow Counter option is enabled using the Enable soft key. Setpoint value is entered using the ENTER, UP and DOWN arrow keys, and ESC key, as detailed in the Setpoint section.



This option is no longer a time based sampling cycle. The time between samples is determined by the number of counts from the flow counter input. Extend and Retract times are based on operator setpoints.

Delay Start

The controller will accept a dry contact input from a plant device, such as a pump. If the Delay Start function is selected, sampling will wait until the contact is closed. Then after the time delay entered has expired, sampling will start.

This feature is useful if you have a pump that cycles off and on. You only want to sample when the pump is on and at full flow. Connect the dry contact, enter the desired time delay, place the controller in AUTO and sampling will take place only when the pump conditions are met.

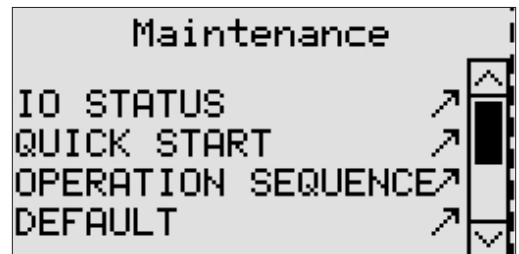


The Delay Start option is enabled using the Enable soft key. Setpoint value is entered using the ENTER, UP and DOWN arrow keys, and ESC key, as detailed in the Setpoint section.

Maintenance Functions

The Maintenance menu provides access to various information options for your controller.

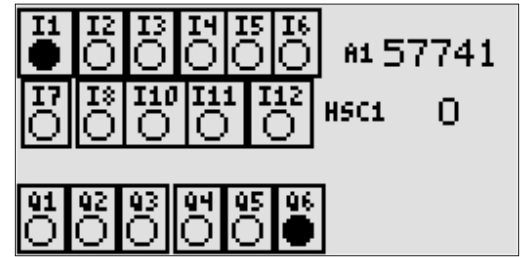
- Press the SERVICE key on the controller to view the Maintenance menu.
- Use the small arrow keys to navigate to the desired option, and then press the Enter key to select the menu item.
- Press the ESC key to return to the Maintenance menu.



IO Status

The IO Status screen allows you to see the current state of inputs and outputs to the controller

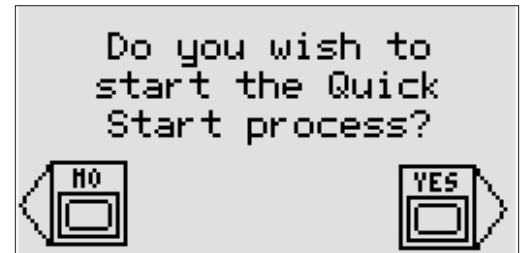
All of the digital inputs (I) and the digital outputs (Q) are represented by indicators. If the indicator is filled in, the signal is present. A1 represents the raw unscaled value of the analog input. HSC1 represents the current value of the high speed counter. This screen is very useful during the trouble shooting phase of startup to help verify inputs and outputs.



Quick Start

The Quick Start feature is an easy way to get your sampler and controller up and running quickly.

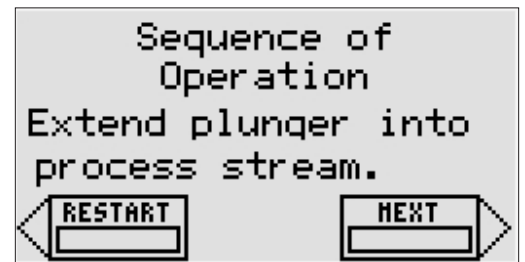
The Quick Start will guide you through each step required for simple operation of the sampler. Connections need to be verified using engineering drawings for your sampler. Important setpoints will be requested. Once the quick start is complete, you should be able to start Local (AUTO) operation of your sampler manually or in continuous mode.



Operation Sequence

The Sequence of Operation is a description of the typical operation for your specific sampler. It is for information only.

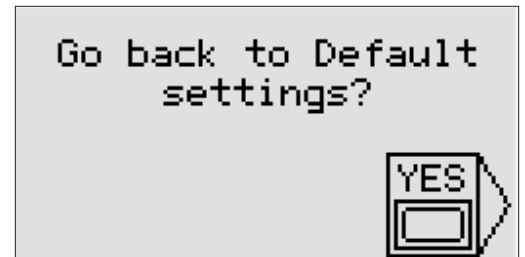
Pressing the soft key across from NEXT on the screen will advance the operator through each step in the sequence of operation for the sampler. The soft key across from RESTART will start the sequence description over from the beginning.



Default

The DEFAULT option allows the user to go back to the original factory settings for options and setpoints.

When you press the soft key next to YES, the setpoints will be set to the factory defaults and modes will be cleared.

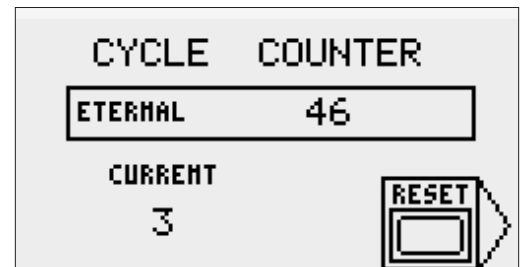


Cycle Counter

The controller has a cycle counter to keep track of the number of samples taken by the sampler.

The CURRENT counter represents the number of samples taken since the last reset. This counter is reset by pressing the arrow key next to the RESET soft key. This counter is limited to 65,536.

The ETERNAL counter cannot be reset and displays the number of samples ever taken by the sampler. This counter is limited to 4,294,967,296.



Contact Us

If a problem should arise with the sampler or controller, please contact Sentry at the number listed on the screen as shown below.

Configuration

This selection is password protected and is for factory use only.

Software

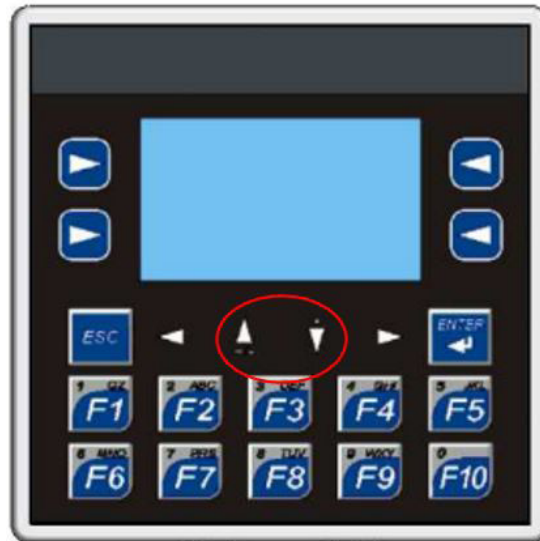
The Software screen lists the revisions for the loaded software.

For Service Call:
(262) 567-7256

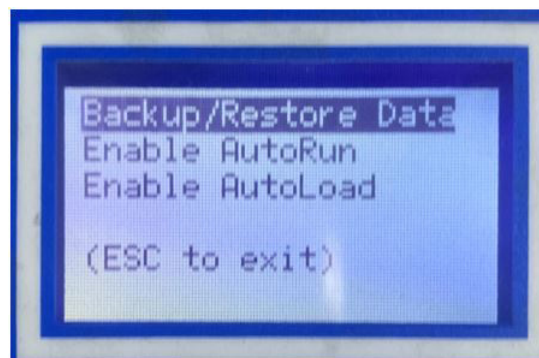
Cscape 8.6B
Firmware: 12.5
User Program:
D2RB_0_C

Instructions for Backing Up/Restoring PLC

1. Access PLC menu by pressing the up and down arrow keys (circled in red) at the same time.



2. Once in the system menu locate Fail-Safe System using the down arrow on the plc and hit enter.
3. Here you can backup and restore the PLC's Registers and Data manually. Press enter to access Backup/Restore Data.

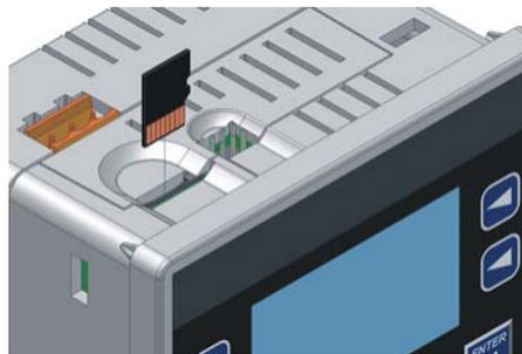


- Hit F1 key (key 1) and create new back up by pressing enter, to backup data and registers. To restore data and registers press F2 (key 2) and hit enter which will reset the system.

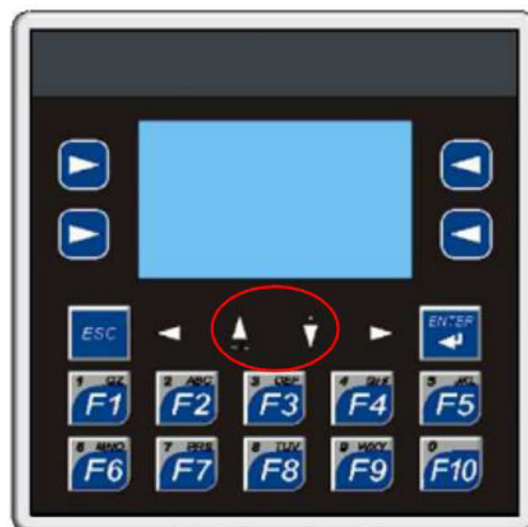


Saving PLC Program

- Using a micro-SD card insert it into the PLC.



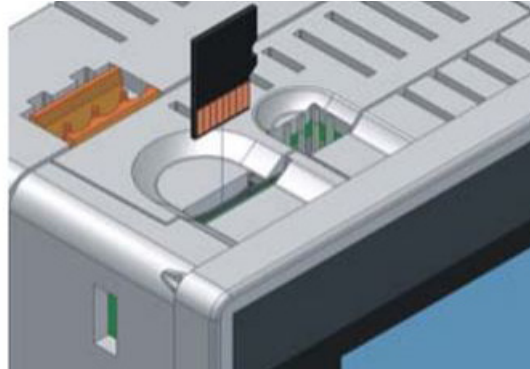
- Access PLC menu by pressing the up and down arrow keys (circled in red) at the same time.



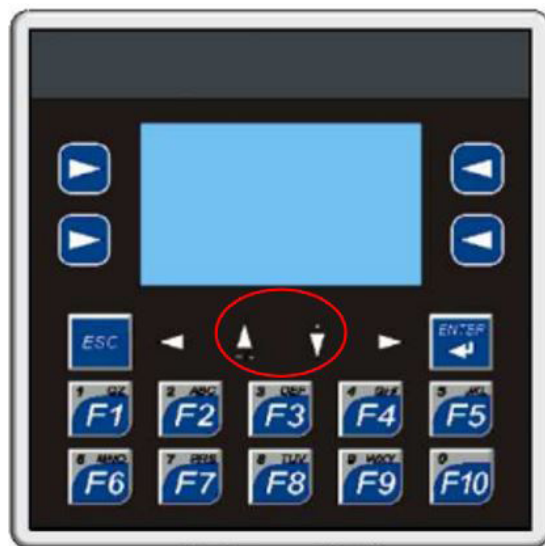
- Once in the system menu locate Removable Media using the down arrow on the PLC. Press enter to open the Removable Media Manager in the System Menu and press the F4 (key 4) function key. After selecting Ok the application will be saved in a file called DEFAULT.PGM in the Micro SD root directory.

Loading PLC Program from SD Card

1. Using a micro-SD card insert it into the PLC.



2. Access PLC menu by pressing the up and down arrow keys (circled in red) at the same time.



3. Once in the system menu locate Removable Media using the down arrow on the PLC. Press enter to open the Removable Media Manager in the System Menu. Find and highlight the desired .PGM file, and then press Enter.

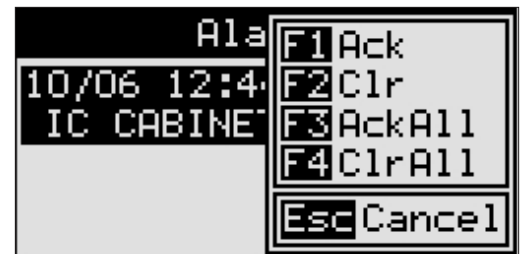
Alarm Function

The Alarms Screen records all alarms with a time and date stamp along with a description of the alarm.

Press the soft key next to the screen arrow (top Left) twice to get the alarm function keys. At this point, the function keys will no longer perform the function described on the keys; they have been switched over to the Alarm Functions.

Pressing F1 (AUTO) will acknowledge the alarm: F2 (Remote) will clear the alarm. If multiple alarms are active, F3 (OFF) will acknowledge all of the alarms and F4 (Purge) will clear all of the alarms. Acknowledging the alarm maintains the record on the alarm screen. Clearing an alarm removes it from the alarm screen.

If the condition causing the alarm is still present, acknowledging or clearing the alarm will not affect the condition and the program will continue to react to the alarm state.



Purge Function

Some samplers have a purge option. The Purge command key on the controller allows manual activation of the Purge solenoid. The solenoid remains energized and air flows through the sampler for as long as the Purge key is held down.

Stopping the controller

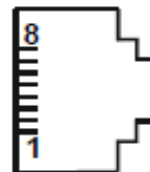
To stop the program and return the sample probe to the home position, press the OFF key. The sampler will finish its current cycle and then return to the home position.

MODBUS Communications

The Sentry SBC Controller is designed to communicate via MODBUS. It is set to operate as a slave-only and the address range is 1-247. See the chart below for proper addressing.

SBC Modbus Mapping						
Utilize port MJ2 for Modbus communications!						
Slave address range 1 - 247						
Function	Register	Description	Read / Write	Units	Data Size	Data Type
1	3007	Air Eject	Read/write		1	Bit
	3020	Batch Enable	Read/write		1	Bit
	6005	Batch Complete	Read		1	Bit
	6007	Running	Read		1	Bit
	6071	Remote Enable	Read/write		1	Bit
	6072	Remote Start	Read/write		1	Bit
	2	15001	Auto (start)	Read Only		1
15003		Off (stop)	Read Only		1	Bit
3	3180	IC Jar # (current jar #)	Read Only		32	Int_32
	3501	Sample Seconds	Read/write	Sec	16	Int_16
	3502	Delay	Read/write	Sec	16	Int_16
	3503	Purge Seconds	Read/write	Sec	16	Int_16
	3504	Cycle Seconds	Read/write	Sec	16	Int_16
	3505	Cycle Minutes	Read/write	Min	16	Int_16
	3506	Cycle Hours	Read/write	Hrs	16	Int_16
	3507	Batch Setpoint	Read/write		16	Int_16
	3512	Purge Delay	Read/write	Sec	16	Int_16
	4100	Modbus Bit Number Status	Read Only		16	Int_16
	4101	Batch Complete	Read Only		16	Int_16 (Bit 0)
	4102	Batch Reset	Read Only		16	Int_16 (Bit 0)
	4103	IC Full	Read Only		16	Int_16 (Bit 0)
	4104	IC Door Open	Read Only		16	Int_16 (Bit 0)

Modbus Wiring		
Pin	MJ2 Pins	
	Signal	Direction
6	GND	IN / OUT
2	RX- / TX-	IN / OUT
1	RX+ / TX+	IN / OUT



Modbus Communication	
Function	Setting
Port	MJ2
Baud Rate	9600
Parity	None
Data Bits	8
Stop Bits	1
Handshake	MD Half
Protocol	M RTU
Mode	RS-485 (Utilizes Data Offset of 1)

Standard Warranty

Sentry Equipment Corp (“Seller”) warrants products manufactured by it and supplied hereunder (“Products”) to be free from defects in workmanship and, to the extent materials are selected by Seller, to be free from defects in materials, in each case for a period as defined in the table below:

Product Line	Product Category	Warranty Period
Sentry®	<ol style="list-style-type: none"> 1. Automatic Sampling 2. Corrosion Monitoring 3. Manual Sampling 4. Sample Conditioning 5. Sampling & Analysis Systems 6. Replacement Parts (without expiration dates) 	Eighteen months from date of shipment or twelve months from startup, whichever occurs first
Waters Equipment	<ol style="list-style-type: none"> 1. Sampling & Analysis Systems 2. Replacement Parts (without expiration dates) 	Twelve months from date of shipment

To view the full warranty, go to www.sentry-equip.com/warranty.

Customer Support

With proven sampling expertise since 1924, Sentry products and services provide business operations the critical insights to optimize process control and product quality. We deliver true representative sampling and analysis techniques to customers around the globe, empowering them to accurately monitor and measure processes for improved production efficiency, output, and safety. Standing behind our commitments, we are determined to tackle any application, anywhere.

We know that running an efficient operation isn't easy. It requires thorough, careful analysis of controlled, real-time data achieved through reliable, accurate, and repeatable process monitoring, and measuring. By effectively conditioning, sampling, and measuring gas, liquid, slurry, powder, solids, steam, or water within their production environments, our customers obtain the critical insights they need to control and optimize their processes.

Yet, controlling your processes also means reliable customer support throughout the life cycle of your equipment.

- Customer Service—General information, warranty claims, order management.
- Installation Service—For systems that require specialized expertise upon installation.
- Technical Support—Troubleshooting, training, and technical manuals.
- Field Service & Retrofits—When a problem needs immediate attention.
- Replacements Parts & Consumables—Order your replacement parts and consumables.
- Sentry ProShield Services—Select from four ProShield Guardian service plans providing different levels of support to protect your large system investments with regularly scheduled maintenance.

To learn more, go to www.sentry-equip.com/support.

Appendix A

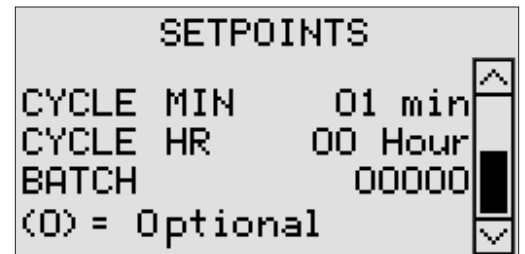
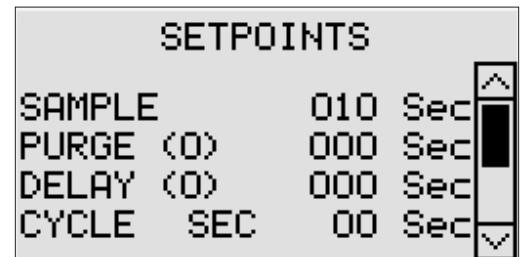
Sampler Models A, L, RX, MG-Air

Sequence of Operations

1. Energize solenoid
 - Model A: air cylinder opens slide gate
 - Models L and RX: air cylinder extends sampler
 - Model MG-Air: sample tube rotates up
2. Start sample timer
3. Sample timer expires
4. De-energize solenoid
 - Model A: slide gate closes
 - Models L and RX: air cylinder retracts sampler
 - Model MG-Air: sample tube rotates down
5. Start cycle timer
6. Cycle timer expires
7. Repeat sequence

Setpoints

- To select a setpoint for changing, press the ENTER key. A selection will be backlit.
- Use the small UP and DOWN arrow keys below the display to move between selections.
- Once the desired selection is backlit, press ENTER again. Now only the value is backlit.
- Use the number keys (light gray number in upper right hand corner of function keys) to enter a value or use the UP and DOWN arrow keys to adjust the current value. When desired value is entered, press ENTER key. The entire selection is again backlit.
- Select another setpoint using the UP and DOWN arrow keys or press ESC to exit the modification mode.
- Once you press ESC, no selection will be backlit.
- Press the MAIN key to go to the Main operations screen.
- The Main operations screen monitors the sampler operation. No setpoints or options may be changed from this screen. This screen shows the current state of the sampler with a graphic representation. It also shows the time remaining for that portion of the sampling cycle. The small indicators at the bottom of the screen confirm the current mode selected (filled indicates selected). They are:
 - AUTO – auto mode
 - REM – remote mode



- MAN – manual grab sample
 - BAT – batch mode enabled
 - IC – Index Cabinet enabled
- When BATCH mode is enabled, the number of samples taken for this batch is displayed next to the BATCH indicator. When the IC is active, the current jar being filled in the IC is displayed next to the IC indicator. When the IC cabinet is full, the IC indicator flashes.
 - Press the AUTO key to start sampling. The sampler will immediately extend the plunger into the process stream and start the sampling cycle. If this does not occur, check to see if the REMOTE ENABLE input is present. Without this input, the sampler will not function under any circumstances.

Appendix B: Other Samplers

Sequence of Operations

Model B1

1. Start motor in purge direction, start purge timer
2. Purge time expires
3. Stop motor, start delay timer
4. Delay time expires
5. Start motor in sample direction, start sample timer
6. Sample time expires
7. Stop motor, start cycle timer
8. Cycle time expires
9. Go to step 1

Model D2

1. Energize solenoid, air cylinder rotates sample tube up, motor starts turning the auger, start sample timer
2. Sample time expires
3. Solenoid de-energized, air cylinder rotates sample tube down, start auger purge timer
4. Auger purge time expires
5. Stop motor, start cycle timer
6. Cycle time expires
7. Go to step 1

Model GA

1. Energize solenoid, air cylinder moves head across the flow to location 2, start cycle timer
2. Cycle time expires
3. Solenoid de-energized, air cylinder moves head across the flow to location 1, start cycle timer
4. Cycle time expires
5. Go to step 1

Model ISOLOK®

1. Energize solenoid, air cylinder extends sampler, start sample timer
2. Sample time expires
3. Solenoid de-energized, air cylinder retracts sampler, start cycle timer
4. Cycle time expires
5. Go to step 1

Model ISOLOK® PARK

1. Energize solenoids, Plunger extends into process stream, Air on ports P6 and P8. Start sample timer
2. Sample time expires
3. Sample & Park Solenoids de-energized, Plunger retracts to the discharge position. Air on port P5
4. Discharge timer starts
5. Discharge timer expires
6. Energize Park solenoid . Plunger advances to the park position. Air on ports P5 and P8
7. Park timer starts
8. Park timer expires.
9. Go to step 1

Model MG (electric motor)

1. Energize motor, motor rotates sample tube 360 degrees
2. Sensor indicates full motor rotation, de-energize motor, start cycle timer
3. Cycle time expires
4. Go to step 1

Model PR

1. Energize solenoid, air cylinder extends sampler, start sample timer
2. Sample time expires
3. Solenoid de-energized, air cylinder retracts sampler, start cycle timer
4. Cycle time expires
5. Go to step 1

Model R

1. Energize solenoid, air cylinder extends sample tube, start sample timer
2. Sample time expires
3. Solenoid de-energized, air cylinder retracts sample tube, start auger delay timer
4. Auger delay time expires
5. Start motor, start auger run timer
6. Auger run timer expires
7. Stop motor, start cycle timer
8. Cycle time expires
9. Go to step 1

Model RB

1. Energize solenoid, air cylinder extends sample tube, start motor, start sample timer
2. Sample time expires
3. Solenoid de-energized, air cylinder retracts sample tube, start auger purge timer
4. Auger purge time expires
5. Stop motor, start cycle timer
6. Cycle time expires
7. Go to step 1

Model RPG

1. Energize sample tube solenoid, air cylinder moves sample tube into process stream, start delay timer (allows time for sample tube to extend)
2. Delay time expires
3. Energize rotary solenoid, sample tube rotates up, start sample timer
4. Sample time expires
5. De-energize sample tube solenoid, sample tube retracts, start delay timer (allows time for sample tube to retract)
6. Delay time expires
7. De-energize rotary solenoid, sample tube rotates down, start cycle timer
8. Cycle time expires
9. Go to step 1

Model SA/A

↻ NOTE

Every actuation of the sample solenoid is two (2) sample collection cycles)

1. Energize solenoid, air cylinder moves pelican across the sample flow, start cycle timer
2. Cycle time expires
3. De-energize solenoid, air cylinder moves pelican across the sample flow, start cycle timer
4. Cycle time expires
5. Go to step 1

Model SA/E & GE

1. Energize motor, motor moves pelican across the sample flow
2. Sensor indicates pelican is under dust seal, de-energize motor, start cycle timer
3. Cycle time expires
4. Go to step 1

Model SSD2

1. Solenoid energizes: Tube rotates up to sample position; sample collects inside screw.
2. Sample time expires: Solenoid de-energizes.
3. Tube rotates down to home position.

↻ NOTE

An optional purge delay is available to provide a delay between the end of sample collection and the start of a purge. If no delay is required, enter 0.

4. Purge (screw) begins: Sample is deposited into the collection device.

↻ TIP

Step 3 does not need to be complete before beginning Step 4. Experiment with the parameters for Purge Delay and Purge to establish the correct amount of sample per event.

5. Purge time expires: Purge (screw) stops.
6. Cycle timer starts.
7. Repeat from step 1.

Model IC

Controls for the IC are usually combined with the sampler controls. A signal is sent to a relay in the IC junction box, starting the motor. The relay signal is held until feedback from the position proximity switch indicates the table has moved to the next position. At this time the relay signal is terminated and the motor stops. Capacitors located in the IC junction box are switched to the motor, serving a braking function.

A proximity switch is located near the door of the IC. At any time the door is opened, operation is immediately stopped. Operation of the sampler should also be halted when the IC door is open.

Indexing of the table can occur one of three ways:

- Automatically as determined by the controller
- Manually when indicated through the controller's display
- Manually when the pushbutton is pressed on the IC junction box

Automatic indexing of the table is performed when the number of samples taken for a jar equals a preset value. After a sample is taken, a delay period should be initiated to allow sample to enter the jar before indexing to the next position. Operation of the sampler should stop after all jars have been filled.

Indexing Cabinet

Batch mode is used in conjunction with the indexing cabinet. The batch setpoint should represent the number of samples needed to fill one jar in the indexing cabinet. The program will automatically select Batch mode and set the Batch setpoint to one (1) if it is currently set to zero. If the setpoint is greater than zero, the program will use the current batch setpoint.

A typical operating sequence for the IC starts with Batch sampling. A series of samples is taken to fill the first jar of the IC. When the Batch is complete, the program waits 5 seconds to allow for all of the product to settle into the jar. After this delay, the controller will send a signal to energize the IC motor. As the IC carousel moves, a proximity sensor monitors the carousel. When the proximity sensor senses a notch in the carousel, the controller stops the motor. The carousel should stop at the next empty jar. This cycle continues until all of the jars are full. When all of the jars are full, all sampling stops until the IC is reset by to Operator. An alarm is logged by the controller and the IC FULL output is activated. The operator should not reset the IC until all of the full jars have been replaced.

Operation of the IC is disabled when the door of the IC is open. This is to prevent injury from the automatic operation of the carousel.

When the Index Cabinet is active, If the sampler does not immediately extend the plunger into the process stream and start sampling check to see if the REMOTE ENABLE input is present. Without this input, the sampler will not function under any circumstances. To see if the remote enable is present, please refer to drawing 10-0468A that came with the SBC controller and confirm contact is being made between terminals TB2 3&4.

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966 Blue Ribbon Circle North, Oconomowoc, WI 53066 U.S.A. | +1-262-567-7256 | support@sentry-equip.com

