

SX5 Safety Scanner Demo Kit Setup Instructions

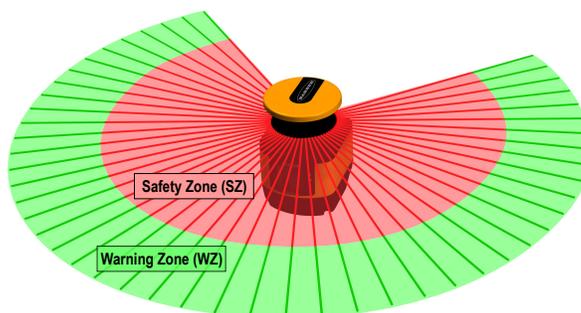


Demo Kit DK-SX5-B Components List



Model	Description
SX5-B	SX5 Safety Scanner
STP-M12D-406	Cordset, M12 D-Code to RJ45
	Box with S22 Touch with In/Out Functions
	Power Supply, 24 V, 1 A

- Two-dimensional laser scanner effectively protects personnel and stationary and mobile systems within a user-designated area
- Individually define up to six Safety Zones and two Warning Zones using a PC
- Safety Zone range of 5.5 meters at 70 mm resolution or 3 meters at 40 mm resolution
- Highly flexible Safety and Warning Zones can be set to match the shape of the work area
- 275° sensing angle
- Suitable for horizontal, vertical, and AGV applications



First Steps

1. Download the SX5soft software from www.bannerengineering.com and install on a computer.
2. Launch the software.
3. Connect the power jack of the power supply into the mating connection located at the top of the I/O box.
4. Connect the 8-in Euro-style connector of the I/O Box to the matching connector on the SX5 scanner.
5. Plug the power supply into a wall outlet.
6. Open the rubber dust cover at the front of the SX5 scanner and connect the Ethernet cable's 4-pin Euro-style connector. Connect the RJ45 end to your computer.

We recommend using the USB-to-Ethernet adapter (not included with the kit). This allows you to have an adapter configured for Ethernet communication with the SX5 and keep the computer's built-in Ethernet adapter available for other uses.

Review of Display

Typical display icons seen during normal set up for static operation, assuming that a Warning Zone and manual reset is defined within the configuration.



All zones are clear



Warning zone interrupted



Safety zone interrupted



Waiting for a restart interlock

Display icons for diagnostic notes, warnings, and errors (19 icons possible)





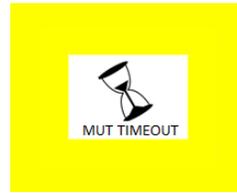
Downloading a new configuration



Override is active



Clean the window



Muting expired



Check the input sequence (zone switching)

Selectable Menu Functions include:

- Hardware information, such as name, part number, serial number, and firmware version
- Configuration name and date, IP address, MAC address
- Display setting to rotate 180 degrees
- Perform a reset function

Status Indicators

The SX5 has three buttons, a graphical display, and five status LEDs (located below the display).

The SX5 has diagnostic LEDs for initial diagnostics. The OFF state and ON state LEDs are below the scanner's display. When it is not possible to see the display because of the way it was mounted or because it is hidden from the operator's position, use the software's **Monitoring** function to check the status.

	Symbol	Meaning
<p>Figure 1. Status LEDs</p>		LED 1: Object Detection in Safety Zone (OSSD 11/12) Red—Object detected in the Safety Zone Green—No object is detected in the Safety Zone
		LED 2: not available
		LED3: Assigned to Warning Zone 2 Amber—Object detected in Warning Zone 2 OFF—No object detected in Warning Zone 2
		LED 4: Assigned to Warning Zone 1 Amber—Object detected in Warning Zone 1 Off—No object detected in Warning Zone 1
		LED 5: Interlock Amber—Interlock function active (waiting for a restart signal)
		Button 1: to browse quickly the Menu functions (up)
		Button 2: to enter and confirm the selected function
		Button 3: to browse quickly the Menu functions (down)

Set up the Demo Kit's Communications

The steps to change your computer's built-in Ethernet adapter or the USB-to-Ethernet converter is the same.

1. Open your PC firewall to allow communication between the scanner and software.
 - a) Look on the firewall for the software title "BannerGUI".
 - b) Edit the settings to check the boxes for DOMAIN, PRIVATE and PUBLIC.
2. Launch the SX5soft software.

3. Go to the **Scanner** menu and select **Discovery**.
The software searches for any scanner connected to the network. The discovered demo kit SX5-B scanner is listed under the Discovery window with its assigned IP address.
4. Double-click on the information box listing the demo kit SX5-B scanner.
If this is the first time the scanner is connected to the computer, a warning message appears asking if you want to change the IP address.
5. Click **OK** to change the IP address.
6. To match the scanner to the network that the adapter is addressed to (IP Local), change the scanner IP address to 192.168.15.X, where X is a number between 1 and 254, and is not equal to anything else on the subnetwork (subset mask 255.255.255.0).
The scanner uses two IP addresses: the one you assign and the next number up from that address.
7. After changing the scanner's IP address, click **OK**.

Now that the recognized scanner is configured to communicate with your laptop, this set of instructions will not need to be repeated if the software is closed and re-opened.

Demo Kit Example Configuration #1

This configuration is a scanner mounted in front of a hazardous machine that should be clear of personnel when in Run Mode. The configuration includes a Warning Zone and assigned warning status output that turns off if the Warning Zone is blocked.

For a simple demonstration, the scanner is set up to use Auto-Reset.

1. Create a new configuration.
 - If the software has just been opened, click **New Safety System Configuration**.
 - If you have already established communication, on the menu bar, go to **File > New Configuration**.
2. On the left side of the screen, double-click on the SX5-B window.
3. In the right corner, click on the right arrow to advance to the next screen.
The **Configuration Settings** screen displays.
4. Set the **Scenario** to Expert. You may also edit the configuration name, author, description, and the scanner name.
After you enter a scanner name, the name and part number display in the SX5-B window.
5. Click on the right arrow to advance to the next screen.
The **Output Configuration** screen displays. Functions that require an output from the SX5 scanner are listed. Grayed-out fields cannot be changed, such as the wires used for OSSD 11 and OSSD 12.
6. In the **Output Functions** section set the following parameters:
 - a) **Warning:** Use the drop-down list to select 1 Warning Zone.
 - b) **Muting:** Select Disabled from the drop-down list.

The three selectable I/O wires (white, green, and yellow) are reserved for the needed input and/or output signals. More complex configurations that may include Muting inputs, Override input, Reset Input, a Mute Lamp output, as well as one or two Warning Zone outputs, are not possible without an additional control module or Safety Controller to perform all needed functions.
7. Click on the right arrow to advance to the next screen.
The **Zone Set Configuration** screen displays.
8. From the **Zone Set No.** drop-down list, select 1.
A Safety Zone with a choice of adding a Warning Zone is considered to be a Zone Set. Having just one Zone Set does not require the use of the three I/O wires because there is no switching.
When setting up Demo Configuration 3, you will be adding an additional Zone Set, which will require more configuration instructions. There can be up to 6 Zone Sets in one configuration.
9. Click on the right arrow to advance to the next screen.
The **Input Configuration** screen displays.
10. In the **Input Functions** section, set the following parameters:
 - a) **Restart Mode:** Select Automatic or Manual. For this demonstration, select Automatic.
 - b) **Recovery Time (msec):** Select the length of time to recover after resetting. This field is only available when in Automatic Restart Mode. For this demonstration, select 200 ms.
 - c) **Muting Type:** Select from drop-down list. (Only available if Muting is enabled on the **Output Configuration** screen.)
 - d) **Max Muting Activation Delay (msec):** Select the delay between M1 and M2, in milliseconds.
 - e) **Timeout min):** Set the muting timeout, in minutes.

11. Click on the right arrow to advance to the next screen.

The **Detection Configuration** screen displays. This screen is for the Detection Configuration of the Safety Zone and, if included, the Warning Zone(s). Make no changes to the default settings on this screen for demo kit configuration 1.

The Number of Scans can be set from 2 to as high as 16 if there are insects or other floating objects that could trip the scanner outputs. Increasing the number of scans increases the response time needed to stop the hazard.

The choice of Detection Capability refers to the resolution at maximum range. For most horizontal detection applications, a resolution of 70 mm will reach a safety zone distance of 5.5 meters. If 40 mm is selected, the maximum safety range is 3 meters, which may be adequate for vertical apps. The same settings can be selected for the Warning Zone(s), resulting in a range of either 40 meters or 22 meters.

The Dust Filter level selection defaults to low. The Low Dust Filter level setting is used in cleaner environments. The High Dust Filter Level is used in extremely dirty environments to prevent floating particles from being detected. A Medium Dust Filter setting is for conditions between Low and High. Raising the dust filter level increases the safety distance under certain lighting conditions.

12. Click on the right arrow to advance to the next screen.

The Zones Configuration screen displays.

The Zones Configuration screen displays the scanner viewed from above. Use this screen to design the shape and extended distance needed for the correct Safety Zone protection and any Warning Zone(s) needed for a specific configuration.

In the center is the Area Graph. On the left is a list of zones that can be configured. On the right are the various configuration icons. To configure Demo Configuration 1, a circular Safety Zone and Warning Zone will be added.

13. Under **Configuration > ZoneSet > Zone1**, click on Safety to select it.

14. Click on the circle icon tool on the right.

15. Position the mouse pointer over the scanner image. Click and hold down the left button to drag the image to the left to create a red Safety Zone circle. Release the mouse button after you are close to X=200mm.

To delete the shape and create another, move your mouse over the shape. Right-click and select the shape name. From the editing choices, click delete.

If no icons display, click on the small arrow at the top right to view all icons. If no Configuration for Zone sets are visible, click on the arrow at the top left of the page.

16. To create a Warning Zone, click to highlight the Warning 1. Select the circle icon and drag the mouse to the left until you are close to X=400 mm. Use the + and - icons to change the size of the image if necessary.

17. To view the Safety Zone and the Warning Zone, select both.

The Reference Point is not used for this configuration. A minimum of three assigned reference points are needed for vertical applications when surfaces are monitored to ensure the scanner doesn't shift from its mounted position.

The configuration up to this point (steps 1-17) may be performed without an attached scanner.

18. To transfer the completed configuration to the attached scanner, click on the **Programming** function.

If this is your first attempt to program the scanner since the software was launched, the software performs a Discovery function as it forms a communications link to the attached SX5-B.

19. Double-click on the SX5-B image (with IP address) on the left side, then click on the right arrow to advance to the next screen.

20. In the **Configuration Upload** window, click **Load**.

21. If the program was successfully validated, click **OK**. If an error message appears, resolve the issue.

22. When the system asks for a password, enter `admin` and click **OK**. Click **OK** for the Off-Duty warning.

The software begins to upload the configuration files to the scanner. Transferring files to or from the scanner may take up to 60 seconds to complete. During and after the upload, the SX5-B display updates with status information on the progress. When the upload is complete, the display show inverted colors to indicate the scanner is still in a pre-acceptance stage. This stage allows you to test in Monitoring mode before you accept the configuration.

23. After transferring the configuration file to the scanner, click **Accept** in the **Validation** window. Wait for finalizing to be completed. The SX5-B display inverts the colors to show a black color background.



The configuration file is loading



Before validation



After validation

A summary document is available, from this screen, that contains information about the configuration file. The summary document can be printed or saved to a PDF.

24. To view the scanner's response with the programmed settings, click on the **Monitoring** function.

25. Demonstrate the reaction of the scanner software as well as the scanner display as you block the two zones. The Demo Kit box should have the S22 light for the Warning Zone (white wire) turn on when the zone is clear and turn off when the zone is blocked. The T8 light (OSSD) is green when the Safety Zone is clear and red when the Safety Zone is blocked.

Discussion Topics:

Application examples using up to the full 275 degree zone protection such as:

1. Guarding around all four sides of a stationary machine with openings that expose to hazards. Using two scanners mounted on opposing corners may be cost effective compared to safety mats.
2. Protecting personnel against a simple moving AGV or mobile apparatus moving back and forth on a rail would also be a great application for two SX5-B scanners located on two corners of the object.

The SX5-B safety scanner does not have available external device monitoring (EDM). The safety outputs (OSSD1 and OSSD2) will need to be connected to a safety-rated module or controller that has EDM monitoring (if necessary), such as Banner's UM-FA-FA module or the SC26/XS26 controllers.

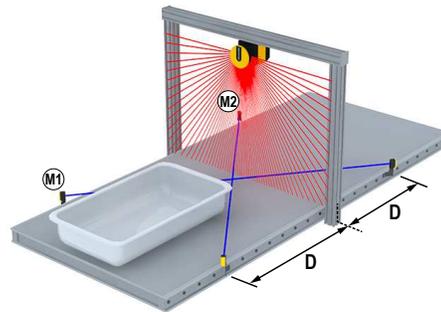
When a configuration includes a Warning Zone, you can select one or two zones with assigned outputs for each. This may be needed for an application that uses each warning output for separate external controls.

Demo Kit Example Configuration #2 -- Muting Inputs

The SX5 is able to assign muting inputs as well as supply an output to indicate the muting status is active. This Demonstration Configuration shows the scanner's ability to perform these functions.

As shown, the SX5-B can be mounted and configured to allow the tray to turn on the M1 and M2 mute sensors, mounted in an X pattern within the Safety Zone.

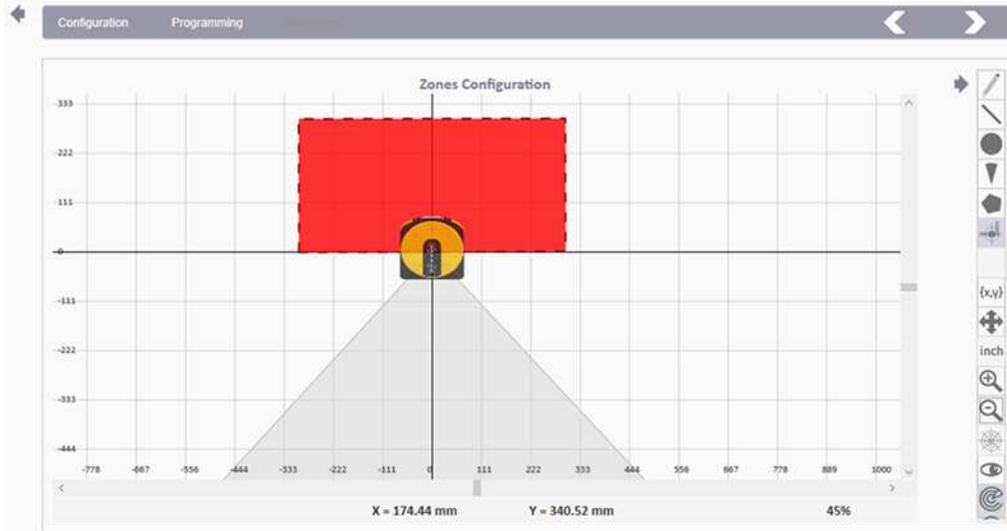
The muted state continues operation as the tray moves past the scanner until the tray clears the monitored X pattern.



1. In the configuration software, go to the **Configuration > Zone Set** screen and change the following parameters.
 - **ZoneSetNo:** 1
2. Go to the **Configuration > Outputs** screen and define the following parameters.
 - **Muting:** Enabled
 - **Muting Lamp:** 1
 - **Output Signals:** Assign PIN 4 (yellow) to Muting Lamp 1.
3. Go to the **Configuration > Inputs** screen and define the following parameters.
 - **Restart Mode:** Automatic
 - **Muting Type:** Bidirectional (travels in both directions through the Safety Zone)
 - **Max Muting Activation Delay:** 4 seconds (sets the maximum delay allowed between the activation of M1 and M2)
 - **Timeout:** 10 seconds
 - **Override:** Disabled
 - **Input Signals:** Assign the remaining two pins to Muting 1 1 and Muting 1 2.
4. Go to the **Configuration > Zones** screen.
5. Right-click your mouse at any location on the configuration grid to access information about the existing Safety Zone shape. As you move the mouse to the left, the software shows you where you can click to delete to remove the Safety Zone shape.

For a demonstration choice, on the left panel click to highlight Safety. On the right, select the (X,Y) tool (or you can use another tool to create your shape).

- Select the rectangle pattern and enter the X, Y coordinates as shown (Start: -300, 0 and End: 300, 300). Click **Draw**.



The red rectangle pattern for the safety zone is created.

- Follow the same steps as for Demonstration Configuration #1 to upload the new configuration file to the scanner.
- On the **Monitoring** screen, demonstrate how the muting works by activating the M1 and M2 inputs on the Demo Box and blocking the Safety Zone with and without muting activated. The Mute Lamp output (yellow S22) flashes during the Mute Mode.

If the **Mute Lamp** is not responding because of a previous configuration that included the yellow S22 assigned as a Warning Lamp output, cycle the power to the SX5 and test again for the proper response.

Discussion: Use a bidirectional Muting Type when the Mute sensors are positioned for an X pattern using two Mute sensor inputs, or a T pattern using four mute sensors as the load passes in either direction through the scanner safety zone during the muted state.

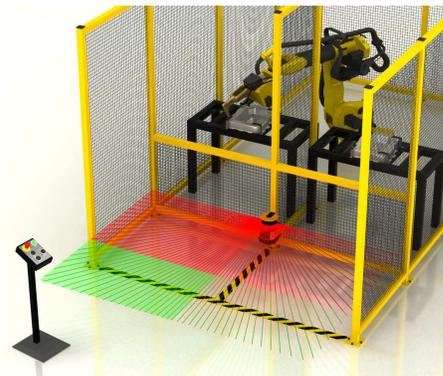
If the Muting Type is selected as unidirectional, the mute sensors can be arranged in an L pattern allowing for convenient muting Off-Delay software settings for the one-way mute configuration.

Demo Kit Example Configuration #3 -- Two Zone Sets

This example application is a scanner mounted in front of a hazardous machine with a small robot inside. There is hard guarding surrounding the cell with two small openings in front used for the operator to place or remove parts. The configuration will have two zone sets to allowing access to one zone while safeguarding the opposite zone.

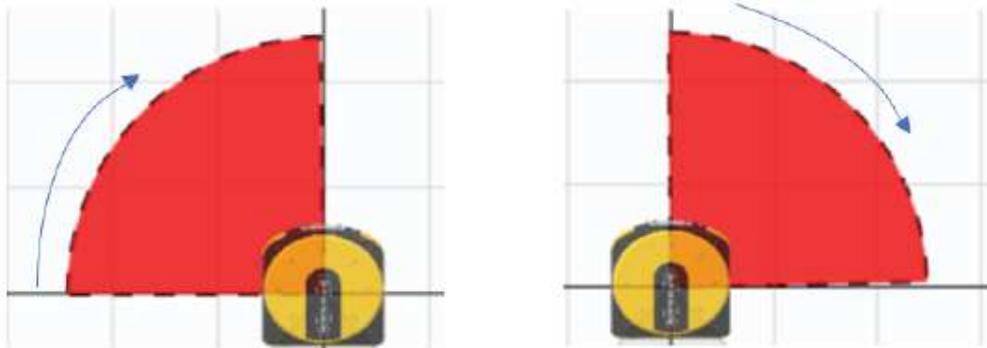
You can demonstrate the switching of the zone sets with the demo box. There will be a restart input used after the Safety Zone is cleared, and that input will also serve as the reset to clear a lockout condition.

For this demonstration, make the Configuration changes, Programming changes, and the Monitoring instructions using information you learned from the steps you completed in Demo Kit Configurations 1 and 2 .



- Go to the **Configuration > Outputs** screen and disable **Muting**.
- Go to the **Configuration > Zone Set** screen and change the **ZoneSetNo** to 2.
- Click **OK** on the warning that pops up and use the arrow to change the **ZoneSetNo** to 2.
- To allow sufficient timing for you to change from one Zone Set to another during the demonstration, increase the Input Delay Max (ms) from 30 ms to 3000 ms.
If you do not increase the Input Delay Max time, you will experience timing faults when you switch zones.

5. Assign each of the two Zone Sets to an Area Switch.
 - For Zone Set 1, click the box under Area Switch1 to change it from 0 to 1 .
 - For Zone Set 2, click the box under Area Switch2 to change it from 0 to 1.
6. Go to the **Configuration > Inputs** screen and set the **Restart Mode** to Manual.
Note that the Recovery Time (ms) is only active for automatic **Restart Mode**.
7. Select the remaining Input Signal pin 4 and assign to RESTART 1RESET. This allows the input to clear a fault condition (reset) and latched condition (restart).
8. Click on the right arrow until you reach the **Zones Configuration** screen.
9. In the left panel, select the Zone 1 Safety section.
10. Select the arc tool.
11. Position your pointer to the left of the scanner at about X = -300 mm. Holding down the left mouse button, sweep the arc, stopping at the top of the scanner near Y = 300 mm.
12. Click the Zone 2 Safety section to select it, then select the ARC tool again.
13. Begin at the top near Y = 300 mm, and sweep towards the right, stopping across from the scanner close to X = 300 mm.



14. Select the device on the tool bar. Click **Load** in the **Configuration Upload** box and enter the password (admin). Wait 60 seconds until the Inverted Display is shown on the SX5, then select **Accept** in the **Validation** box.
15. The SX5 displays a Restart. The Monitoring Screen shows the status as Activate and releases the Restart (S22 Yellow touch button).
Show how the Zone Set 1 and Zone Set 2 patterns alternate using the S22 switches.



Important: There can be only one ACTIVE safety zone selected to avoid creating an "Input Sequence Fault," which places the scanner in LOCKOUT. To avoid the lockout condition, press one of the Zone Switch Inputs on the Demo Box to ON before beginning the LOAD process.

If a lockout condition occurs: Wait to perform the steps below until AFTER you LOAD and ACCEPT the downloaded Validation. Do not try to the fault prior to the Accept step.

The SX5 scanner displays the Input Sequence Fault.



The Monitoring screen shows a LOCKOUT state.

1. Press to activate one of the assigned S22 Touch button SAFETY ZONE inputs.
2. Perform a Fault Reset by activating ,then de-activating the S22 Touch button that is assigned.
3. After the 40 second scanner reboot, perform a Restart with S22 again. The SX5 display shows GO.
4. While on the Monitoring Screen, click OK to the Warning box and OK to the Fault box.
5. Refresh the Monitoring screen by clicking on "Monitoring" at the tool bar.

The screen status should be showing a green "GO".