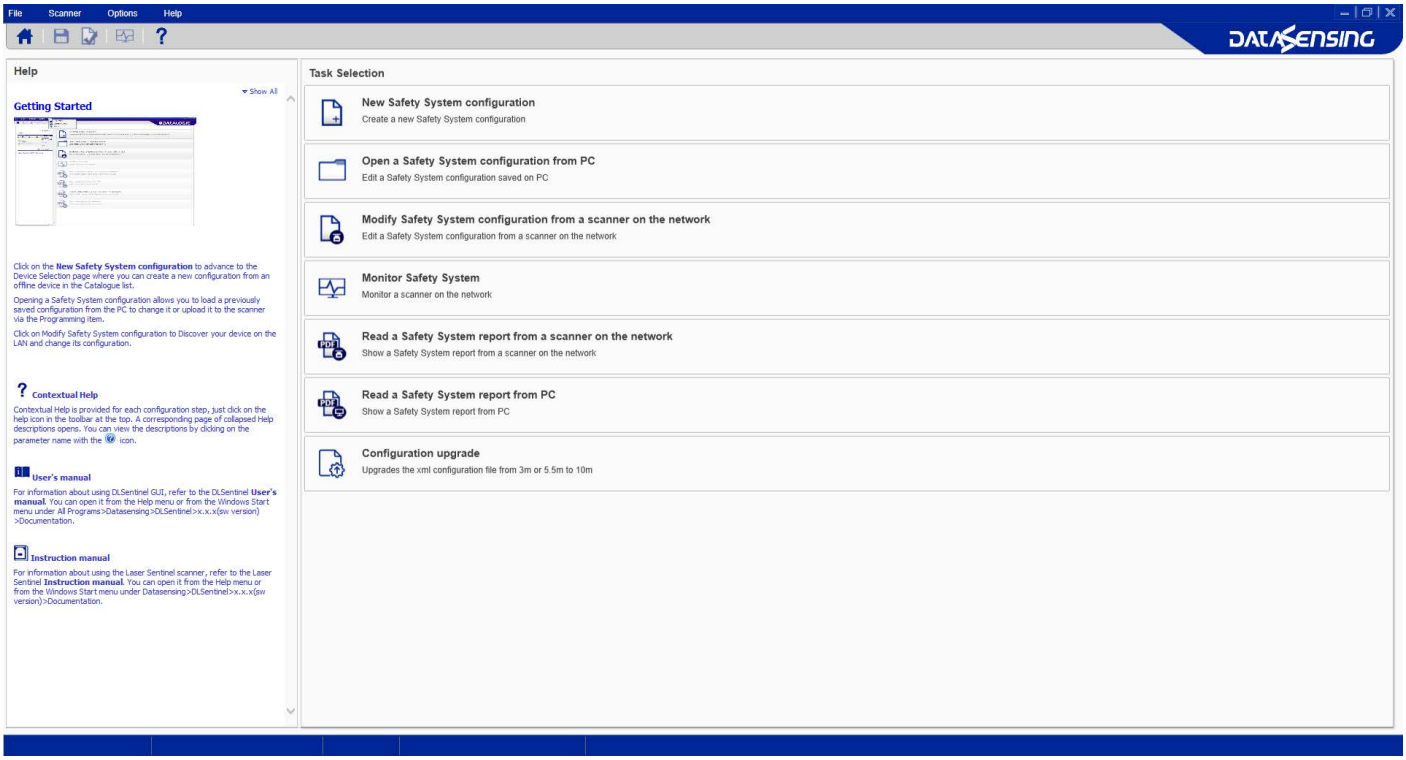
DLSentinel

USER'S MANUAL



Laser Sentinel User Interface Client Application

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WixNetFxExtension.dll

WixUIExtension.dll

WixUtilExtension.dll

2.1 Available Under License: Microsoft Reciprocal License (MS-RL)

https://documentation.help/WiX-3.10.1/license.html

3. CommonServiceLocator

3.1 Available Under License: Microsoft Public License (Ms-PL)

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4. ClosedXml

4.1 Available Under License: https://licenses.nuget.org/MIT

5. ICSharpCode.SharpZipLib

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6. log4net

6.1 Available Under License: Apache

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7. PDFSharp

7.1 Available Under License: MIT

http://www.pdfsharp.net/(X(1)S(a1hk1jlh3qweb4iq0awlblmh))/Licensing.ashx

8. clipper_library

8.1 Available Under License: Boost Software License

https://www.boost.org/LICENSE_1_0.txt

9. PdfiumViewer

9.1 Available Under License: Apache

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Effective April 2, 2026

PREFACE

ABOUT THIS MANUAL

This User's Manual is provided for users seeking advanced technical information, including connection, programming, maintenance and specifications. The Quick Reference Guide (QRG) and other publications associated with this product can be downloaded free of charge from the website listed on the back cover of this manual.

The latest DLSentinel versions (SW 5.0 or greater) can replace the older ones (3.x, 4.x) allowing to manage the following SLS models:

MODEL	DESCRIPTION	CODE
SLS-SA3-08	Stand Alone 3 m 6 zone sets Enhanced	958001080
SLS-SA5-08	Stand Alone 5.5 m 6 zone sets Enhanced	958001090
SLS-M3-0812-E	Master 3 m 10 zone sets Enhanced	958001020
SLS-M3-1708-E	Master 3 m 70 zone sets Enhanced	958001010
SLS-M5-0812-E	Master 5.5 m 10 zone sets Enhanced	958001110
SLS-M5-1708-E	Master 5.5 m 70 zone sets Enhanced	958001030
SLS-M5-E-1708-E	Master 5.5 m Encoder 70 zone sets Enhanced	958001050
SLS-M10-0812-E	Master 10 m 10 zone sets Enhanced	958000033
SLS-M10-1708-E	Master 10 m 70 zone sets Enhanced	958000034
SLS-M10-E-1708-E	Master 10 m Encoder 70 zone sets Enhanced	958000035
SLS-M5-PP-BA	Laser Sentinel PROFINET/PROFIsafe 5.5m 70 zone sets (Back/Rear connector model)	958000012
SLS-M5-PP-BO	Laser Sentinel PROFINET/PROFIsafe 5.5m 70 zone sets (Bottom connector model)	958000013
SLS-R3-E	Remote 3 m Enhanced	958001060
SLS-R5-E	Remote 5.5 m Enhanced	958001120
SLS-R10-E	Remote 10 m Enhanced	958000036

Manual Conventions

The following conventions are used in this document:

The symbols listed below are used in this manual to notify the reader of key issues or procedures that must be observed when using the reader:



NOTE: Notes contain information necessary for properly diagnosing, repairing and operating the reader.



CAUTION: The CAUTION symbol advises you of actions that could damage equipment or property.



WARNING: The WARNING symbol advises you of actions that could result in harm or injury to the person performing the task and/or persons in the vicinity of the source of danger.

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For quick access, from the home page click on the search icon, and type in the name of the product you're looking for. This allows you access to download Data Sheets, Manuals, Software & Utilities, and Drawings.

NOTES

TABLE OF CONTENTS

PREFACE VIII
About this Manual viii
Manual Conventions ix
Technical Support ix
Support Through the Website ix

CHAPTER 1. DLSENTINEL GRAPHIC USER INTERFACE 1
Program Description 1
Before using DLSentinel 2
Installing DLSentinel 2
Minimum System Requirements 2
Program Installation 2
DLSentinel user interface 4
Main menu 5
Toolbar buttons 6
Task selection 6
Laser Sentinel configuration checklist 7

CHAPTER 2. LASER SENTINEL CONFIGURATION 9
Establishing Ethernet Communications with the Scanner 9
DLSentinel Device Discovery through a Network 10
Point-to-Point Configuration PC Static IP Addressing Alignment 12
Modify Safety System Configuration from a Scanner on the Network 16
Configuration Settings 18
Output Configuration 20
Enhanced Models 20
Fieldbus Models 22
Zone Set Configuration 24
Enhanced Models 24
Encoder 29
Fieldbus Models 31
Input Configuration 32
Enhanced Models 32
Fieldbus Models 34
Detection Configuration 37
Enhanced Models 37
Fieldbus 5.5m Models 39
Profinet/Profisafe Configuration 40
Zones Configuration 43
Acting on Drawn Objects 49
Selecting and Visualizing Areas on the Graph 56
New Configuration Selection 57
Save the Configuration 58
Open a Previously Saved Safety System Configuration From PC 59

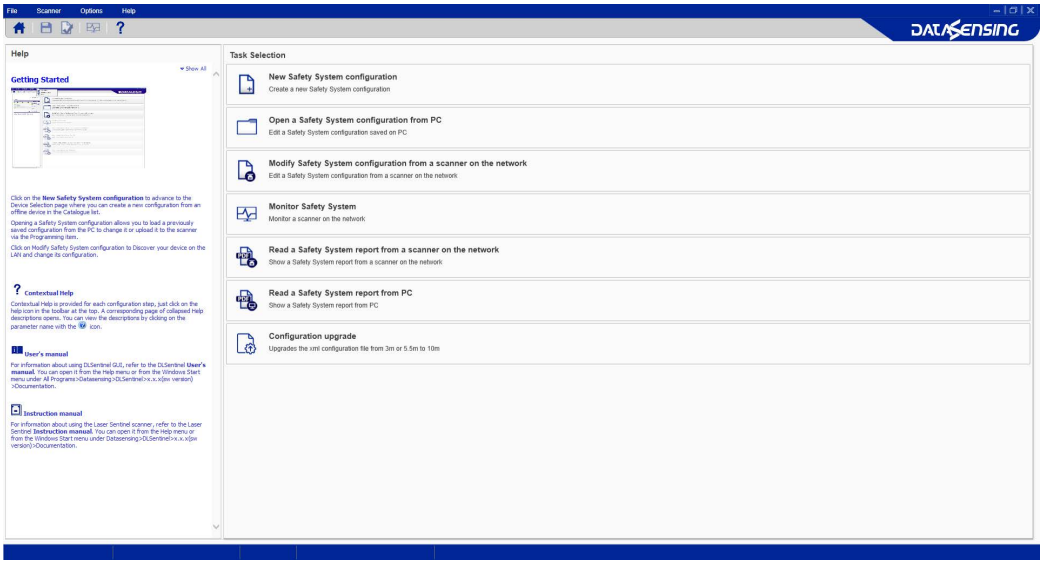
CHAPTER 3. PROGRAMMING AND MONITORING FUNCTIONS 62
Programming 62
Monitoring (Enhanced Models) 65

Monitoring And Controller Simulator (Fieldbus Models) 68
ACCESS CONTROL 72
Assign or Change Passwords 72
Reset a Password 75
FIRMWARE UPDATE 76
Checks after Firmware Update 77
FACTORY RESET 79
ADVANCED MONITORING 81

CHAPTER 1
DLSENTINEL GRAPHIC USER INTERFACE

PROGRAM DESCRIPTION

DLSentinel is a User Interface client application that provides device configuration for the Laser Sentinel series of safety laser scanners. It is installed in and runs on Windows-based PCs, and connection takes place through an Ethernet TCP/IP interface.



Main features

A summary of the DLSentinel main features is listed below:

- Settings for changing the device password and to manage the network configuration
- User and Session Language configuration in real time
- System configuration
- Report
- Manual

BEFORE USING DLSENTINEL

To employ the device, a safety configuration with the DLSentinel GUI must be created, where the user will enter all the parameters, configure inputs and outputs and create monitored areas.

INSTALLING DLSENTINEL

The DLSentinel client application software needs to be installed on your PC to configure the safety laser scanner.

Minimum System Requirements

To ensure proper interfacing with the system, the personal computer must meet the following minimum requirements:

COMPONENT	RECOMMENDED	MINIMUM
Processor(s)	Pentium 4	Pentium 4
Clock frequency	>= 3 GHz	>= 2 GHz
RAM	2 GB	1 GB
Free hard drive space	70 MB	70 MB
Monitor resolution	1280x768	1024x768
Supporting Operating System	Windows 10, Windows 11	

Besides the components listed in the table above, your PC must be equipped with the following hardware and software drivers:

- Installed Ethernet network card and installed driver
- One free 100 Mbps Ethernet port

Program Installation

DLSentinel is a Datasensing safety laser scanner configuration tool providing several important advantages:

- Intuitive Graphical User Interface for rapid configuration
- Defined configuration directly stored in the device
- Discovery and IP address setting features to facilitate remote configuration
- Device Monitoring and Controller Simulator

To install DLSentinel

1. On the PC that will be used for configuration, download the free setup file from the Datasensing website: https://www.datasensing.com/eng/downloads-dw-82.html
   Unzip the file and run the installation program by double-clicking the **SetupDlSentinel.msi** file. The downloaded folder also contains Windows Framework (dotNetFx40_x86_x64.exe) provided by Datasensing in case you need to update your operating system. Run the .msi setup file first, and only install the framework .exe file if requested.

2. Follow the setup procedure and accept all terms and conditions required for this software release.

3. When the installation is complete, the DLSentinel entry is created in the Start > All Programs menu under “Datasensing” along with a desktop icon.

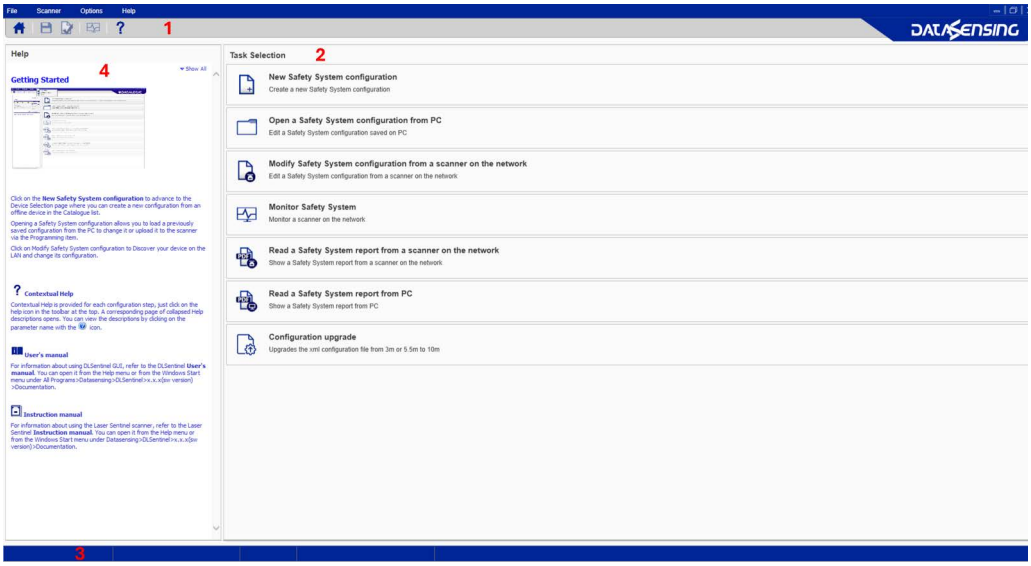
4. Before launching DLSentinel, you have to create the network LAN with the same address as the new device. Follow the connection procedure described in "Modify Safety System Configuration from a Scanner on the Network" on page 16.



NOTE: A dedicated computer running DLSentinel must be connected to a safety laser scanner through the Ethernet port to perform the configuration and monitoring features.

DLSENTINEL USER INTERFACE

After launching DLSentinel to configure devices or handle reports, the DLSentinel Task Selection shows the following main areas:



1. **Main Menu and Toolbar Area** – The DLSentinel main features.

2. **Task Selection Area** – Presents a list of the tasks that can be performed from DLSentinel. These selections are also available in the File and the Scanner Menus (**Main Menu Area**).

3. **Status Bar** – A reserved area that keeps specific information about the connected device. It displays information on the current network status, the connected device status, the connector and the application type.

4. **Help Online** – A Help Guide that includes all the information and parameters to create a proper configuration. For the next configuration steps, the help online is available/visible only by clicking on the dedicated button ? in the toolbar.

Main menu

FILE	
New Configuration	To create a new Device Configuration
Open Configuration from PC	To open a previously saved Configuration on the local drive
Read from PC	**Report**: shows a Safety System Configuration Report saved on PC
Save	Saves the current configuration or report on PC
Exit	To exit the DLSentinel user interface

SCANNER	
Discovery	Searches for a Device connected to the Network (LAN)
Direct Connect	To connect to a device by entering its IP address
Open Configuration from scanner	To open a configuration from a device
Open Shape from file	To insert a previously saved shape in a zone
Apply Configuration	To apply a configuration to a connected device
Read from Scanner	**Report**: shows a Safety System Configuration Report saved on PC
	Open log from memory scanner
Settings	**Change Network Configuration**
	Change Access Controls
	Reset Password
	Factory Reset
Update Firmware	To update the Firmware file
Window Replacement	To start the Window Replacement procedure
Get Module Versions	To download the Firmware version of the connected scanner

OPTIONS	
Change Language	Allows the user to change the display language used for DLSentinel in real time. The selected language will also be used for successive sessions.
DLSentinel Log	**Extract Log**
Report Settings	**Measure Unit**
	System Coordinate
Advanced Monitoring	Allows receiving measurement distance data and information about the status of the device(s).

HELP	
User's Manual	Opens the DLSentinel User's Manual
Instruction Manual SLS-Enhanced	Opens the Laser Sentinel Instruction Manual for 3m/5.5m Enhanced models
Instruction Manual SLS-Fieldbus	Opens the Laser Sentinel Instruction Manual for 5.5m Fieldbus models
Instruction Manual SLS-Enhanced 10m	Opens the Laser Sentinel Instruction Manual for 10m Enhanced models
About	Opens a window that contains DLSentinel release version information

Toolbar buttons

ICON	DESCRIPTION
	**Getting Started**: allows the user to start a session by clicking on one of the Task Selection options.
	**Save**: saves the current configuration or report session.
	**Configuration Validator:** this tool allows you to check the new configuration in DLSentinel before sending it to the device. By clicking on this option, a validation test will be made on the entire configuration in DLSentinel. A pop-up window will appear displaying either a list of configuration errors or validating the configuration.
	**Monitoring**: starts a monitoring session.
	**Help Online**: displays a window that includes the help online guide and it shows the parameters depending on the selected configuration step.

Task selection

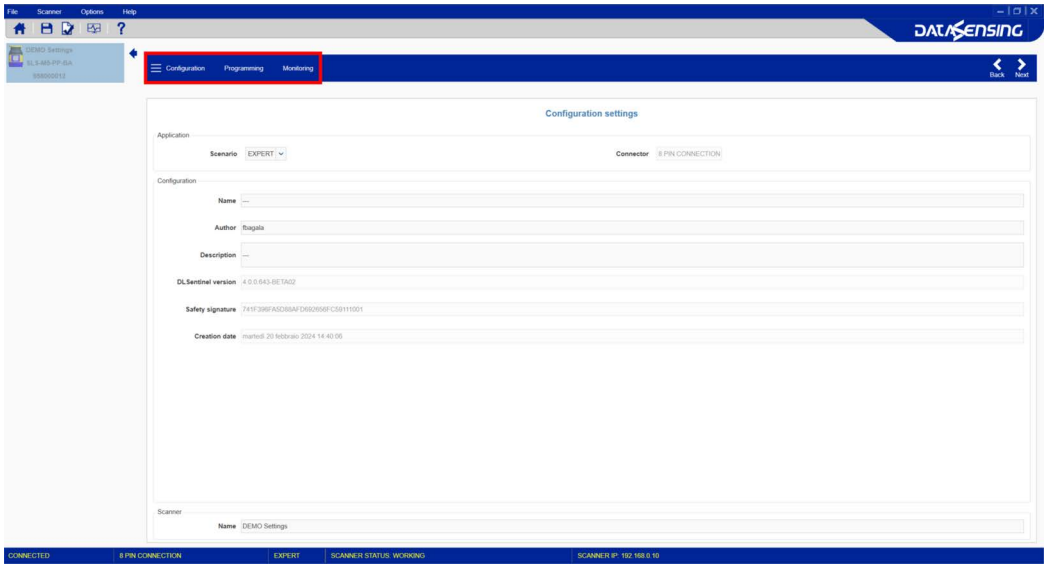
The right side of the main window includes the list of the Task selection. The list is explained in the chart below.

ICON	DESCRIPTION
	**New Safety System Configuration**: to create a new Safety System Configuration on a Virtual Scanner.
	**Open a Safety System Configuration from PC**: to open and edit a Configuration saved on PC.
	**Modify Safety System Configuration from a Scanner on the Network**: to edit a Safety System Configuration from a Scanner on the Network.
	**Monitor Safety System**: to enter the monitoring function of a connected Device.

ICON	DESCRIPTION
	Read a Safety System Report from a Scanner on the Network: to view, print or save a Safety System Configuration Report.
	Read a Safety System Report from PC: to view or print a Safety System configuration report stored on PC.
	Configuration upgrade: to upgrade the .xml configuration file of 3m/5.5m versions to 10m.

LASER SENTINEL CONFIGURATION CHECKLIST

DLSentinel allows creating, testing and validating a device configuration. Complete configuration can only be performed on a connected device (Online).



The main steps to configure the Laser Sentinel are:

1. **CONFIGURATION**: create the configuration through Settings, Outputs, Zone Set, Inputs, Detection, Profinet/Profisafe, Zones.
2. **PROGRAMMING**: upload the configuration and generate the report file.
3. **MONITORING**: test and monitor the device functioning with the new configuration.
4. **PROGRAMMING**: validate the configuration (accept it or reject it).

NOTE: At first connection, the device has no pre-set configuration. The display shows the following icon indicating that the Laser Sentinel is waiting for configuration. You need to define a new configuration as described in Chapter 2, Laser Sentinel Configuration**.**



NOTES

CHAPTER 2
LASER SENTINEL CONFIGURATION

ESTABLISHING ETHERNET COMMUNICATIONS WITH THE SCANNER

The first thing to do is connect the configuration PC to the Laser Sentinel scanner through the Ethernet port. There are two different methods of establishing Ethernet communications with the Laser Sentinel depending on the network restrictions of the plant in which it is installed.

If the plant provides an Ethernet network to which the Laser Sentinel is connected, then the Discovery feature can be used by connecting the configuration PC to the network, as described in "DLSentinel Device Discovery through a Network" on page 10.

If there is no Ethernet network available or it is restricted, then the configuration PC must be connected point-to-point with the Laser Sentinel and its IP address must be aligned to the Laser Sentinel default address to establish communication, as described in "Point-to-Point Configuration PC Static IP Addressing Alignment" on page 12.

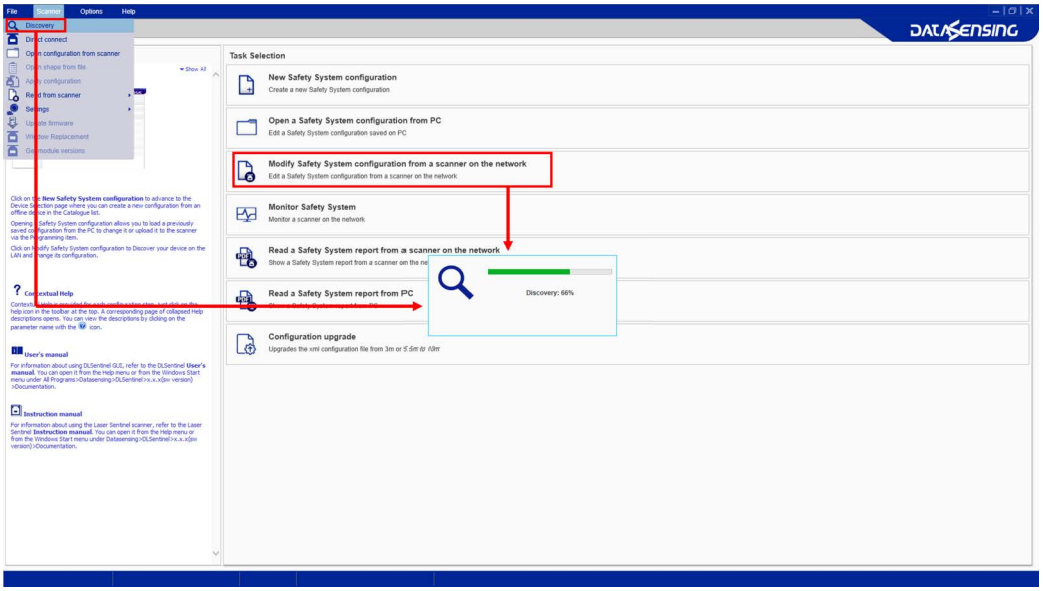


NOTE: When connecting and using the device with your PC for the first time, use a point-to-point connection with the factory default IP addresses, as described in "Point-to-Point Configuration PC Static IP Addressing Alignment" on page 12**. This is to avoid any network conflicts in the Ethernet communication.**

DLSentinel Device Discovery through a Network

DLSentinel has a discovery feature to find the connected device.

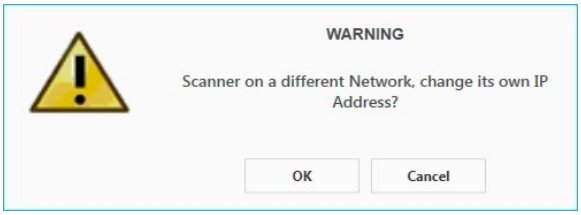
1. Click on the **Discovery** item in the Scanner menu to search for the connected device. Alternatively, you can select the **Modify Safety Configuration** item from the task menu.



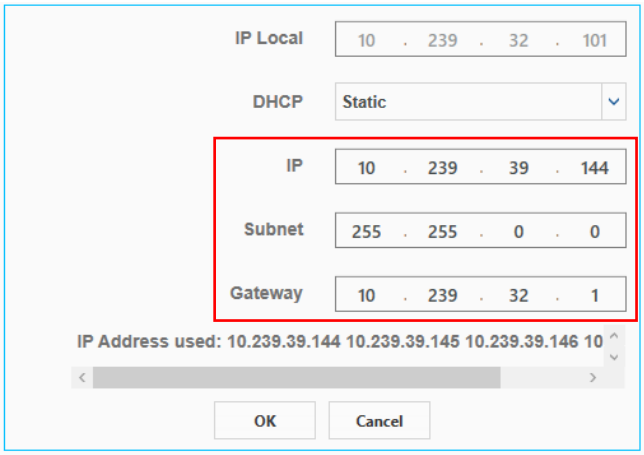
The User Interface opens and displays the device with its own default IP Address (192.168.0.10). Any other device on the network will also be discovered.



2. Click on the discovered device to place it in the Device Configuration panel. A warning message will be displayed indicating that the device is not on the same network and prompts you to align it with the network.



3. Click OK and then change the IP Address parameters in the Network Configuration window to align them with your network. Consult your network administrator for these parameters.

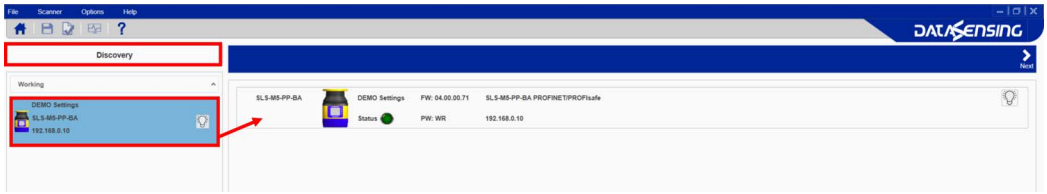


NOTE: Each Laser Sentinel also reserves the successive IP Address for internal functions.

4. Click OK to accept the new IP Address parameters. The device resets.

5. Click on the Discovery button. DLSentinel will rediscover the device with the new IP Address.

6. Click on the device to load it into the task area.

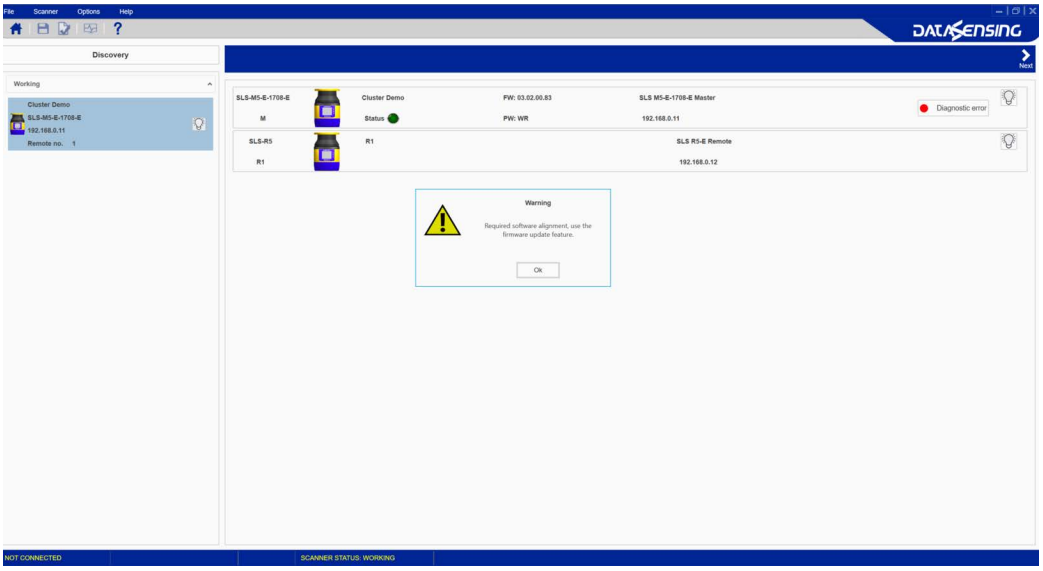


7. Click on the white right-pointing arrow on the upper right side on the main panel to download the current configuration from the device to the PC. DLSentinel is now connected to the device.

NOTE: If you are connecting the device for the first time or after a Factory Reset (see Appendix C, Factory Reset**), the display will show a "NO CONF" message until a new configuration is loaded.**

NOTE: See "Modify Safety System Configuration from a Scanner on the Network" on page 16 **for modifying the current configuration or** "Open a Previously Saved Safety System Configuration From PC" on page 59 **for downloading a previously saved configuration from the PC.**

NOTE: For 3m/5m models, if you are connecting a Master (with a software release 3.2.0 or later) with any Remote (with software release prior to 3.2.0) and the software versions of the devices are different, by clicking on the Next button, a warning popup is shown to inform that a software alignment and thus a firmware update is needed.



Point-to-Point Configuration PC Static IP Addressing Alignment

It is possible to connect a configuration PC directly to the device using the Ethernet TCP/IP interface (point-to-point).

NOTE: When connecting and using the device with your PC for the first time, this procedure is recommended to avoid any network conflicts in the Ethernet communication.

The Ethernet IP Addressing parameters must be aligned between the configuration PC and the scanner. Please follow the procedure below.

The default Laser Sentinel static assignment Ethernet IP Address is: **192.168.0.10**.

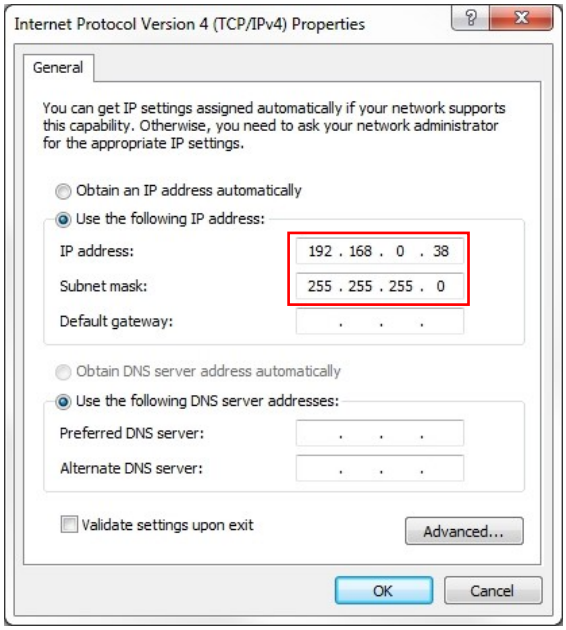
NOTE: Enhanced models only:

The successive address (192.168.0.11) will also be reserved for internal functions. Two consecutive IP addresses are reserved for each device, including Remote models.

In case of a Master/Remote configuration, Remote devices will be assigned IP addresses consecutive to those of the Master device.

1. Connect the device to the LAN port of your PC and switch it on.
2. Before changing the Ethernet network settings on the PC running the GUI, close any open applications that use network resources (e.g. Outlook, Web browser).
3. On the configuration PC, from the Control Panel>Network and Internet>Network and Sharing Center, click on the Local Area Connection link and open the properties window.
4. Select the Internet Protocol Version 4 (TCP/IPv4) item and open the properties window.

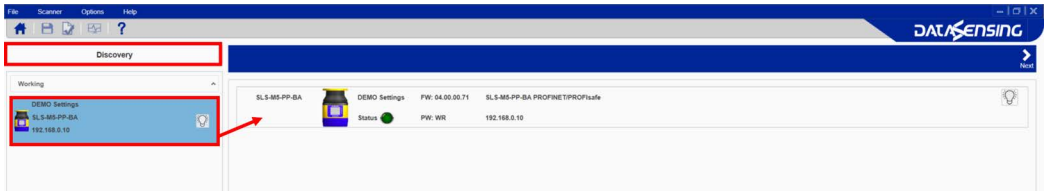
5. Set the IP Address fields as follows: 192.168.0.xx, where “xx” is any number differing from the device address and click *OK* to save. The PC is now aligned with the Laser Sentinel default network.



6. Launch DLSentinel from the configuration PC.

7. Click on the Discovery button. DLSentinel will discover the device with the default IP Address.

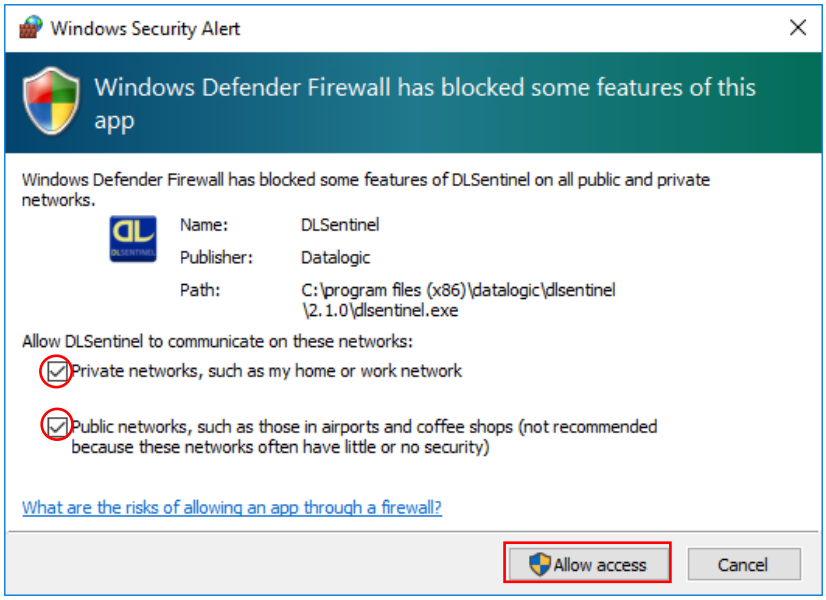
8. Click on the device to load it into the task area.



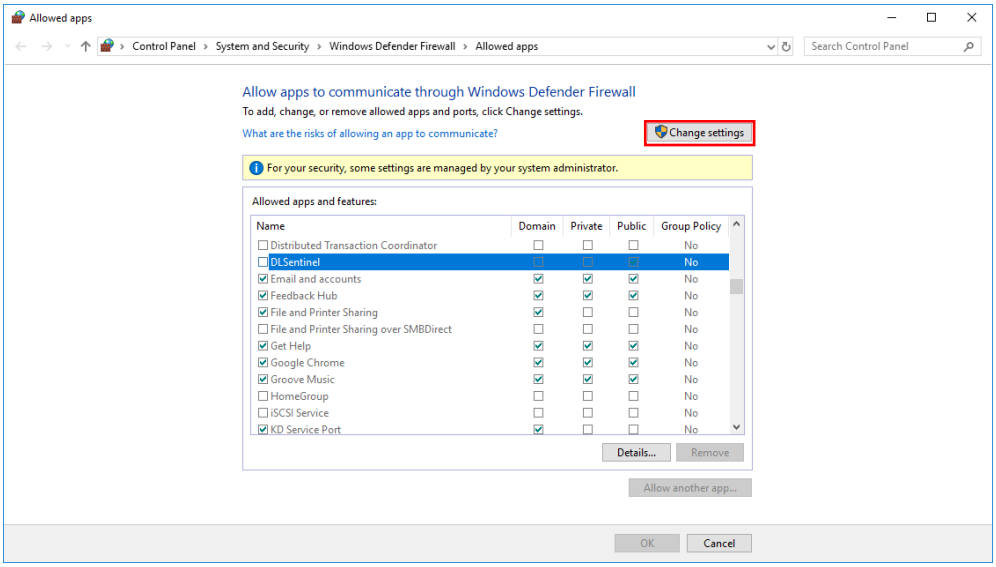
9. If **Windows Firewall** is active on the configuration PC, a pop-up window will appear after discovering the device.

NOTE: If no firewall window appears, but an “Unable to connect” message is still shown, it may be due to the antivirus firewall installed on you PC.

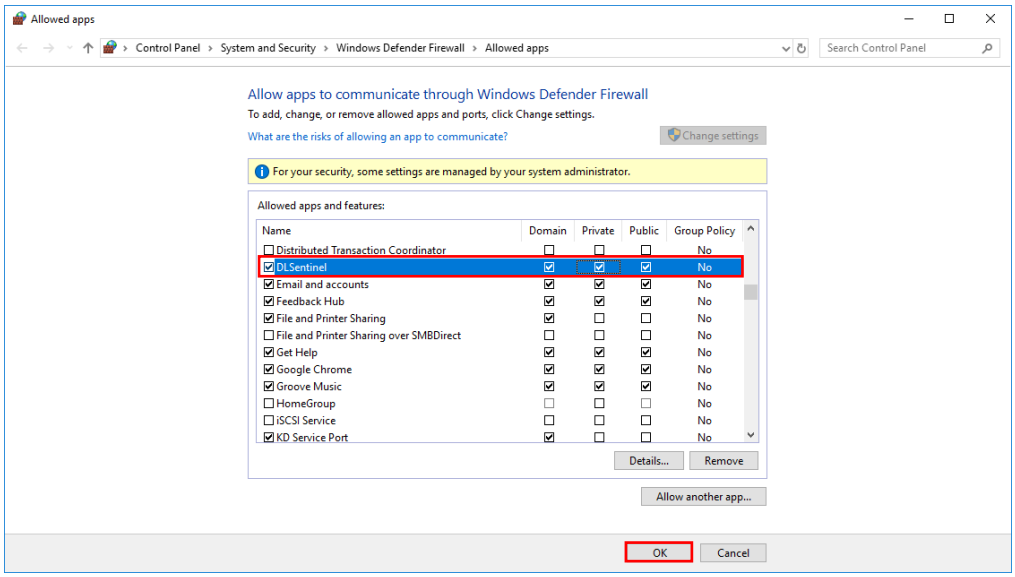
Do not close the pop-up window before allowing access to both private and public networks of the PC to communicate and exchange data with the device through the Ethernet port.



If you close the pop-up window before confirming the Firewall authorization, go to Control Panel>System and Security>Windows Defender Firewall>Allowed apps and click on “Change settings”.



Scroll down the list and check the boxes on the DLSentinel row as shown in the figure below, then click *OK*. The Firewall is now disabled on DLSentinel.



NOTE: If you cannot find DLSentinel on the program list, uninstall and reinstall the software and follow the procedure described in point 9.

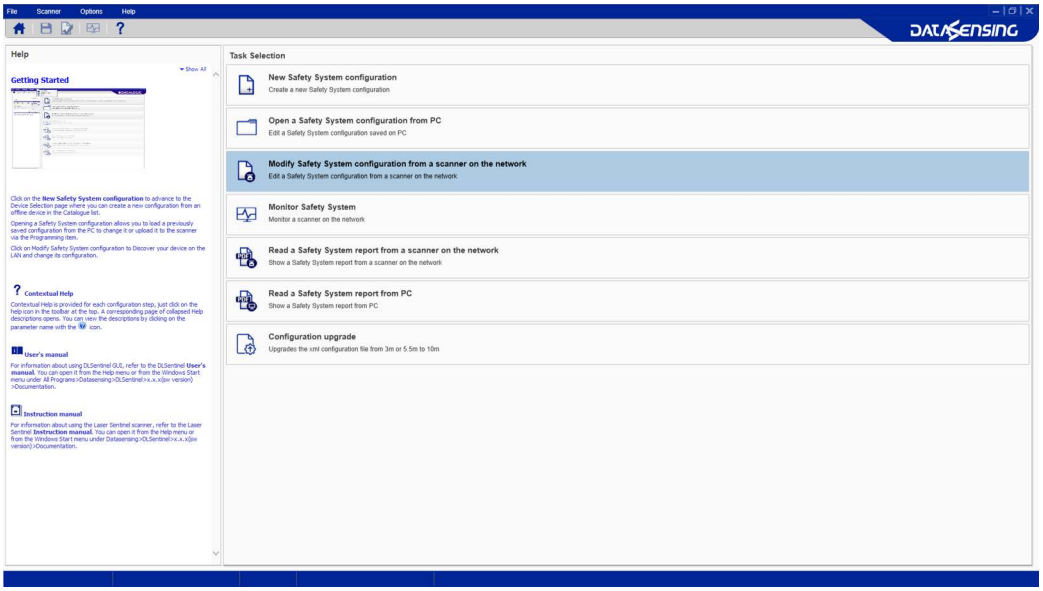
10. Back on DLSentinel, click on the white right-pointing arrow on the upper right side on the main panel to download the current configuration from the device to the PC. DLSentinel is now connected to the device.

NOTE: If you are connecting the device for the first time or after a Factory Reset (see Appendix C, Factory Reset**), the display will show a "WAITING CONF" message until a new configuration is loaded.**

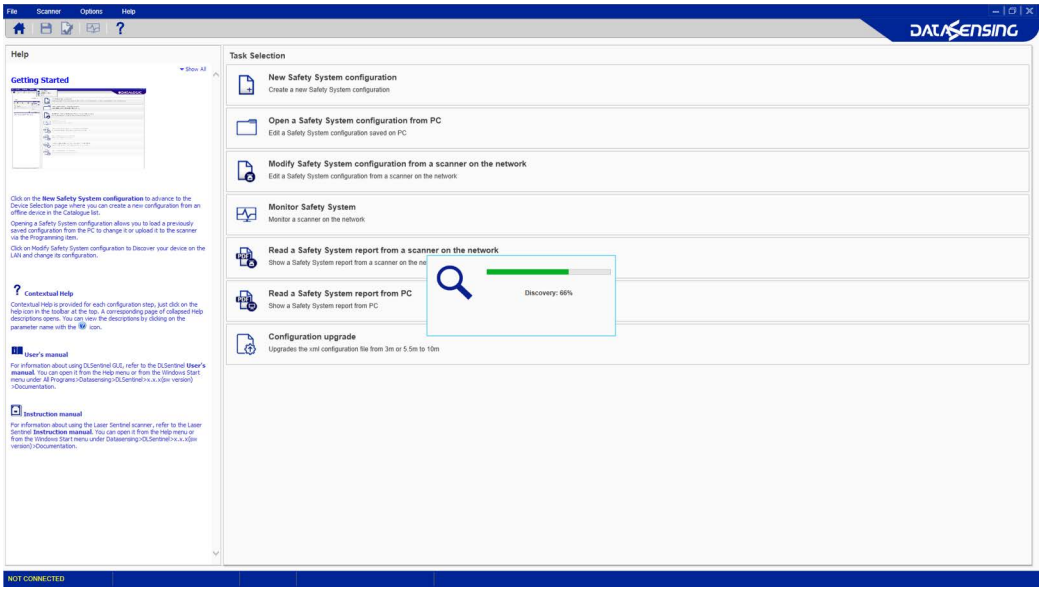
NOTE: See "Modify Safety System Configuration from a Scanner on the Network" on page 16 **for modifying the current configuration or** "Open a Previously Saved Safety System Configuration From PC" on page 59 **for downloading a previously saved configuration from the PC.**

MODIFY SAFETY SYSTEM CONFIGURATION FROM A SCANNER ON THE NETWORK

1. Click on Modify Safety System Configuration From a Scanner on the Network task to edit a configuration on a device on the Network (Online Configuration).

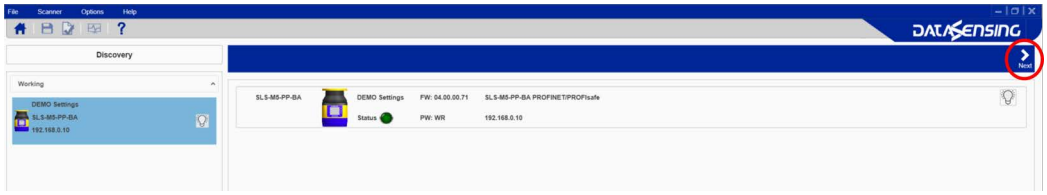


DLSentinel will enter Discovery mode to search for a connected device.



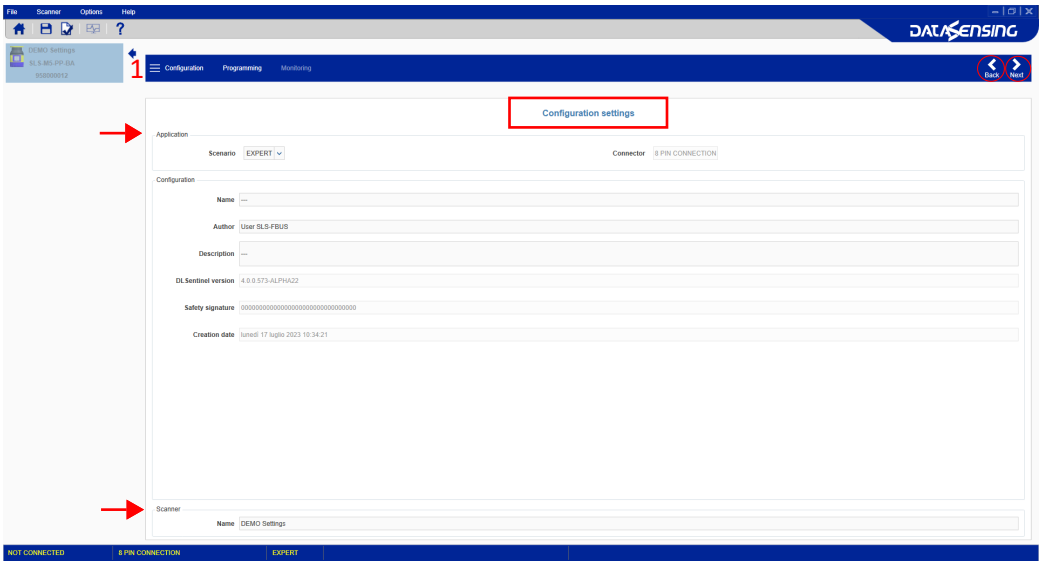
NOTE: If the Laser Sentinel and the PC LAN are not aligned, it will be necessary to set the network configuration settings. See "Establishing Ethernet Communications with the Scanner" on page 9**.**

2. Click on the white right-pointing arrow on the upper right side on the main panel to download the current configuration from the device to the PC. DLSentinel is now connected to the device.



Configuration Settings

The first page is the **Configuration Settings** page, which contains information about the application.



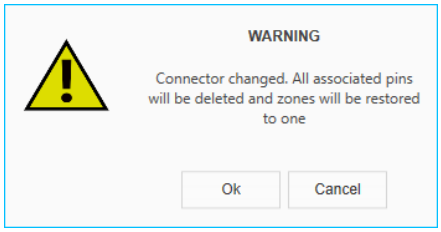
Scenario to select the configuration type (depending on the application).

- **Vertical:** Same as expert but requires that Reference Points be defined in the Zone configuration (they are not optional for Vertical applications).
- **Expert:** provides the maximum configuration possibilities for the device. It contains the entire set of parameters, regardless of the device use.

Connector to select the connector type (depending on the device model and application).

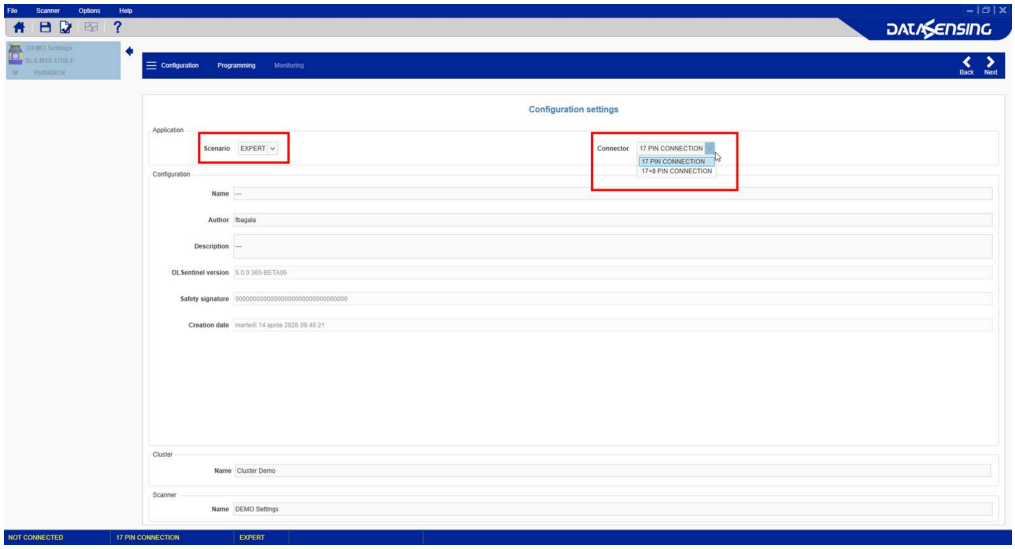
- **8 pin connection**: The configuration will manage the pins relative to this connector.
- **12 pin connection**: The configuration will manage the pins relative to this connector (Master only).
- **17 pin connection**: The configuration will manage the pins relative to this connector (Enhanced Master only).
- **17+8 pin connection**: The configuration will manage the pins relative to this connector (Enhanced Master only).

NOTE: If you switch from 8 to 12 pin connection or from 17 to 17+8 pin connection (or vice versa), the following warning message will appear:



In particular, if you do this after completing a configuration:

- **If one single Zone was configured, its areas will be preserved, while all associated pins will be deleted;**
- **If more than one Zone were configured, just the area of Zone 1 will be preserved, while all other areas and associated pins will be deleted.**



It is possible to view and edit some of the parameters in the **Configuration** section, such as:

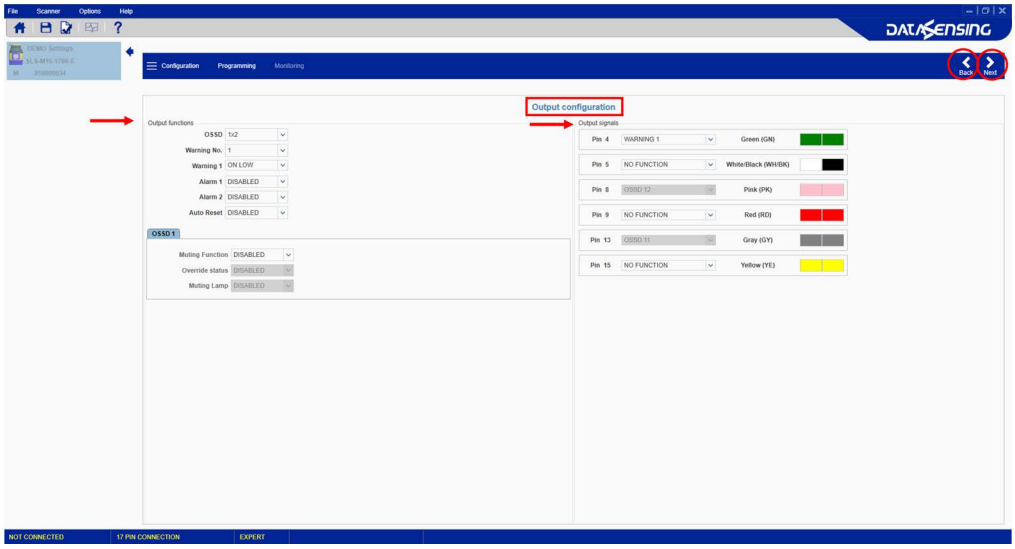
- **Name**: A name to identify the configuration.
- **Author**: A name to identify the author.
- **Description**: A short text description to identify the configuration.
- **DLSentinel Version**: (Read-only). The software version of DLSentinel.
- **Safety Signature**: (Read-only). This is a 16-byte unique identifier randomly generated by DLSentinel based on the time and date when the configuration is downloaded into the scanner.
- **Creation Date**: (Read-only). The date and time the configuration was created.
- **Scanner**: A name to identify the scanner.

NOTE: To proceed with the configuration, click on the white right-pointing arrow on the upper right side on the main panel. To go back to the previous page, click on the white left-pointing arrow.

Output Configuration

Enhanced Models

The Output Configuration page displays the following parameters:



Output Functions

- **OSSD:** to select the number of OSSD pairs to use for the configuration. This component is connected to the machine control system and associated with the Safety Zone. If an object is detected in the Safety Zone, the OSSD pair switches to the Off-State effectively shutting down the machine.
  - **1x2 (One Pair)** All OSSD outputs are managed in pairs, two pins (x2). OSSDs 1/1 and 1/2 are assigned respectively Pin 5 and Pin 6 (8 pole model), Pin 8 and Pin 5 (12 pole model), Pin 13 and Pin 12 (17 pole model), and Pin 13 and Pin 8 (17+8 pole model).
  - **2x2 (Two Pairs)** Two pairs of OSSD outputs are available for 17 and 17+8 pole models. OSSDs 1/1 and 1/2 are assigned respectively Pin 13 and Pin 8. OSSDs 2/1 and 2/2 can be assigned either Pin 4 or Pin 15.
  - **3x2 (Three Pairs)** Three pairs of OSSD outputs are available for 17 and 17+8 pole models. OSSDs 1/1 and 1/2 are assigned respectively Pin 13 and Pin 8. OSSDs 2/1 and 2/2 can be assigned either Pin 4 or Pin 15. OSSDs 3/1 and 3/2 can be assigned either Pin 5 or Pin 9.



NOTE: OSSD 3 can only be used for Automatic Restart with Recovery Time.

- **Warning No.:** to select the number of Warning Zones to use for the configuration. This is the area outside the Safety Zone where an object can be detected but the device will not switch to the Off-State. It can be used to light a warning lamp or sound a siren.
- **Warning x:** to activate Warning 1 and/or 2 when the output goes low (0V), select “On Low”. To activate Warning 1 and/or 2 when the output goes high (24V), select “On High”.
- **Clean Window:** Enabling Clean Window activates the “*Clean Window*” device error warning. (For 3.2.x devices, this is Alarm1).
- **Device Error:** Enabling Device Error activates the “*Device Error*” warning. (For 3.2.x devices, this is Alarm2).

- **Auto Reset:** to activate the Auto Reset function. The scanner will automatically reset after 10 seconds from the error condition and will resume normal operation. The Auto Reset function will be permanently inhibited if the device locks in INTFx more than 5 times within 15 minutes. In this case a power cycle is necessary to reactivate the scanner.



NOTE: Auto Reset can be configured in the Output Configuration page, but it is not an output function.

- **Muting:** Enabling the Muting function allows the scanner to operate under controlled conditions where an object can pass through the Safety Zone without the scanner switching to the Off-State. See the Laser Sentinel Instruction Manual for more details on this feature. Dedicated devices must be connected to the scanner input signals to control this function. An optional lamp can be connected to signal this condition.
- **Override Status:** When the Muting function is enabled, enabling Override allows forcing the safety function deactivation to clear the safety zone from a work cycle anomaly.
- **Muting Lamp:** If the Muting function is enabled, an optional muting lamp can be connected to a scanner output signal to indicate when the scanner is functioning in Muting (dangerous area temporarily unprotected).

Output Signals

This parameter group assigns the signals of the output functions to the scanner pins. Each pin is also associated with color-coded cable wiring, according to safety equipment regulations and standards.

The following pins are available for the **8 pin configuration**:

- **Pin 1 (White Wire), Pin 3 (Green Wire), Pin 4 (Yellow Wire)**
  If a Warning Zone function is selected, these pins can be assigned as the Warning output. If a Muting Lamp is selected (Muting function enabled), these pins can be assigned as the Muting Lamp output. If an Alarm is enabled, these pins can be assigned to the Alarm 1 or Alarm 2 output. Otherwise, they must be assigned here as No Function in order to be used as a Reset, Restart, Area Switch, Muting, Muting Enable or Override input. See the Zone Set and Input configuration steps.
- **Pin 5 (Gray Wire)**
  This pin is automatically assigned to the safety output OSSD 1/1 (pair 1, output 1).
- **Pin 6 (Pink Wire)**
  This pin is automatically assigned to the safety output OSSD 1/2 (pair 1, output 2).

The following pins are available for the **12 pin configuration** (M/S only):

- **Pin 5 (Pink Wire)**
  This pin is automatically assigned to the safety output OSSD 1/2 (pair 1, output 2).
- **Pin 7 (Black Wire), Pin 9 (Red Wire), Pin 10 (Violet Wire), Pin 11 (Gray/Pink Wire)**
  If a Warning Zone function is selected, these pins can be assigned as the Warning output. If a Muting Lamp is selected (Muting function enabled), these pins can be assigned as the Muting Lamp output. If an Alarm is enabled, these pins can be assigned to the Alarm 1 or Alarm 2 output. If the Override status in enabled, these pins can be assigned to the Override output. Otherwise, they must be assigned here as No Function in order to be used as a Reset, Restart, Area Switch, Muting, Muting Enable or Override input. See the Zone Set and Input configuration steps.

- **Pin 8 (Gray Wire)**

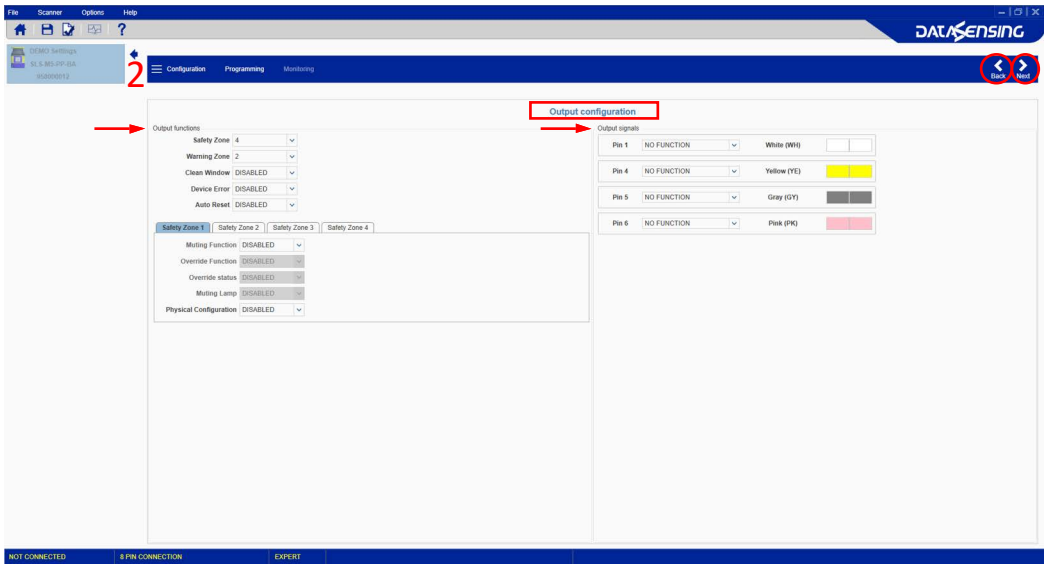
This pin is automatically assigned to the safety output OSSD 1/1 (pair 1, output 1).

The following pins are available for the **17 and 17+8 pin configuration**:

- **Pin 4 (Green Wire), Pin 15 (Yellow Wire)**
  If a Warning Zone function is selected, these pins can be assigned as the Warning 1 or Warning 2 output. If a Muting Lamp is selected (Muting function enabled), these pins can be assigned as the Muting Lamp output. If an Alarm is enabled, these pins can be assigned to the Alarm 1 or Alarm 2 output. If the Override status in enabled, these pins can be assigned to the Override output. If two pairs of OSSDs (2x2) are enabled, these pins can be assigned as OSSD 2/1 or 2/2. Otherwise, they must be assigned here as No Function in order to be used as a Reset, Restart, Area Switch, Muting, Muting Enable or Override input. See the Zone Set and Input configuration steps.
- **Pin 5 (Black/White Wire), Pin 9 (Red Wire)**
  If a Warning Zone function is selected, these pins can be assigned as the Warning 1 or Warning 2 output. If a Muting Lamp is selected (Muting function enabled), these pins can be assigned as the Muting Lamp output. If an Alarm is enabled, these pins can be assigned to the Alarm 1 or Alarm 2 output. If the Override status in enabled, these pins can be assigned to the Override output. If three pairs of OSSDs (3x2) are enabled, these pins can be assigned as OSSD 3/1 or 3/2. Otherwise, they must be assigned here as No Function in order to be used as a Reset, Restart, Area Switch, Muting, Muting Enable or Override input. See the Zone Set and Input configuration steps.
- **Pin 8 (Pink Wire)**
  This pin is automatically assigned to the safety output OSSD 1/2 (pair 1, output 2).
- **Pin 13 (Gray Wire)**
  This pin is automatically assigned to the safety output OSSD 1/1 (pair 1, output 1).

Fieldbus Models

The Output Configuration page displays the following parameters for the SLS-Fieldbus models:



Output Functions

- **Safety Zone:** to select the number of Safety Zone to be monitored within the active zone set (up to 8).
- **Warning Zone:** to select the number of Warning Zone to be monitored within the active zone set (up to 7).

- **Clean Window:** if enabled, the “Clean Window” device error/warning is output on the selected pin.
- **Device Error:** if enabled, any device error is output on the selected pin.
- **Auto Reset:** if enabled, the scanner will automatically reset after 10 seconds from the error condition and will resume normal operation. The Auto Reset function will be permanently inhibited if the device locks in INTFx more than 5 times within 15 minutes. In this case a power cycle is necessary to reactivate the scanner.



NOTE: Auto Reset can be configured in the Output Configuration page, but it is not an output function.

- **Muting Function:** if enabled, the safety laser scanner can operate under controlled conditions where an object can pass through the Safety Zone without the scanner switching to the Off-state.
- **Override Function:** if enabled, when the muting function is enabled, the safety laser scanner can enable override to force the safety function deactivation to clear the safety zone form a work cycle anomaly.
- **Override Status:** when the override function is active, the status of override is signaled. Override status is valid on output pin only for Safety Zone 1.
- **Muting Lamp:** if the Muting function is enabled for Safety Zone 1, an optional muting lamp can be connected to a scanner output signal to indicate when the scanner is functioning in Muting (dangerous area temporarily unprotected) or Override for the Safety Zone 1 only.



NOTE: The maximum number of Safety Zone, Warning Zone and Muting shall be 8 (e.g., 3 Safety Zones, 3 Warning Zones, 2 Muting zones is an allowed configuration).

Safety Zone 1

Only for the Safety Zone 1, Physical Configuration can be enabled to allow the user to select output signals for Override Status and Muting Lamp when they are enabled.

Safety Zone 2…8

The Muting and Override function can be enabled or disabled according to the constraint of maximum 8 among Safety, Warning, Muting zones. These functions are handled by the Fieldbus protocol through the Process image.

Output signals

This parameter group assigns the signals of the output functions to the scanner pins only for the Safety Zone 1 if Physical configuration is enabled, except for Clean Window and Device Error which can be always assigned.

Each pin is also associated with color-coded cable wiring according to safety equipment regulations and standards.

The following pins are available for the Safety Laser Scanner Fieldbus:

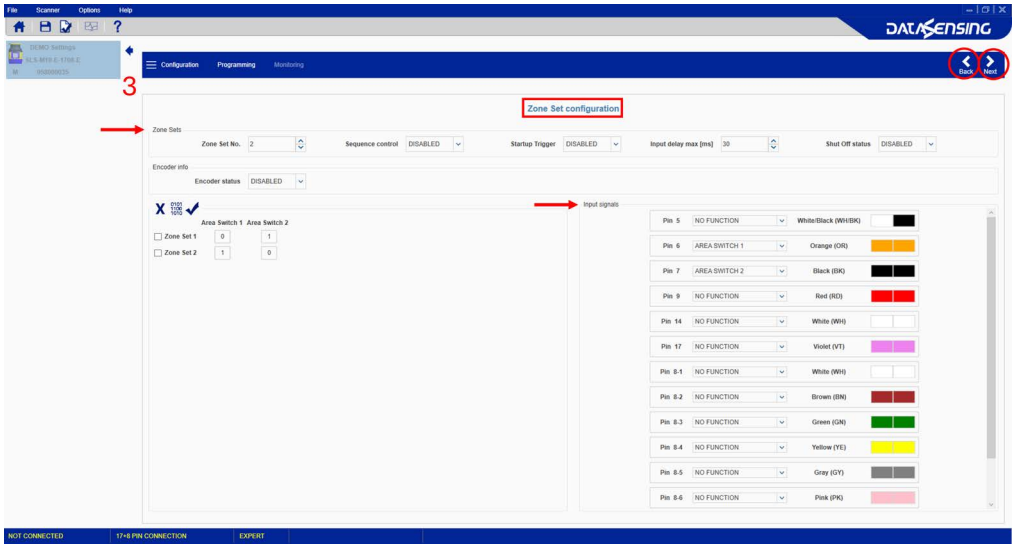
- **Pin 1 (White Wire), Pin4 (Yellow Wire), Pin 5 (Gray Wire), Pin 6 (Pink wire)**

If an alarm is enabled, these pins can be assigned to the Clean Window or Device Error output. If the Override Function is enabled (Muting function enabled), these pins can be assigned to the Override Status. If Muting Lamp is enabled (Muting function enabled) these pins can be assigned as the Muting Lamp output. Otherwise, they must be assigned here as No Function.

Zone Set Configuration

Enhanced Models

Zone Set Configuration displays the following parameters:



A Zone Set defines the area within the Laser Sentinel operating range to be monitored (Safety Zone, and if present, Warning and Muting Zones). More than one Zone Set can be configured to define either separate or overlapping areas and these can be switched alternatively using combinations of input signal states.

Zone Set Parameters

- **Zone Set No.**
  To select the number of Zone Sets to use for the configuration. The default value is one Zone Set (no Area Switching). By pressing the up arrow more Zone Sets can be added. Please note that you can select max. 70 Zone Sets with the 17+8 pole Master Remote configuration, max. 20 Zone Sets with the 17-pole Master Remote configuration, max. 10 Zone Sets with the 12-pole Master Remote configuration, max. 3 Zone Sets with the 8-pole Master Remote configuration, and max. 6 Zone Sets with the Stand Alone model.
- **Input Delay Max [msec]**
  This parameter is valid when there are at least two Zone Sets. It determines the delay to apply between switching from one Zone Set to the next. The input delay allows waiting for the Area Switching inputs to stabilize from their transient states before accepting the Zone Set. Otherwise the activation and deactivation of the inputs could put the device in undesired or invalid and temporary switching zone input combinations and therefore cause the device to enter the fault state.
  The minimum input delay (default) value is 30 msec. It can be increased in 30 msec increments.
- **Shut Off status**
  To enable or disable the Shut Off function. This field is only available with Laser Sentinel Enhanced models. Refer to the Laser Sentinel Instruction Manual for more details.
- **Encoder status**
  To enable or disable encoders for dynamic applications. This field is only available with Laser Sentinel models supporting encoders. Refer to "Encoder" on page 29 for more information.
- **Area Switches**
  This parameter group allows editing the Area Switch input combinations depending on the number of selected Zone Sets.

By selecting more than one Zone Set in the Zone Set No. parameter, a number of Area Switches equal to the number of unassigned inputs will appear in the graphic.
It is possible to set the input switch coding with specific buttons. See the table below:

X	By selecting a Zone Set through the checkbox and clicking on this button, the Zone Set will be removed.
0101 1100 1010	By clicking on this button, the Zone Set Combination will be automatically set.
✓	By clicking this button, the created combination will be verified.

Alternatively, you can click inside the Area Switch box to manually change its state. All Area Switching must differ by two input bit states to be valid.

- **Sequence control (only for models with SW release 4.x or greater)**
  If more than one zone set (Zone Set No.) is selected, the Sequence control can be ENABLED or DISABLED by the user. If ENABLED, the change of zone set from x to y shall be admissible only for a sequential number of the zone set (incremental or decremental), i.e., y=x+1 or y=x-1. If the user tries to activate a different zone set from y=x+1 or y=x-1, the device goes to a safe condition and the error INPUTCF3 is shown on the display.
  E.g.: if three zone sets are configured, if Sequence control is ENABLED, zone set No.3 shall be activated only if the current zone set active is the zone set No. 2. Or zone set No. 4. When the maximum number of configured Zone Set is reached, the next incremental admissible Zone Set is the first one, otherwise, if Zone Set No. is set to 0, the error INPUTCF2 is shown on the display.
  E.g.: if three zone sets are configured, if Sequence control is ENABLED, after zone set No.3, the next incremental admissible zone set is the zone set No. 1.
- **Startup trigger (only for M10 models)**
  The *Startup Trigger* can be used to enable a trigger signal for the Zone Sets activation: this can be useful, for example, to avoid a lockout of the Laser Scanner in applications where its boot time is lower than the time needed by the controller to start driving the input signals.
  If this feature is enabled during the configuration, the user must also select an I/O pin (any available input signal pins is eligible) as Startup Trigger: if this is done, the SLS will automatically boot in state “WAIT FOR INPUT” with the OSSDs in OFF-status.
  To activate the Zone Sets, a 24 Vdc signal must be sent on the dedicated pin for a time 200 ms < t < 500 ms (refer to the SLS Instruction Manual).

Input signals

This parameter group assigns the signals of the input functions to the scanner pins. Each pin is also associated with color-coded cable wiring, according to safety equipment regulations and standards.

The following pins are available for the **8 pin configuration**:

- **Pin 1 (White Wire)**
  If this pin has been assigned as a Warning, Alarm or Muting Lamp output, it is not available (shown in gray). If it hasn’t been assigned to any output, it can be assigned here as an Area Switch input. Selecting No Function here allows it to be assigned to one of the Muting input signals or the Muting Enable signal, the Muting Override input signal or as a manual Restart and/or Reset input (see the Input

configuration step in "Input Configuration" on page 32). If this input is not used, select No Function.

- **Pin 3 (Green Wire), Pin 4 (Yellow Wire)**
  These pins can be assigned here as an Area Switch input. Selecting No Function here allows them to be assigned to one of the Muting input signals or the Muting Enable signal, the Muting Override input signal or as a manual Restart and/or Reset input (see the Input configuration step in "Input Configuration" on page 32). If these inputs are not used, select No Function.

The following pins are available for the **12 pin configuration**:

- **Pin 3 (White Wire), Pin 9 (Red Wire), Pin 10 (Violet Wire), (Pin 11 (Gray/Pink Wire)**
  These pins can be assigned here as an Area Switch input. Selecting No Function here allows them to be assigned to one of the Muting input signals or the Muting Enable signal, the Muting Override input signal or as a manual Restart and/or Reset input (see the Input configuration step in "Input Configuration" on page 32). If these inputs are not used, select No Function.
- **Pin 7 (Black Wire)**
  If this pin has been assigned as a Warning, Alarm or Muting Lamp output, it is not available (shown in gray). If it hasn't been assigned to any output, it can be assigned here as an Area Switch input. Selecting No Function here allows it to be assigned to one of the Muting input signals or the Muting Enable signal, the Muting Override input signal or as a manual Restart and/or Reset input (see the Input configuration step in "Input Configuration" on page 32). If this input is not used, select No Function.

The following pins are available for the **17 pin configuration**:

- **Pin 5 (Black/White Wire), Pin 9 (Red Wire)**
  If these pins have been assigned as an Alarm, Muting Lamp, or OSSD 3 output, they are not available (shown in gray). If haven't been assigned to any output, they can be assigned here as Area Switch inputs. Selecting No Function here allows them to be assigned to one of the Muting input signals or the Muting Enable signal, the Muting Override input signal, the EDM signal, or as a manual Restart and/or Reset input (see the Input configuration step in "Input Configuration" on page 32). If these inputs are not used, select No Function.
- **Pin 6 (Orange Wire), Pin 7 (Black Wire), Pin 14 (White Wire), Pin 17 (Violet Wire)**
  These pins can be assigned here as an Area Switch input. Selecting No Function here allows them to be assigned to one of the Muting input signals or the Muting Enable signal, the Muting Override input signal, the EDM signal, or as a manual Restart and/or Reset input (see the Input configuration step in "Input Configuration" on page 32). If these inputs are not used, select No Function.

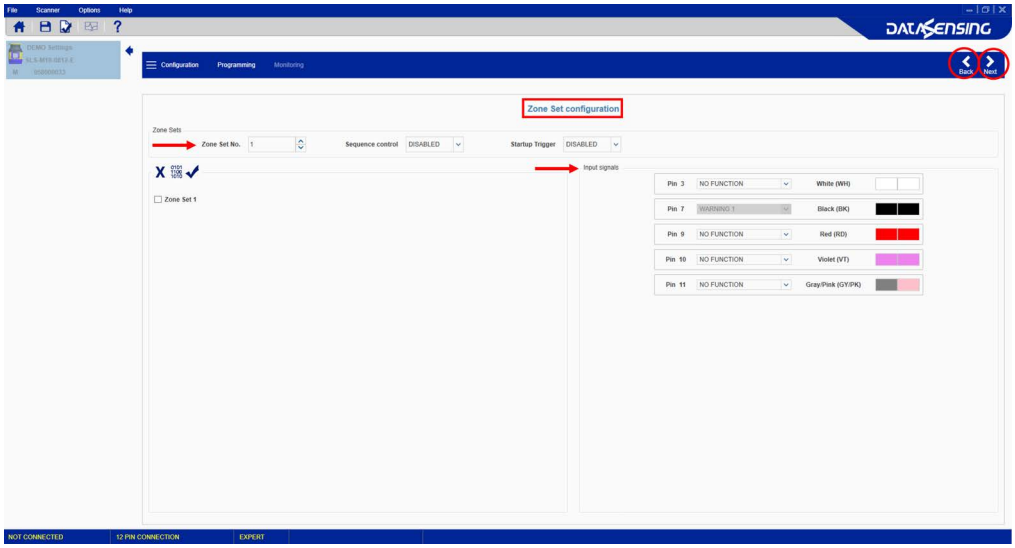
The following pins are available for the **17+8 pin configuration**:

- **Pin 5 (Black/White Wire), Pin 9 (Red Wire)**
  If these pins have been assigned as an Alarm, Muting Lamp, or OSSD 3 output, they are not available (shown in gray). If haven't been assigned to any output, they can be assigned here as Area Switch inputs. Selecting No Function here allows them to be assigned to one of the Muting input signals or the Muting Enable signal, the Muting Override input signal, the EDM signal, or as a manual Restart and/or Reset input (see the Input configuration step in "Input Configuration" on page 32). If these inputs are not used, select No Function.
- **Pin 6 (Orange Wire), Pin 7 (Black Wire), Pin 14 (White Wire), Pin 17 (Violet Wire), Pin 8-1 (White Wire), Pin 8-2 (Brown Wire), Pin 8-3 (Green Wire), Pin 8-4 (Yellow Wire), Pin 8-5 (Gray Wire), Pin 8-6 (Pink Wire), Pin 8-7 (Blue Wire), Pin 8-8 (Red Wire)**

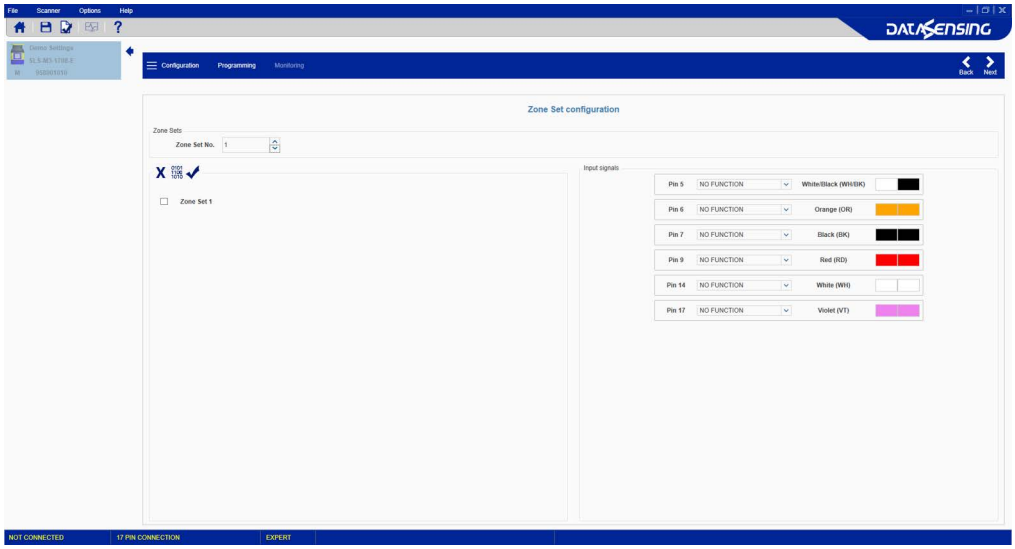
These pins can be assigned here as an Area Switch input. Selecting No Function here allows them to be assigned to one of the Muting input signals or the Muting Enable signal, the Muting Override input signal, the EDM signal, or as a manual Restart and/or Reset input (see the Input configuration step in "Input Configuration" on page 32). If these inputs are not used, select No Function.

Zone Sets configuration example

If the configuration includes only one Zone Set, there is no area switching, so it is not necessary to assign any input to an area switch.



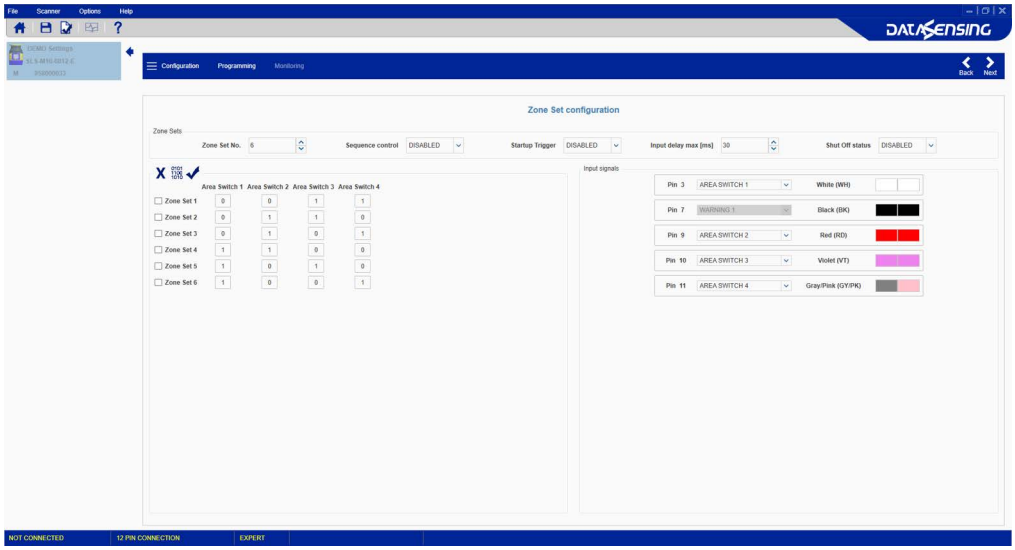
If two Zone Sets are selected, **Area Switching** is required, and so two inputs must be assigned to the area switch functions (AREA SWITCH 1, AREA SWITCH 2).



If six Zone Sets are selected:

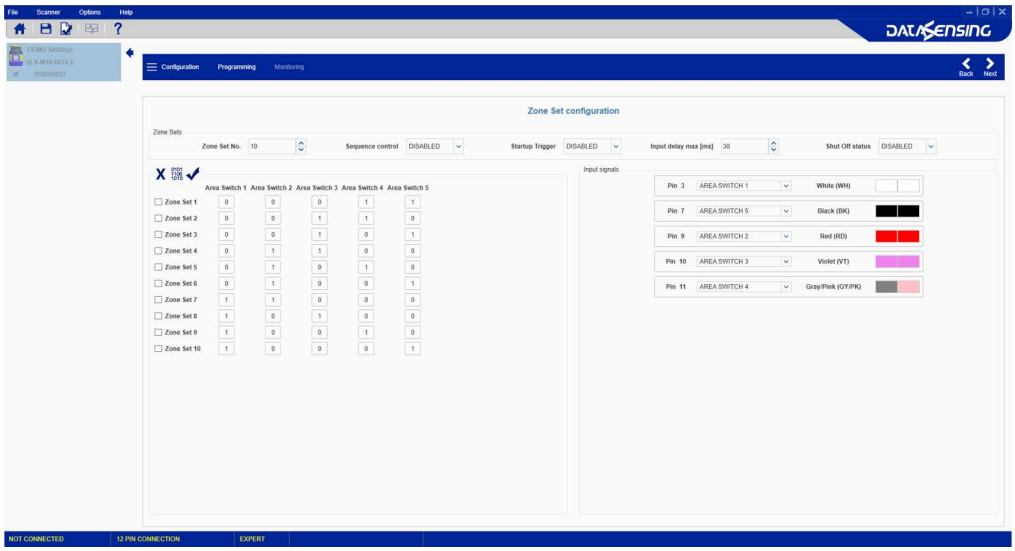
- for the **8 pin configuration**, Pins 1, 3 and 4 must all be assigned to the **Area Switch** functions (AREA SWITCH 1, AREA SWITCH 2 and AREA SWITCH 3);

- for the **12, 17, and 17+8 pin configuration**, four pins must be assigned to the **Area Switch** functions (AREA SWITCH 1, AREA SWITCH 2, AREA SWITCH 3, and AREA SWITCH 4).



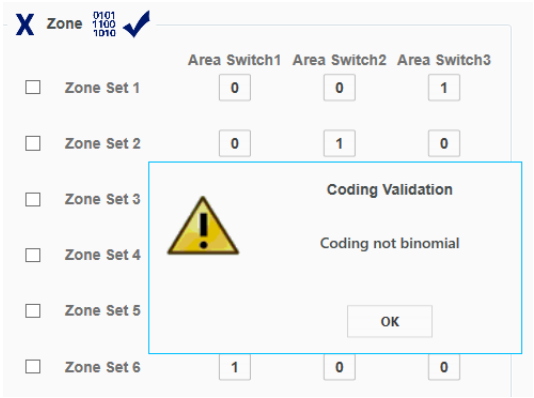
If ten Zone Sets are selected:

- for the **12 pin configuration** (the Warning function is not available), Pins 3, 7, 9, 10 and 11 must all be assigned to the **Area Switch** functions (AREA SWITCH 1, AREA SWITCH 2, AREA SWITCH 3, AREA SWITCH 4 and AREA SWITCH 5);
- for the **17 and 17+8 pin configuration**, five pins must be assigned to the **Area Switch** functions (AREA SWITCH 1, AREA SWITCH 2, AREA SWITCH 3, AREA SWITCH 4, and AREA SWITCH 5).



NOTE: 17 pole models can manage up to 20 Zone Sets. 17+8 pole models can manage up to 70 Zone Sets.

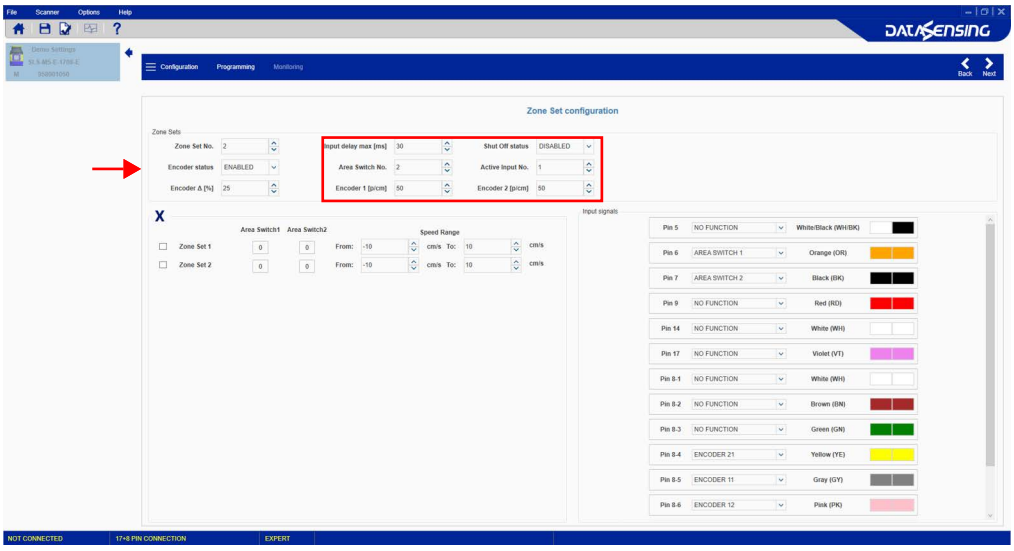
NOTE: In case of more than one Zone Set, make sure to create a valid input coding combination: Zone Sets must differ by two input bit states with respect to any other Zone Set. Otherwise, by clicking on the validation button a pop-up window that shows the coding validation error will be displayed.



Encoder

In the Zone Set Configuration page, the Encoder function can be enabled for dynamic applications. This function is only available for **17+8 pole models**.

For more details on the Encoder function, refer to the Laser Sentinel Instruction Manual.

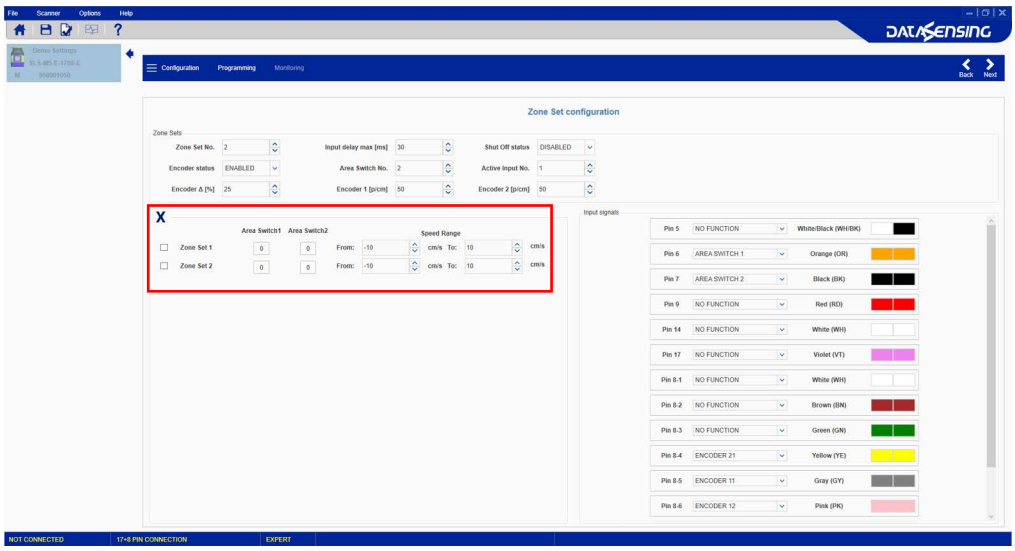


- **Input Delay Max [msec]**
  This parameter is valid when there are at least two Zone Sets. It determines the delay to apply between switching from one Zone Set to the next. The input delay allows waiting for the Area Switching inputs to stabilize from their transient states before accepting the Zone Set. Otherwise the activation and deactivation of the inputs could put the device in undesired or invalid and temporary switching zone input combinations and therefore cause the device to enter the fault state.
  The minimum input delay (default) value is 30 msec. It can be increased in 30 msec increments. If the zone set switch is triggered by the Positional Encoder Range, this parameter is replaced by the SLS motor revolution time (**TREV**, refer to section “Response Time And Scan Cycle” of the Instruction Manual).
- **Area Switch No.**
  Sets the number of Areas Switches, i.e. the univocal input combinations that make the Zone Sets change.

- **Active Input No.**
  Sets the number of available Active Inputs. This value can be increased according to the number of Area Switches.

- **Encoder Δ [%]**
  Position:
  This is the allowable variation in the position measures collected by Encoder 1 and Encoder 2. The minimum value is 0, the maximum value is 100, the default value is 10. At each cycle, the scanner checks the movement of both encoders with respect to the previous cycle: if the difference between the movement of the two encoders exceeds the value “Encoder Δ”, the OSSDs enter the OFF status (Encoder Error).
  Speed:
  This is the allowable variation in the speed measures collected by Encoder 1 and Encoder 2. The minimum value is 0%, the maximum value is 45%, the default value is 25%.
- **Encoder 1 / 2 [p/cm]**
  Encoder (1 and 2) pulse number per centimeter. For both encoders the minimum value is 50 (default), and the maximum value is 1,000.
  This is based on the number of pulses the encoder supplies per revolution, and on the ratio between the vehicle wheel and the friction wheel on which the encoder is mounted.
- **Sensors Max Delay [ms] (only for Positional Encoder)**
  This parameter is the maximum time which can elapse between the transition of the two Homing sensors. It can be configured on the GUI, in a range between 16-500 ms (50 ms is the default value). If the device detects the transition of one of the Homing sensors but not the second one (or the second one is detected after a time greater than **Sensors Max Delay**), the Homing is not performed, and the laser scanner shows an Encoder Warning.
- **Sensors Position Tolerance [mm] (only for Positional Encoder)**
  This parameter is the tolerance of the sensors used to perform the Homing procedure. It can be configured on the GUI, in a range between 0-5 mm (1 mm is the default value).

After setting the encoder values, the Zone Sets must be configured.



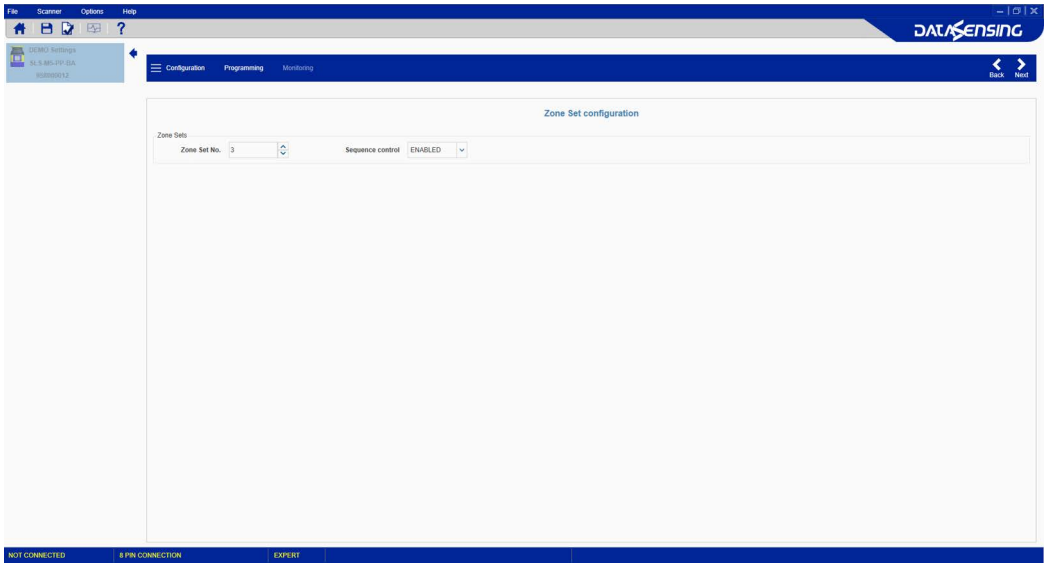
- **Zone**
  This parameter group allows editing the Area Switch input combinations depending on the number of selected Zone Sets and the Speed Range of each Zone Set.

NOTE: If a different input switch coding is configured for each Area Switch, the relevant Zone Sets can have either overlapping or different Speed Ranges. In this case, all Area Switches must differ by two input bit states (Hamming distance) to be valid.

On the other hand, if more Area Switches share the same input switch coding, different Speed Ranges must be configured for each Zone Set.

Fieldbus Models

The Zone Set Configuration page displays the following parameters for the SLS-Fieldbus models:



Zone Set Parameters

- **Zone Set No.**
  To select the number of Zone Sets to use for the configuration. The default value is one Zone Set (no Area Switching). By pressing the up arrow more Zone Sets can be added. Please note that you can select max. 70 Zone Sets for SLS-Fieldbus models.
- **Sequence control**
  If more than one zone set (Zone Set No.) is selected, the Sequence control can be ENABLED or DISABLED by the user. If ENABLED, the change of zone set from x to y shall be admissible only for a sequential number of the zone set (incremental or decremental), i.e., y=x+1 or y=x-1. If the user tries to activate a different zone set from y=x+1 or y=x-1, the device goes to a safe condition and the error INPUTCF3 is shown on the display.

  E.g.: if three zone sets are configured, if Sequence control is ENABLED, zone set No.3 shall be activated only if the current zone set active is the zone set No. 2. or zone set No. 4.

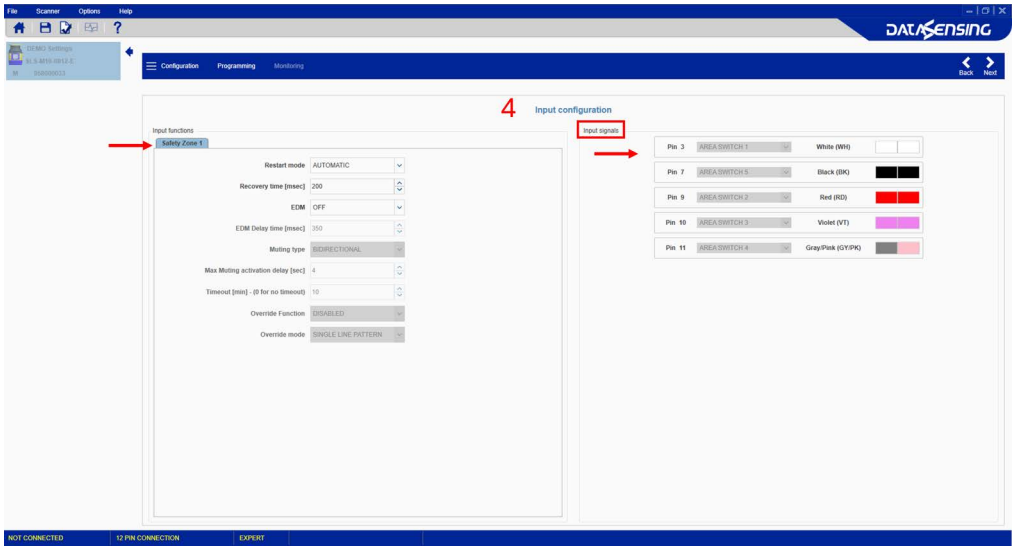
  When the maximum number of configured Zone Set is reached, the next incremental admissible Zone Set is the first one, otherwise, if Zone Set No. is set to 0 the error INPUTCF2 is shown on the display.

  E.g.: if three zone sets are configured, if Sequence control is ENABLED, after zone set No.3, the next incremental admissible zone set is the zone set No. 1.

Input Configuration

Enhanced Models

The **Input Configuration** page displays the following parameters:



Input Functions

- **Restart Mode:** For each Safety Zone you can select the restart mode.
  - -**Automatic**: The Laser Sentinel automatically returns the OSSD pair to the On-State after all detected objects are removed from the Safety Zone and the configured Recovery Time elapses.
  - -**Manual**: The Laser Sentinel returns the OSSD pair to the On-State after all detected objects are removed from the Safety Zone and a manual Restart switch (push-button) is pressed for at least 500 msec. If the restart switch is pressed while an object is still within the safety area, the Laser Sentinel is not restarted.
- **Recovery time:** This parameter is only significant for Automatic Restart Mode. The recovery time is the time between the object removal from the Safety Zone and the OSSDs achieving the On-State. Select the time to elapse before the OSSD pair returns to the On-State. The minimum Recovery Time is 200 msec. This can be increased to 60000 msec in 1 msec increments.
- **EDM:** Enables/disables the EDM (External Device Monitoring) function.
- **EDM Delay time [msec]:** The user can select an EDM delay time from OSSD status switch (from 200 to 1000 msec).
- **Muting Type:** The Muting function can be used in two different configurations:
  - -**Unidirectional**: This is when objects can pass through the Safety Zone from only one direction. It requires two Muting sensors be connected to the Laser Sentinel inputs.
  - -**Bidirectional**: This is when objects can pass through the Safety Zone from both directions. It requires four Muting sensors be connected to the Laser Sentinel inputs.
- **M coeff.:** For Unidirectional Muting, the M coefficient is the delay multiplier that causes the Muting function to end. This is the multiplier of the activation delay between the two sensors. It can be set from 2 to 16.
- **Max Muting Activation Delay:** This is the maximum delay between the Muting sensors activation that will still allow the Muting function to be enabled. If the second Muting sensor is activated after this max. delay, the Laser Sentinel will not enter Muting.

- **Timeout:** This defines the maximum duration for the Muting function regardless of the Muting sensors state. The values range from 10 to 1080 minutes. If set to 0, the Muting function is indefinite. This means that Muting will continue as long as the Muting conditions exist.
  Attention: User is warned that the latter setting is not compliant with IEC 61496-1.
- **Override:** When the Muting function is enabled, enabling the Override input allows forcing the safety function deactivation to clear the safety zone from a work cycle anomaly.
- **Override Mode:** The available override modes are single line pattern, edge and trigger. See the Laser Sentinel Instruction Manual for details.

Input Signals

This parameter group assigns the signals of the input functions to the scanner pins. Each pin is also associated with color-coded cable wiring, according to safety equipment regulations and standards.

The following pins are available for the **8 pin configuration**:

- **Pin 1 (White Wire)**
  If this pin has been assigned as a Warning, Alarm or Muting Lamp output, or as an Area Switch input, it is not available (shown in gray). If it hasn't been assigned yet, it can be assigned to one of the Muting input signals or the Muting Enable signal, the Muting Override input signal or as a manual Restart and/or Reset input. If this input is not used, select No Function.
- **Pin 3 (Green Wire), Pin 4 (Yellow Wire)**
  If these pins have been assigned as Area Switch inputs, they are not available (shown in gray). If not, they can be assigned here to one of the Muting input signals or the Muting Enable signal, the Muting Override input signal or as a manual Restart and/or Reset input. If these inputs are not used, select No Function.

The following pins are available for the **12 pin configuration**:

- **Pin 3 (White Wire), Pin 9 (Red Wire), Pin 10 (Violet Wire), Pin 11 (Gray/Pink Wire)**
  If these pins have been assigned as Area Switch inputs, they are not available (shown in gray). If not, they can be assigned to one of the Muting input signals or the Muting Enable signal, the Muting Override input signal or as a manual Restart and/or Reset input. If these inputs are not used, select No Function.
- **Pin 7 (Black Wire)**
  If this pin has been assigned as a Warning, Alarm or Muting Lamp output, or as an Area Switch input, it is not available (shown in gray). If it hasn't been assigned yet, it can be assigned to one of the Muting input signals or the Muting Enable signal, the Muting Override input signal or as a manual Restart and/or Reset input. If this input is not used, select No Function.

The following pins are available for the **17 pin configuration**:

- **Pin 5 (Black/White Wire), Pin 9 (Red Wire)**
  If these pins have been assigned as Warning, Alarm, Muting Lamp, or OSSD 3 outputs, or as Area Switch inputs, they can be assigned to one of the Muting input signals or the Muting Enable signal, the Muting Override input signal, the EDM signal, or as a manual Restart and/or Reset input. If these inputs are not used, select No Function.
- **Pin 6 (Orange Wire), Pin 7 (Black Wire), Pin 14 (White Wire), Pin 17 (Violet Wire)**
  If these pins have not been assigned as Area Switch inputs, they can be assigned to one of the Muting input signals or the Muting Enable signal, the Muting Override

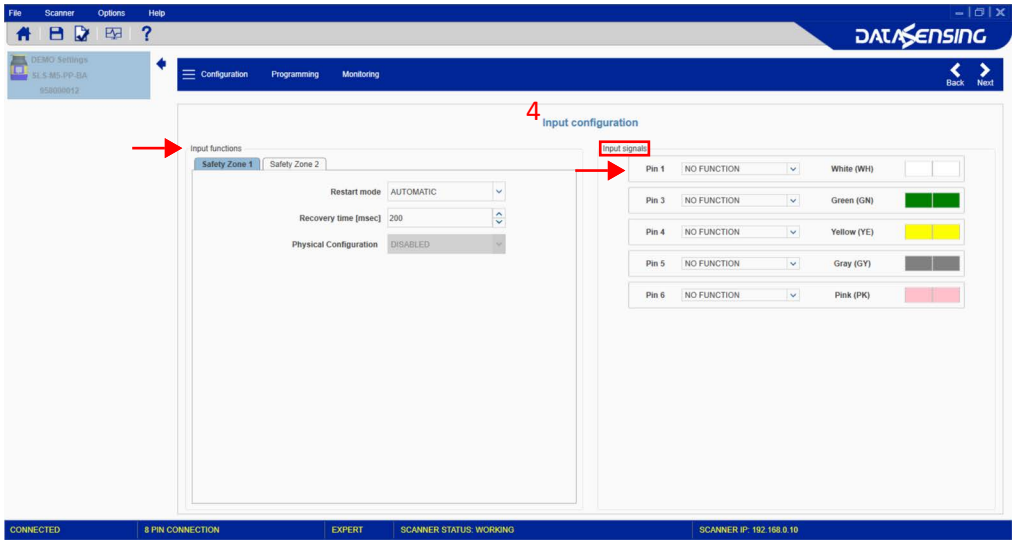
input signal, the EDM signal, or as a manual Restart and/or Reset input. If these inputs are not used, select No Function.

The following pins are available for the **17+8 pin configuration**:

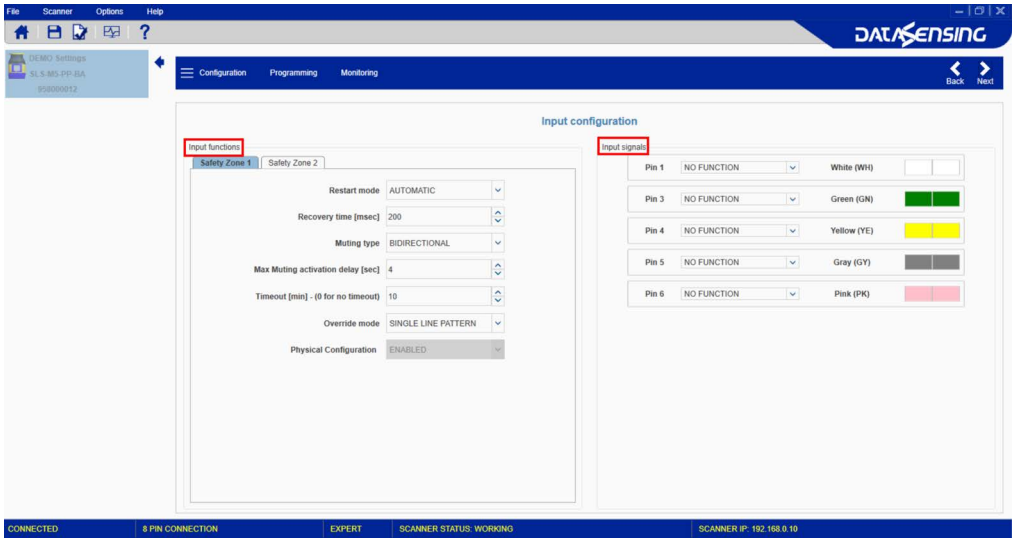
- **Pin 5 (Black/White Wire), Pin 9 (Red Wire)**
  If these pins have been assigned as Warning, Alarm, Muting Lamp, or OSSD 3 outputs, or as Area Switch inputs, they can be assigned to one of the Muting input signals or the Muting Enable signal, the Muting Override input signal, the EDM signal, or as a manual Restart and/or Reset input. If these inputs are not used, select No Function.
- **Pin 6 (Orange Wire), Pin 7 (Black Wire), Pin 14 (White Wire), Pin 17 (Violet Wire), Pin 8-1 (White Wire), Pin 8-2 (Brown Wire), Pin 8-3 (Green Wire), Pin 8-4 (Yellow Wire), Pin 8-5 (Gray Wire), Pin 8-6 (Pink Wire), Pin 8-7 (Blue Wire), Pin 8-8 (Red Wire)**
  If these pins have not been assigned as Area Switch inputs, they can be assigned to one of the Muting input signals or the Muting Enable signal, the Muting Override input signal, the EDM signal, or as a manual Restart and/or Reset input. If these inputs are not used, select No Function.

Fieldbus Models

The **Input Configuration** page displays the following parameters for all the Safety Zones defined:



If the Physical Configuration is ENABLED (for Safety Zone 1), the Input Configuration page displays the following parameters:



Input Functions

- **Restart Mode**: for each Safety Zone it's possible to select the restart mode.
  -Automatic: the Laser Sentinel automatically returns the SafetyStatusZone bit of the process image to 0 after all detected objects are removed from the Safety Zone and the configured Recovery Time elapses.
  -Manual: the Laser Sentinel returns the related SafetyStatusZone bit of the process image to 1 after all detected objects are removed from the Safety Zone and the related RestartSafetyZone bit is set to 0 after a transition 0-1-0. (see Instruction Manual for details) by the controller. When the objects are removed, the InterlockReqZone bit is set to 1 in the Process Image (by the SLS) to inform the controller that Restart is possible. Only for the SafetyZone1, if Physical Configuration is enabled, a manual Restart switch (push-button) can be used on the selected pin and shall be pressed for at least 500 msec. If the Restart switch is pressed while an object is still inside the Safety Zone, the Laser Sentinel switches to a failure lockout state and must be Reset.
- **Recovery Time**: this parameter is only significant for Automatic Restart Mode. The recovery time is the time between the object removal from the Safety Zone and the SafetyStatusZone bit achieving the value 1. The minimum Recovery Time is 200 msec. This can be increased to 60000 msec in 1 msec increments.

Only for the Safety Zone 1, if Physical Configuration is enabled:

- **Muting Type**: the Muting function can be used in two different configurations:
  -Unidirectional: this is when objects can pass through the Safety Zone from only one direction. It requires two Muting sensors be connected to the Laser Sentinel inputs.
  -Bidirectional: this is when objects can pass through the Safety Zone from both directions. It requires four Muting sensors be connected to the Laser Sentinel inputs.
- **M coeff**.: for Unidirectional Muting, the M coefficient is the delay multiplier that causes the Muting function to end. This is the multiplier of the activation delay between the two sensors. It can be set from 2 to 16.
- **Max Muting Activation Delay**: this is the maximum delay between the Muting sensors activation that will still allow the Muting function to be enabled. If the second Muting sensor is activated after this max. delay, the Laser Sentinel will not enter Muting.
- **Timeout**: this defines the maximum duration for the Muting function regardless of the Muting sensors state. The values range from 10 to 1080 minutes. If set to 0, the Muting function is indefinite. This means that Muting will continue as long as the Muting conditions exist.
  Attention: User is warned that the latter setting is not compliant with IEC 61496-1.
- **Override**: when the Muting function is enabled, enabling the Override input allows forcing the safety function deactivation to clear the safety zone from a work cycle anomaly.
- **Override Mode**: the available override modes are single line pattern, edge, and trigger. See the Laser Sentinel Instruction Manual for details.

Input Signals

This parameter group assigns the signals of the input functions to the scanner pins. Each pin is also associated with color-coded cable wiring, according to safety equipment regulations and standards.

The following pins are available

- **Pin 1 (White Wire), Pin4 (Yellow wire), Pin5 (Gray wire), Pin6 (Pink wire)**

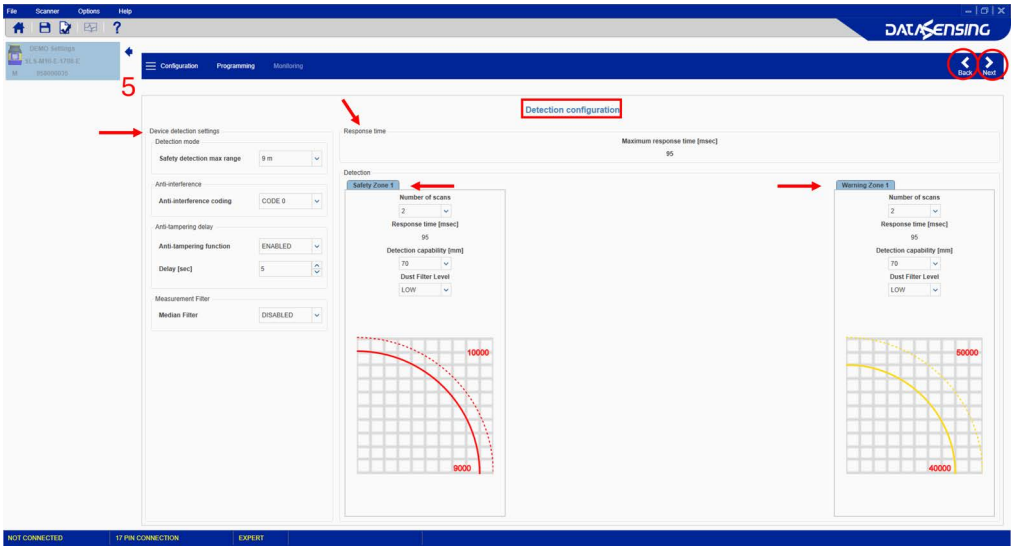
If these pins have been assigned as Alarm, Override Status or Muting Lamp output, they are not available. If they haven't been assigned yet, they can be assigned to one of the Muting input signals, the Muting Override input signal or as a manual Restart or Reset input. If these inputs are not used, select No Function.

- **Pin 3 (Green Wire)**
  This pin is only input, it can be assigned to one of the Muting input signals, the Muting Override input signal or as a manual Restart or Reset input.

Detection Configuration

Enhanced Models

The **Detection Configuration** page displays the following parameters:



Detection Parameters

- **Anti-interference coding:** This parameter changes the scan cycle time. This helps avoid interference among scanners working in the same environment.
- **Number of Scans:** Select the number of scans required to validate detection. This parameter has a direct impact on the **Response Time**, which is the time from when an object is detected in the Safety Zone to when the OSSD switches to the OFF-State. The Response Time ranges from 62 to 2444 ms.
- **Detection Capability:** The ability to detect an object of given dimensions within the detection zone. Objects greater than or equal to the selected value can be detected both for the Safety and Warning Zones.
- **Anti-Tampering Delay:** Choose whether to enable the function and the delay time for its activation.
- **Measurement Filter:** A median filter on the measurement can be enabled or disable to have smoothed corners of the object detected.
- **Dust Filter Level**: Must be set according to different conditions specific to the application. In general, it is the sensibility to various levels of airborne particles that impact the response of the Laser Sentinel detection.
  -High Dust Filter Level is used in dirty environments to filter (ignore) detection of airborne particles from being confused with objects to detect. The Laser Sentinel is less sensitive to dust and therefore avoids shutting down the machinery unnecessarily.
  -Mid
  -Low Dust Filter Level is used in cleaner environments where airborne particles have little effect on object detection.

Dust Filter Level should be set to the lowest value that still allows the machinery to work without detections due to dust.

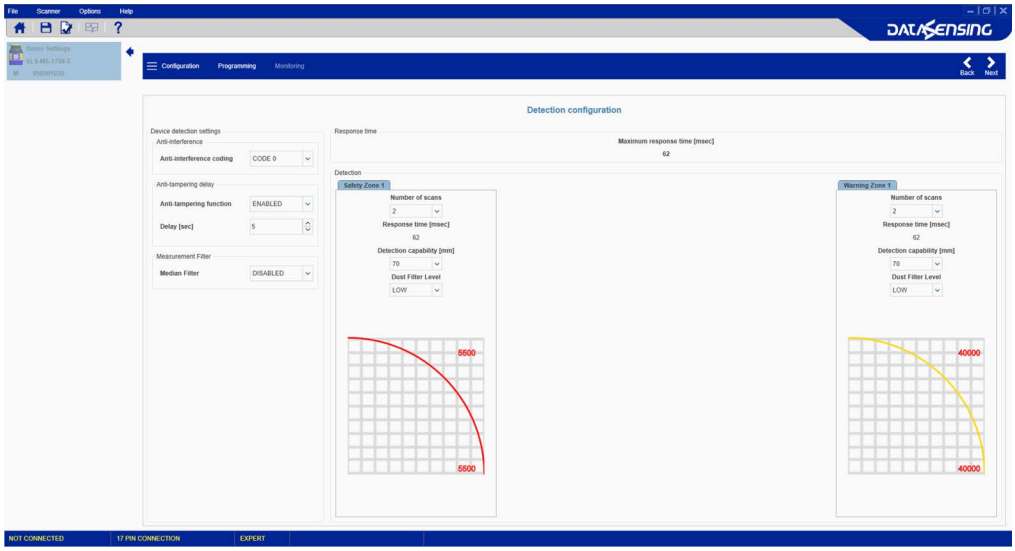
- **Detection mode (for 10m models only)**
  The Safety Detection Max Range is the maximum distance from the scanner, which can be drawn in the Safety Zones, with the largest detection capability. For further details, refer to the Instruction Manual, section “Detection Capability”.

NOTE: In addition to the level of airborne particles in the Laser Sentinel environment, some special lighting conditions also affect the detection sensibility. These conditions are:

- **high reflective backgrounds within 3 meters of the Safety Zone boundary,**
- **the presence of bright light within +/- 5 ° of the detection plane.**

The additional distance must be included in the Minimum Safety Distance calculations for these cases.

See the graphs in the Laser Sentinel Instruction Manual for these additional distances.

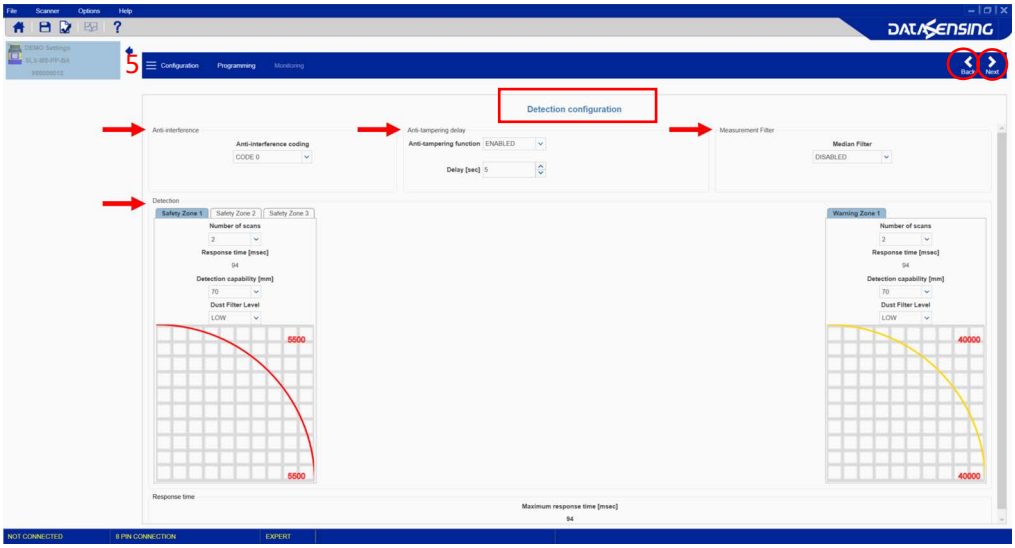


NOTE: The response time of the Cluster corresponds to the response time of the safety output of the device that goes into STOP and the network latency time. If the device in STOP is the master, no latency must be added; if the remotes are in STOP, then the latency time must be added to each device response time.

NOTE: Disabling the Anti-Tamper function or selecting a delay time longer than 5 s is an exception to the product standard that must be evaluated by personnel experienced in the functional safety of the application in order to verify the risks and take appropriate countermeasures.

Fieldbus 5.5m Models

The **Detection Configuration** page displays the following parameters:



Detection Parameters

- **Anti-interference coding:** This parameter changes the scan cycle time (default = 42ms for maximum of 4 Safety + Warning zones). This helps avoid interference among scanners working in the same environment.
- **Number of Scans:** Select the number of scans required to validate detection. This parameter has a direct impact on the **Response Time**, which is the time from when an object is detected in the Safety Zone to when the StatusSafetyZone bit of the Process Image is set to 0. The Response Time ranges from 94 to 2065 ms according to configuration. Check the chapter “Response Time and Scan Cycle Settings” of the Instruction Manual for further details.
- **Detection Capability:** The ability to detect an object of given dimensions within the detection zone. Objects greater than or equal to the selected value can be detected both for the Safety and Warning Zones.
- **Anti-Tampering Delay:** choose whether to enable the function and the delay time for its activation.
- **Measurement Filter:** a median filter on the measurement can be enabled or disable to have smoothed corners of the object detected.
- **Dust Filter Level** must be set according to different conditions specific to the application. In general, it is the sensibility to various levels of airborne particles that impact the response of the Laser Sentinel detection.
  -High Dust Filter Level is used in dirty environments to filter (ignore) detection of airborne particles from being confused with objects to detect. The Laser Sentinel is less sensitive to dust and therefore avoids shutting down the machinery unnecessarily.
  -Mid
  -Low Dust Filter Level is used in cleaner environments where airborne particles have little effect on object detection.

Dust Filter Level should be set to the lowest value that still allows the machinery to work without detections due to dust.

NOTE: In addition to the level of airborne particles in the Laser Sentinel environment, some special lighting conditions also affect the detection sensibility. These conditions are:

- **high reflective backgrounds within 3 meters of the Safety Zone boundary,**
- **the presence of bright light within +/- 5 ° of the detection plane.**

The additional distance must be included in the Minimum Safety Distance calculations for these cases.

NOTE: Disabling the Anti-Tamper function or selecting a delay time longer than 5 s is an exception to the product standard that must be evaluated by personnel experienced in the functional safety of the application in order to verify the risks and take appropriate countermeasures.

Profinet/Profisafe Configuration

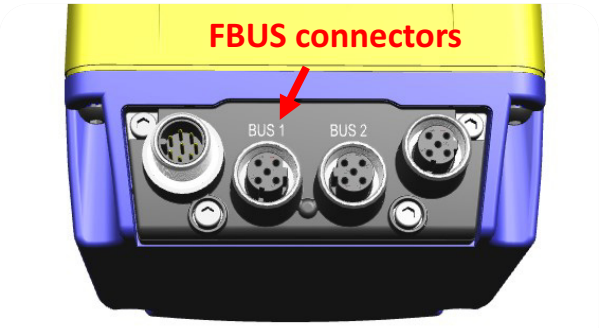
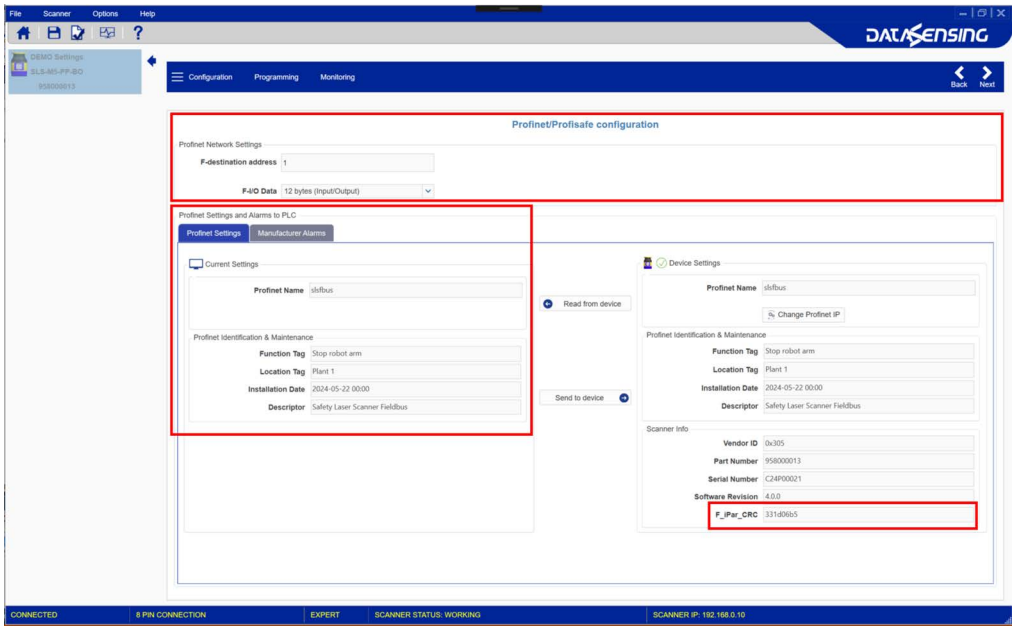


Abbildung 1 - Fieldbus connector

PROFINET/PROFIsafe configuration page shows the following parameters:



Profinet Network Settings:

- **F-destination address**: unique address for the SLS within the Fieldbus network.
- **F-I/O Data:** define the I/O cyclic data to be exchanged between the SLS and the controller (7 or 12 byte Input/Output). It is possible to select only output data (7 or 12 byte Output, from SLS to the controller). In this condition, any input cyclic data from the Controller is neglected and only one Zone Set is configurable.

Profinet/Profisafe Settings and Alarms to PLC

- **Profinet Settings:** define the settings of the SLS within the PROFINET network.
  -Profinet Name: Allows you to assign a PROFINET name that is unique in the network. The name may not be in use already for another device in the PROFINET network. It can only contain lowercase letters, numerals, and periods and hyphens. The DLsentinel stores the PROFINET name retentively in the device.

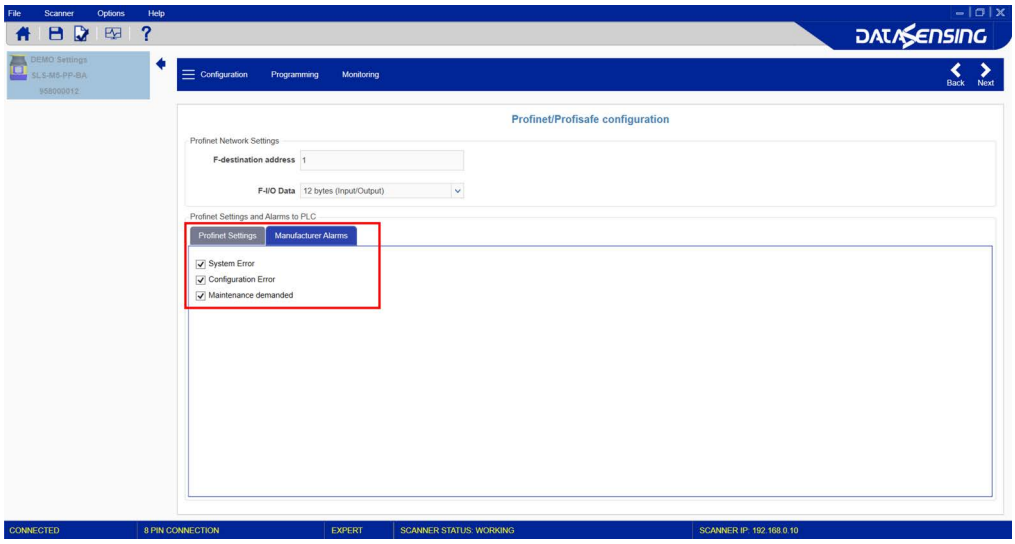


NOTE: The PROFINET name, F-Destination address and F-I/O data changes are valid only after a power cycle of the device.

-Function Tag, Location Tag, Installation Date, Descriptor: Identification&Maintenance parameter for the identification and maintenance function within the PROFINET network.
These parameters are not sent to device with the DLSentinel configuration but they can be read or sent directly from/to device through the related buttons.
If the values in the DLSentinel and the values in the device differ, you can read (Read from device) the values out from the SLS and adopt them in the DLSentinel. Alternatively, you can transmit (Send to device) values from the DLSentinel directly to the device.

- **Scanner Info:** the F_iPar_CRC stored in the device can be read. If a process image with check of F_iPar_CRC is used, the F_iPar_CRC value must be provided in the software configuration of the controller (e.g. PLC).
- **Manufacturer Alarms:** define which manufacturer specific Alarms shall be transmitted to the PLC within the process image (see Instruction Manual for details about the classification of alarms). If the respective check mark is set, the alarm, if present, is transmitted to the controller. Otherwise, if the respective mark is not set, the alarm, if present, is not transmitted to the controller, but the error is

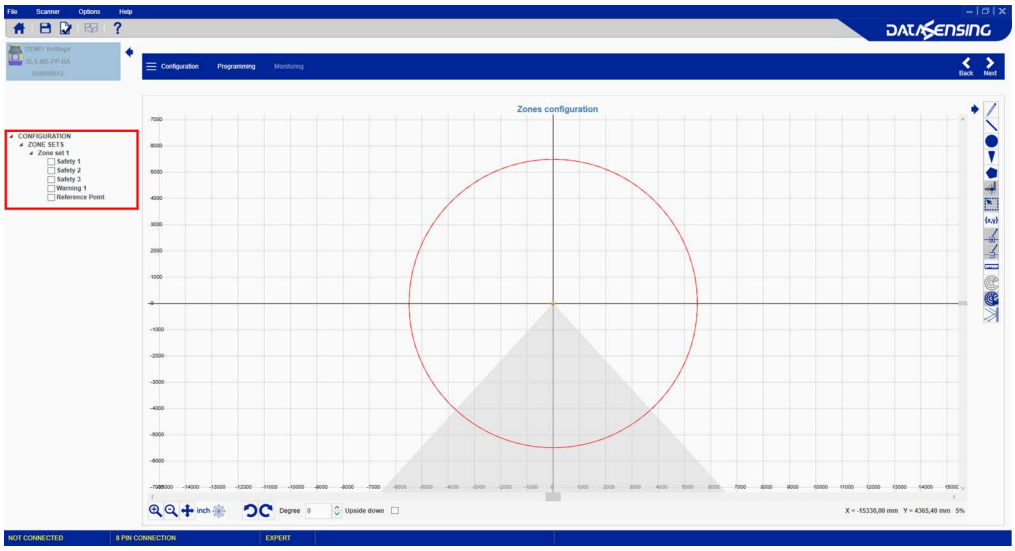
shown on the display and the device goes in an error state accordingly to the alarm occurred.



Zones Configuration

In the **Zones Configuration**, tools are provided to draw the Safety and Warning Zones as well as Reference Points. It is possible to select different shapes and different functions to manage the areas on the graph.

The panel on the left side allows selecting the areas to handle on the graph (Safety, Warning, or Reference Points) and managing them individually. See the paragraph on Selecting and Visualizing Areas on the Graph.

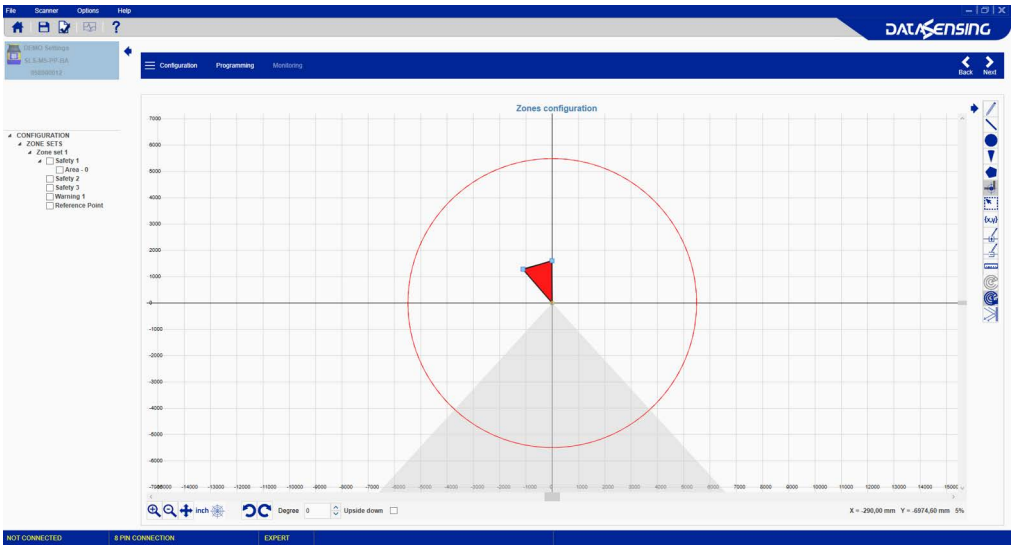


NOTE: This is the last step in defining the configuration. To complete configuration (load it onto the scanner, test it and Accept it), see Chapter 3, Programming and Monitoring Functions**.**

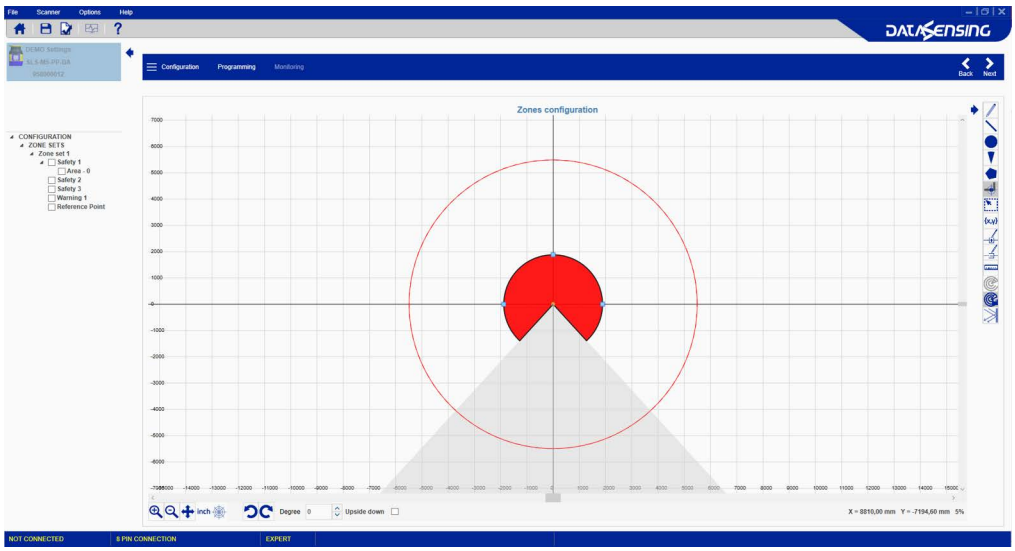
ICON	DESCRIPTION
	Click this button to free-hand draw an area by holding pressed the left button of the mouse and dragging it across the graph. Once finished, release the left button.



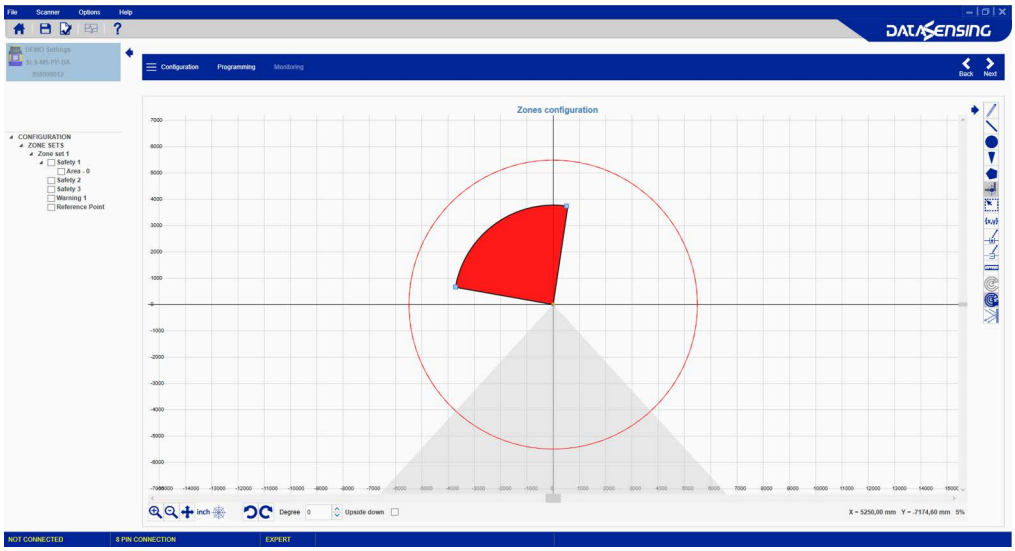
ICON	DESCRIPTION
	Click this button to draw a straight-edged area by holding pressed the left button of the mouse and dragging it across the graph. Once finished, release the left button.



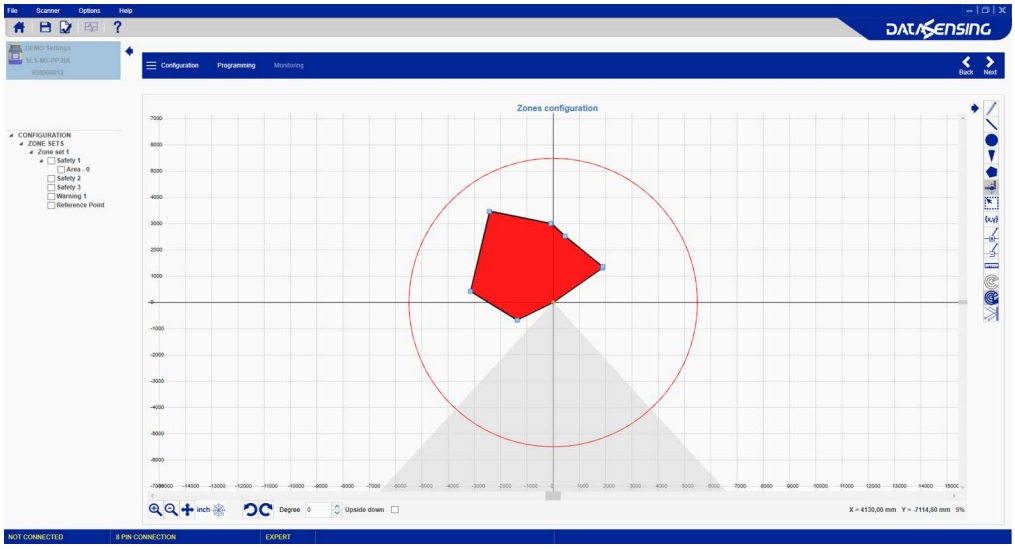
ICON	DESCRIPTION
	Click this button to draw a circle shaped area with its center at the scanner by holding pressed the left button of the mouse and dragging it across the graph. Once finished, release the left button.



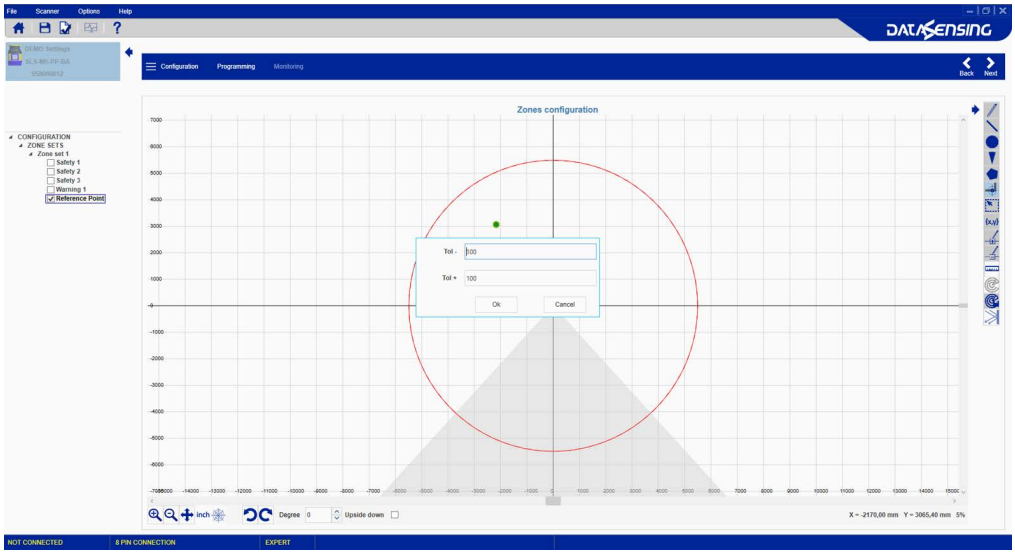
ICON	DESCRIPTION
	Click this button to draw an arc shaped area by holding pressed the left button of the mouse and dragging it across the graph. Once finished, release the left button.



ICON	DESCRIPTION
	Click this button to draw a polygon shaped area. Left-click and release the mouse button on a point in the graph and drag the mouse to draw the area. Left-click again to start the next edge of the polygon area. Once finished, double-click the left button.



ICON	DESCRIPTION
	Click this button to draw Reference Points.

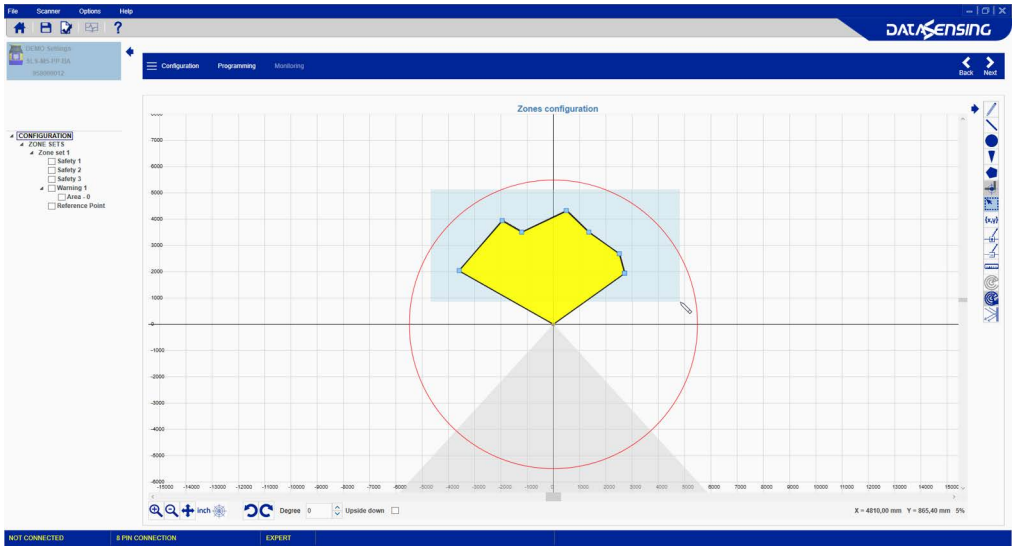


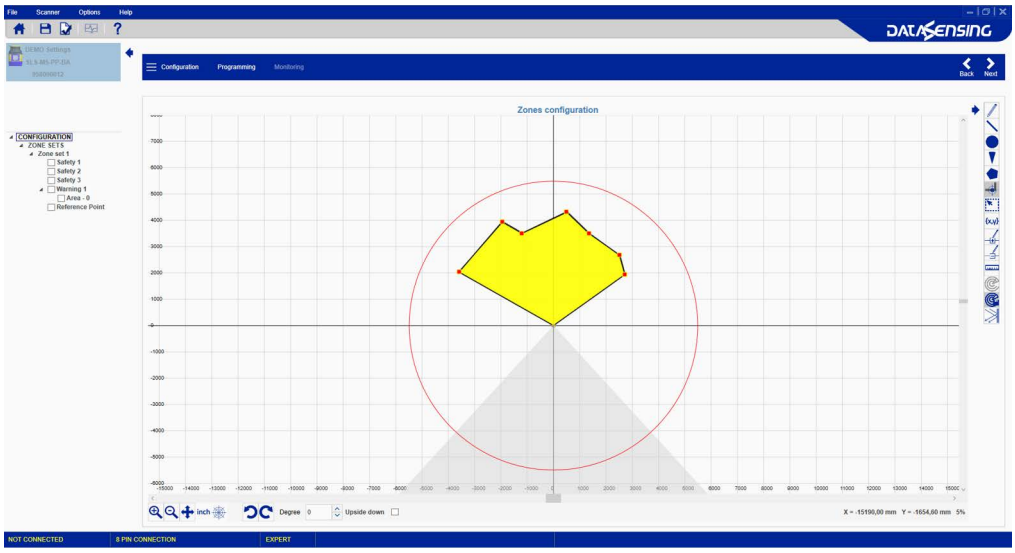
NOTE: To activate this function, select the REFERENCE POINT area on the left pane.

Specify the distance tolerance of the reference point from the scanner along the ray ("+" means farther from the scanner, "-" means closer to the scanner).

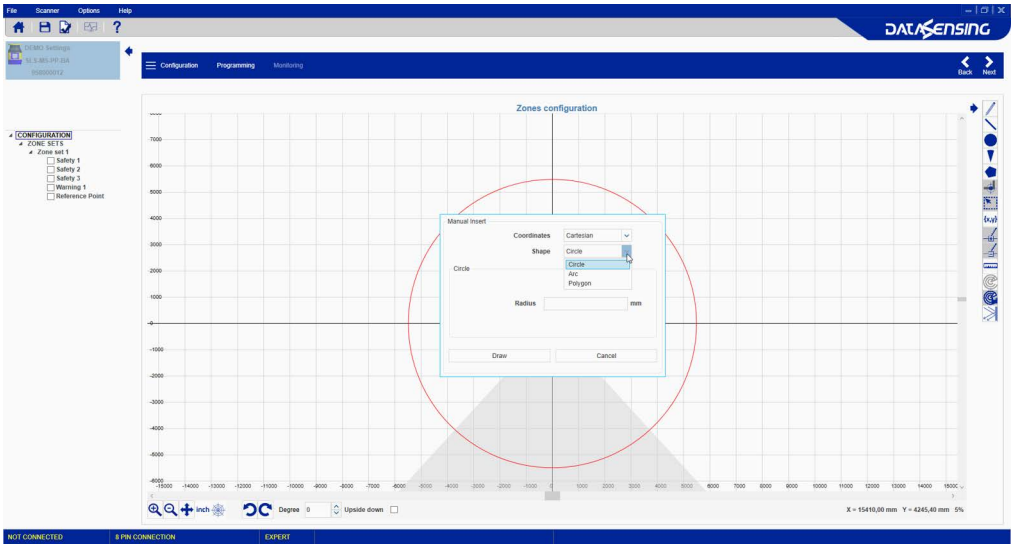
There must be a minimum of 3 and a maximum of 15 Reference Points. Reference points monitoring is a safety function used to monitor any change in position of the scanner, a protective structure or a moving structure located at the specified reference point. These structures either allow or prevent access to the dangerous area and are therefore outside the monitored Safety Zone. When the device detects a change in position at the Reference Points exceeding the specified tolerance, the safety function is activated. This function is required for Vertical applications. See the Laser Sentinel manual for more details.

ICON	DESCRIPTION
	Click this button to create a selection and resize a group of selected points. The points included in the selection will turn red. Drag and drop one of them to edit the whole group.





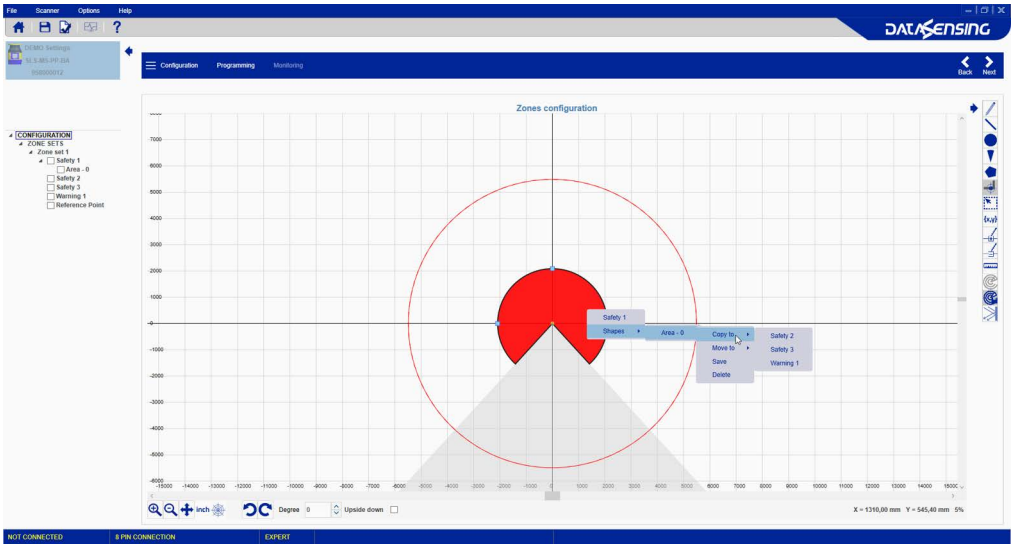
ICON	DESCRIPTION
	Click this button to draw an area by selecting the type of shape (circle, arc or polygon) and directly inserting the measurements and coordinates.



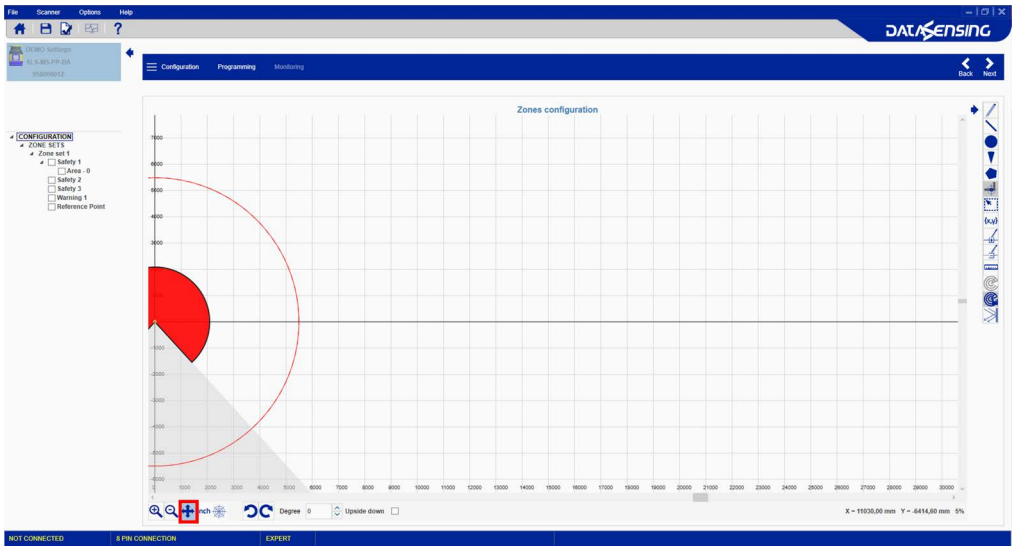
Acting on Drawn Objects

Once the area has been drawn, it is possible to access an edit menu by right-clicking on the selected area. This menu allows:

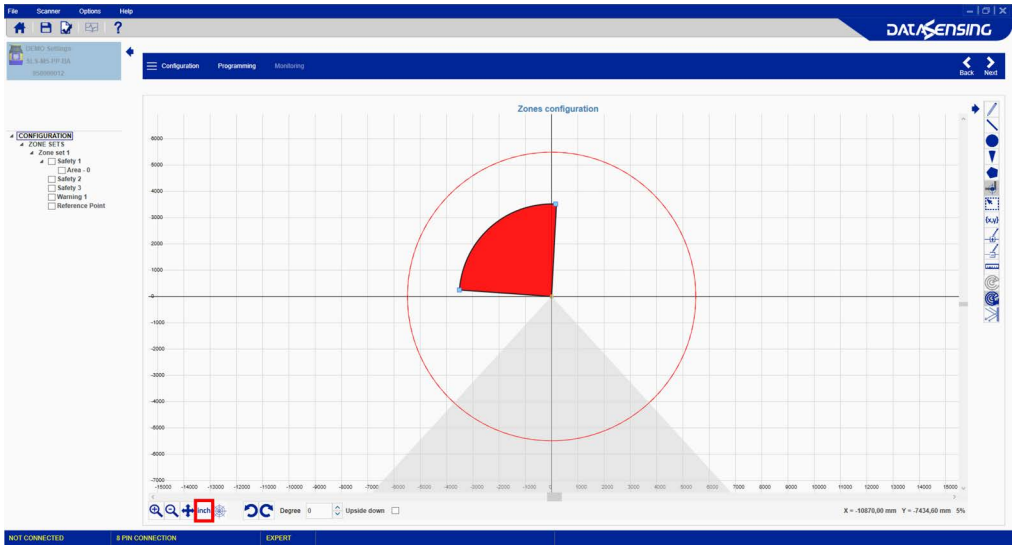
- copying a drawn object between Warning and Safety of the same Zone
- moving a drawn object between Warning and Safety
- of the same Zone
- saving a drawn object
- deleting a drawn object



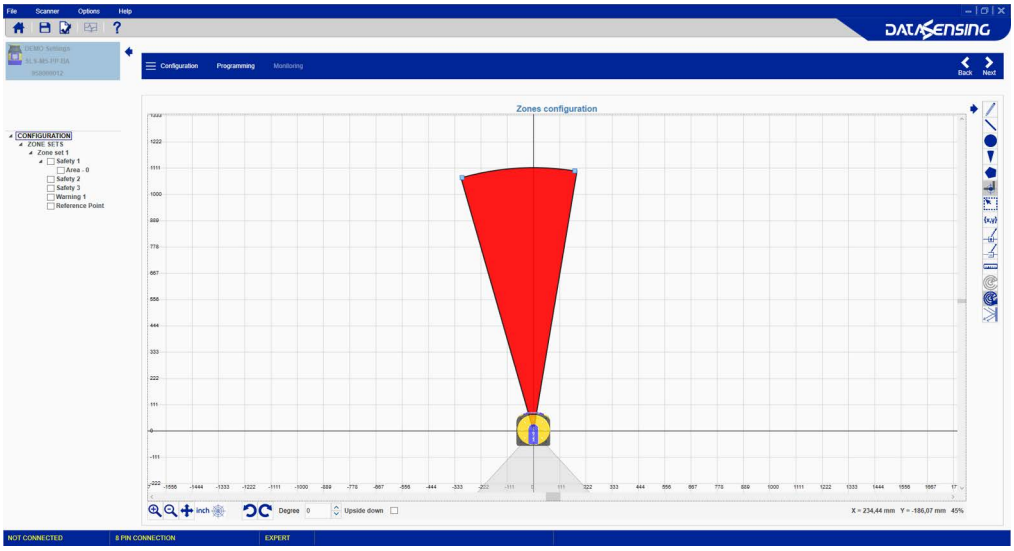
ICON	DESCRIPTION
	Click this button to move (drag) the graph in any direction. Once finished, re-click on the button.



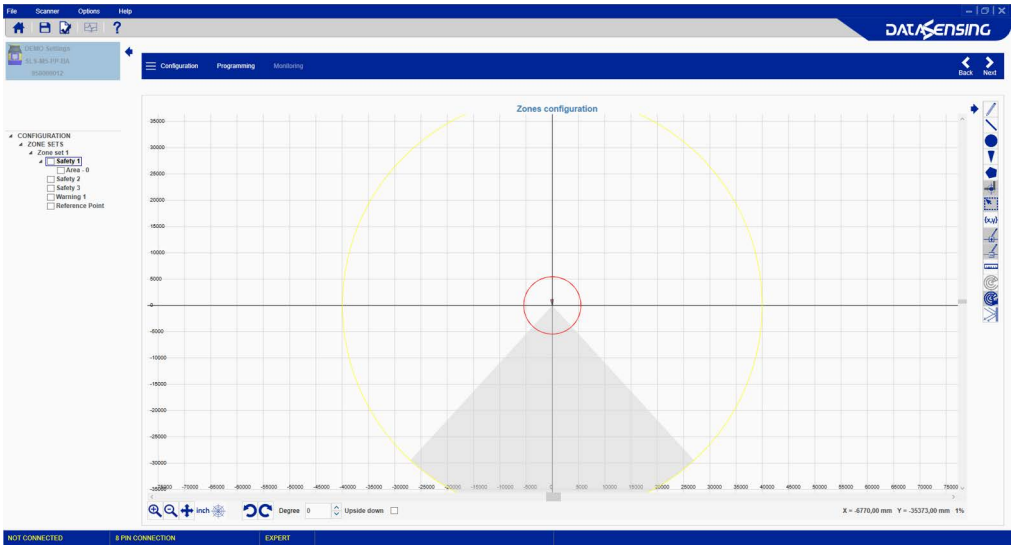
ICON	DESCRIPTION
	Click this button to toggle the graph unit of measurement between inches and millimeters.



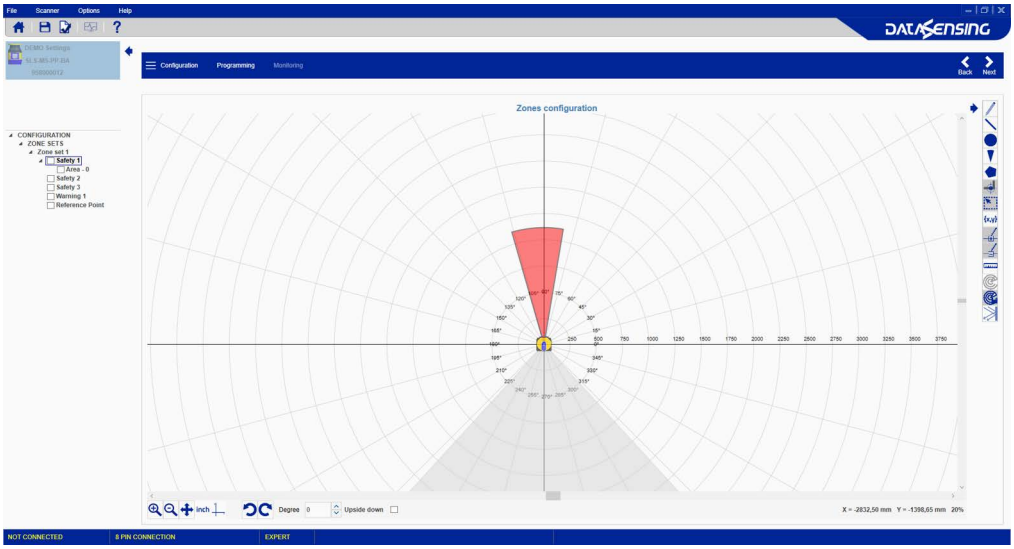
ICON	DESCRIPTION
	Click this button to zoom in on the graph. Clicking multiple times continues to zoom in.



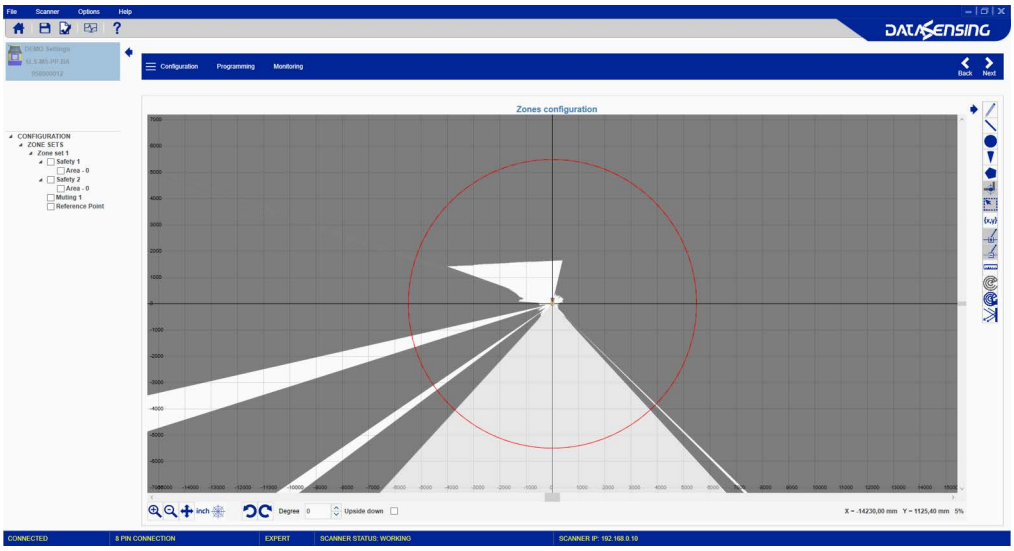
ICON	DESCRIPTION
	Click this button to zoom out on the graph. Clicking multiple times continues to zoom out.



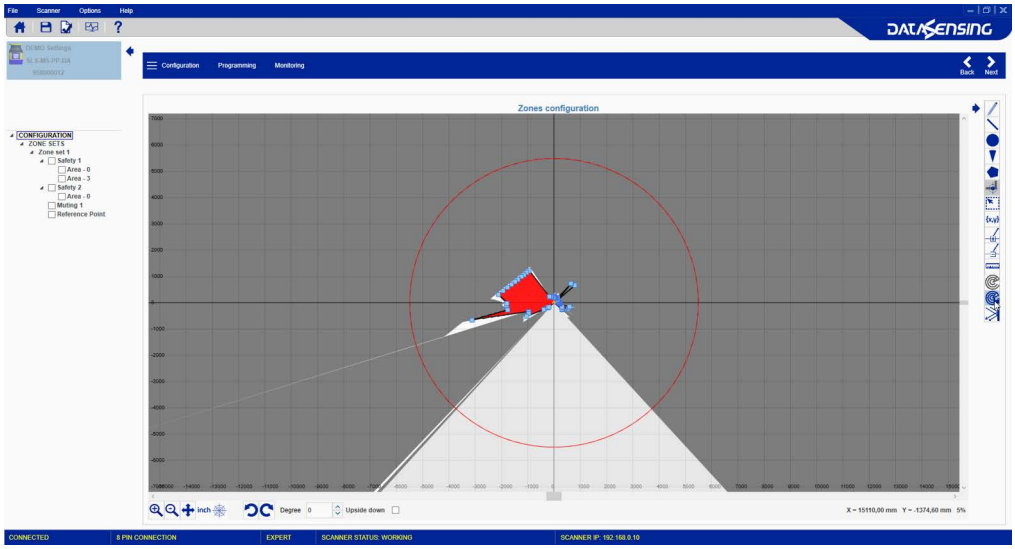
ICON	DESCRIPTION
	Click this button to toggle the graph coordinates between Cartesian and Polar.



ICON	DESCRIPTION
	Click this button to enter the Teach In feature. This function scans and shows the area surrounding the device. It displays a white area that is free from obstacles and therefore can be assigned to a safety or a warning zone. The grey areas are detected obstructions.



ICON	DESCRIPTION
	This function is the Teach In Area Assignment, to assign a zone type to the detected white area. After choosing Teach In, select the checkbox of either the safety zone or warning zone in the left pane and then click this button to assign it.





NOTE: Teach In and Draw Teach in Zone are only available if the device is online.

ICON	DESCRIPTION
	Click this button to add a new point to a shape. The new point must be inserted along the shape perimeter.



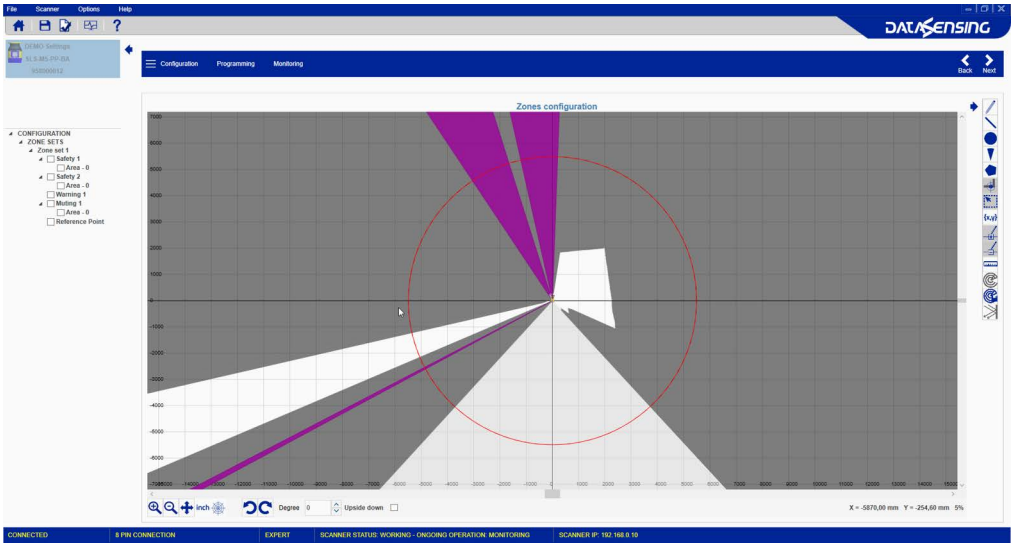
ICON	DESCRIPTION
	Click this button to remove a point from a shape.



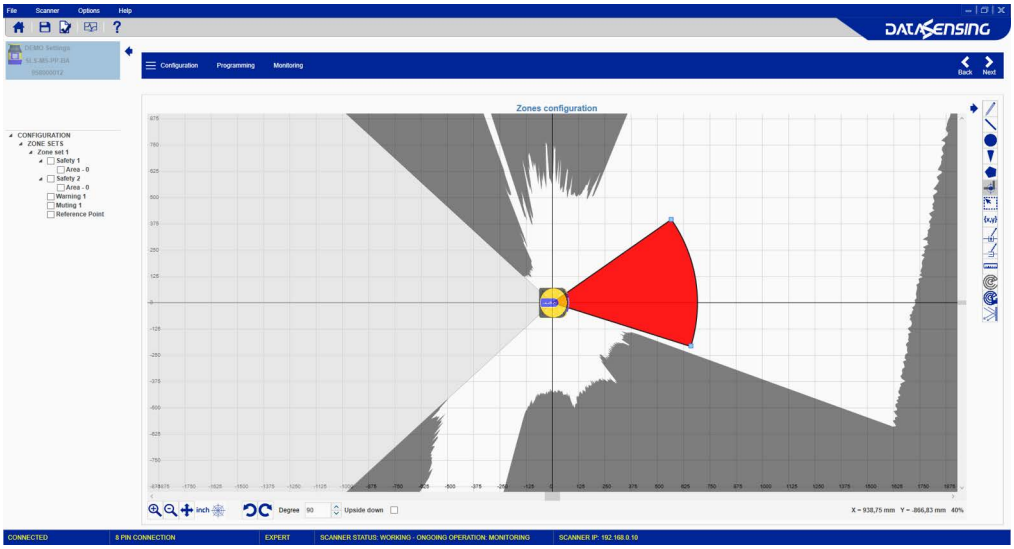
ICON	DESCRIPTION
	Click on a point on the graph and drag the cursor to measure the distance.



ICON	DESCRIPTION
	Click this button to show reflective objects. These will be shown in purple.



ICON	DESCRIPTION
	Click one of these buttons to rotate the view 45 degrees to the left or to the right.

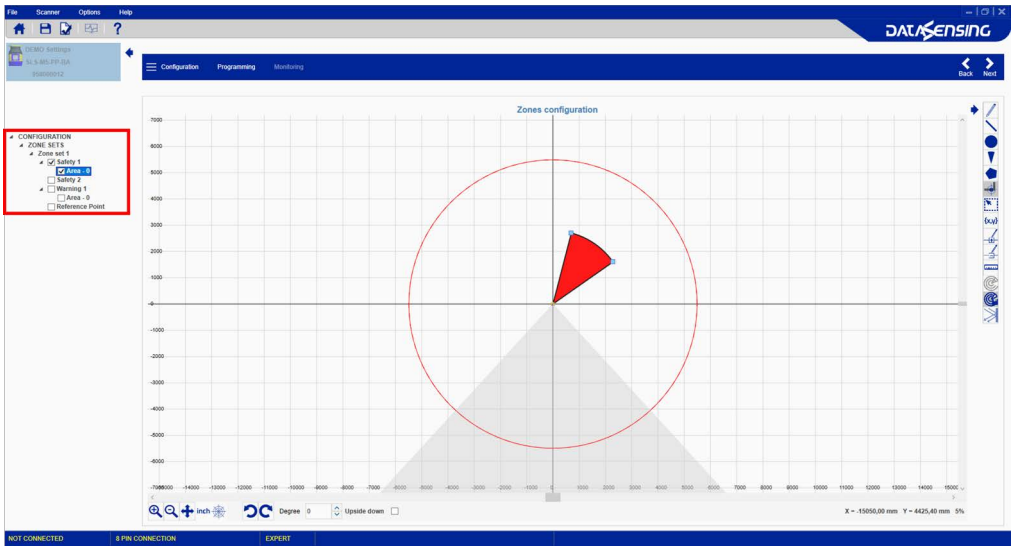




NOTE: It is also possible to flip the view by checking the "Upside down" box.

Selecting and Visualizing Areas on the Graph

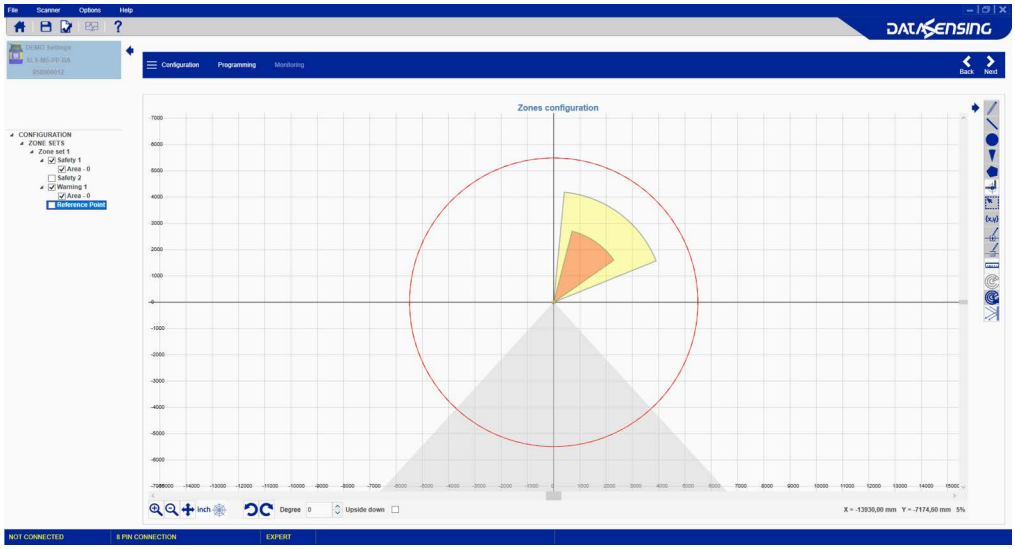
The panel on the left side allows selecting the areas to handle on the graph (Safety, Warning, Muting, or Reference Points) and managing them individually.



By clicking on the **label name** (outside the check box), it is possible to highlight a specific area, e.g. a Safety Zone or a Warning Zone.

By clicking on the **checkbox**, it is possible to select and edit a specific area.

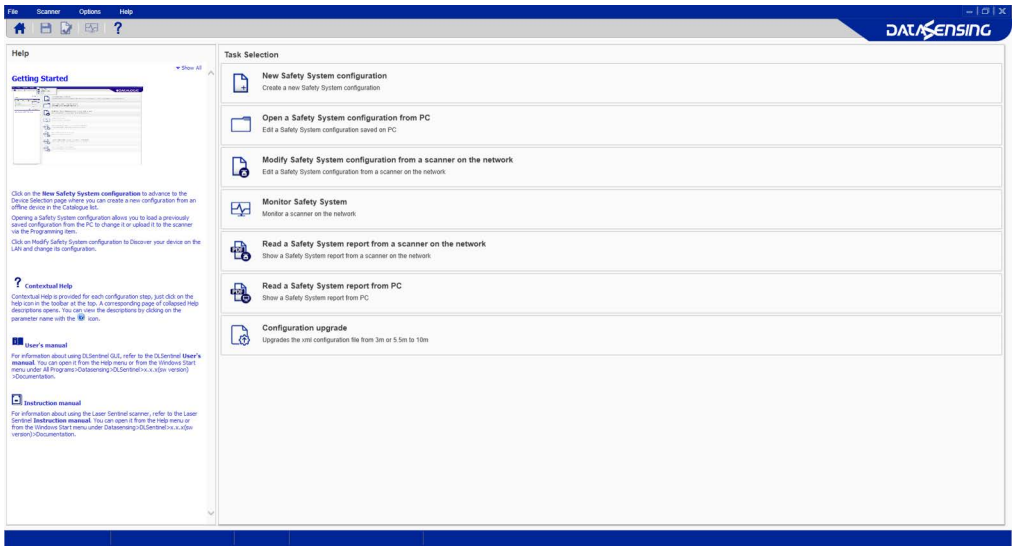
The combination of these selections allows you to show/hide the areas together or individually.



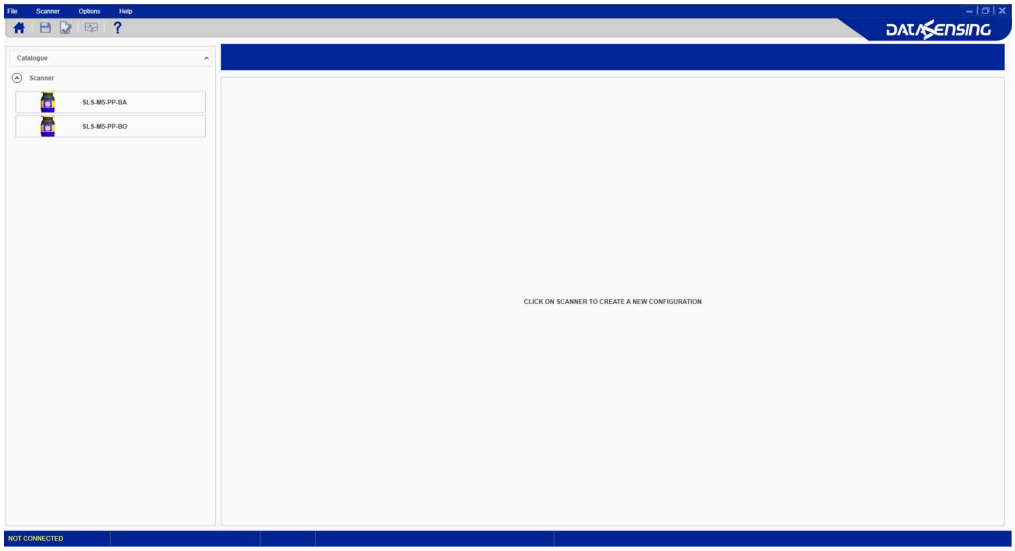
NOTE: This is the last step in defining the configuration. To complete configuration (load it onto the scanner, test it and Accept it), see Chapter 3, Programming and Monitoring Functions**.**

NEW CONFIGURATION SELECTION

1. Click on the New Configuration task to create a new configuration and save it on a local PC for upload to a device at a later time (Offline Configuration).



2. Click on the device in the catalogue list to load it into the task area.

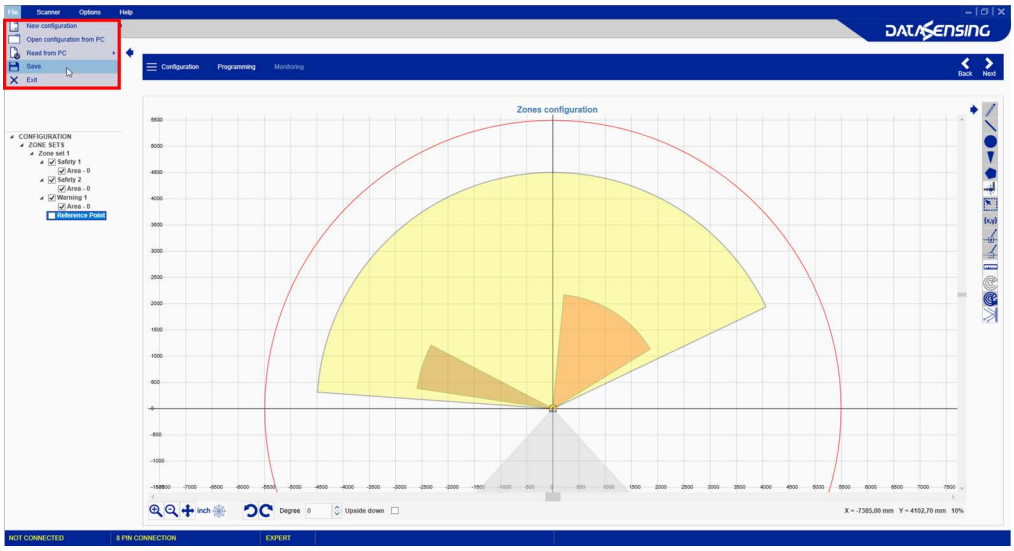


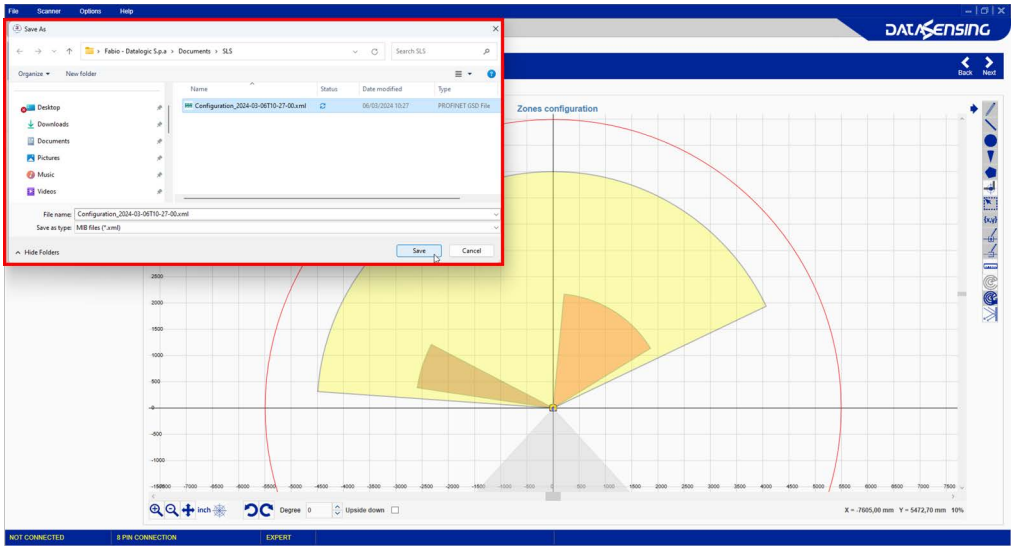
3. Click on the right-pointing arrow on the upper right side on the main panel to open the offline configuration. You can now create your configuration and save it on your PC. See the subparagraphs under "Modify Safety System Configuration from a Scanner on the Network" on page 16 for configuration details.

4. Save the configuration on a file on your PC. See "Save the Configuration" on page 58.

SAVE THE CONFIGURATION

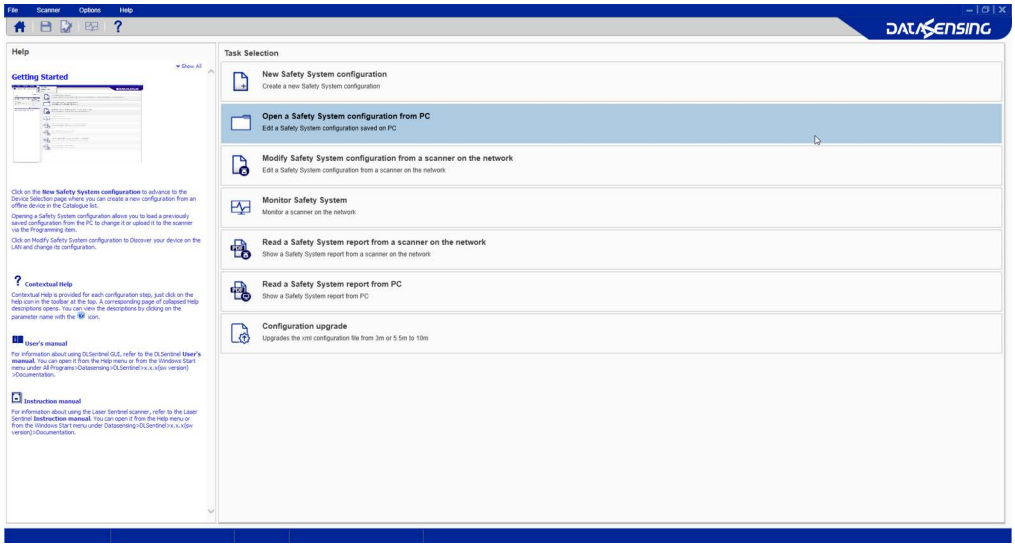
Once the configuration is done, it is possible to save it on the PC by clicking on File > Save.



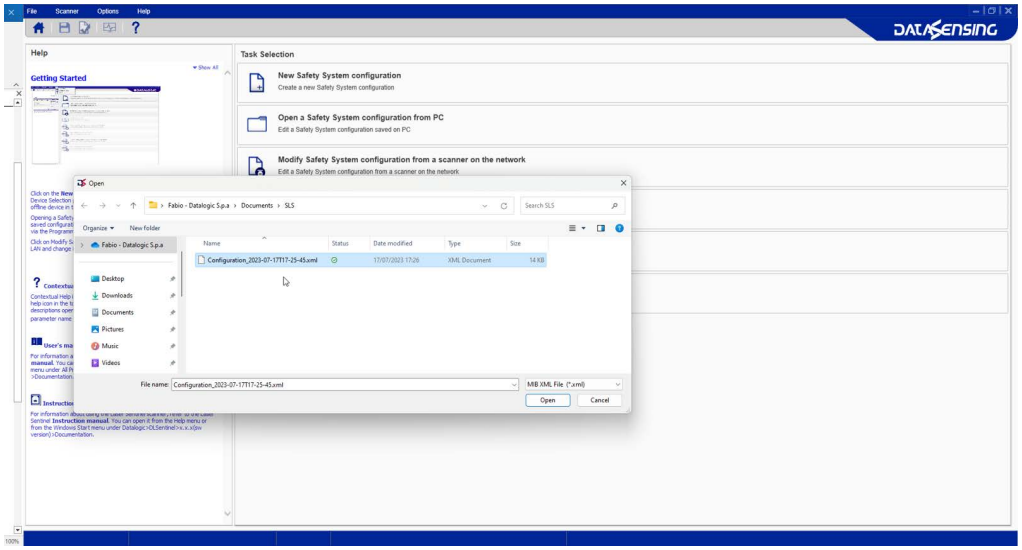


OPEN A PREVIOUSLY SAVED SAFETY SYSTEM CONFIGURATION FROM PC

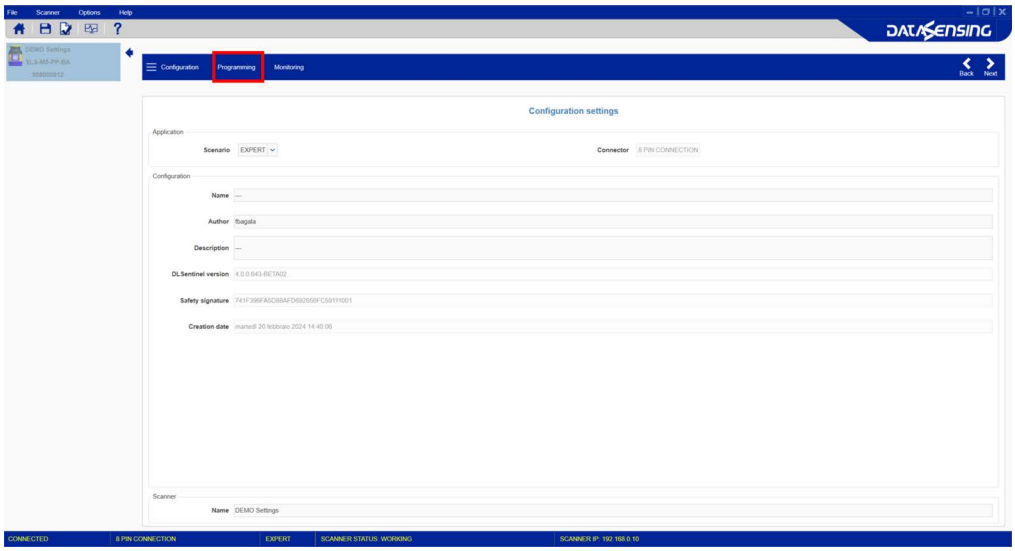
1. Click on the Open a Safety System Configuration from PC task to open and upload a previously saved configuration onto a device.



2. Select the Configuration File to open.



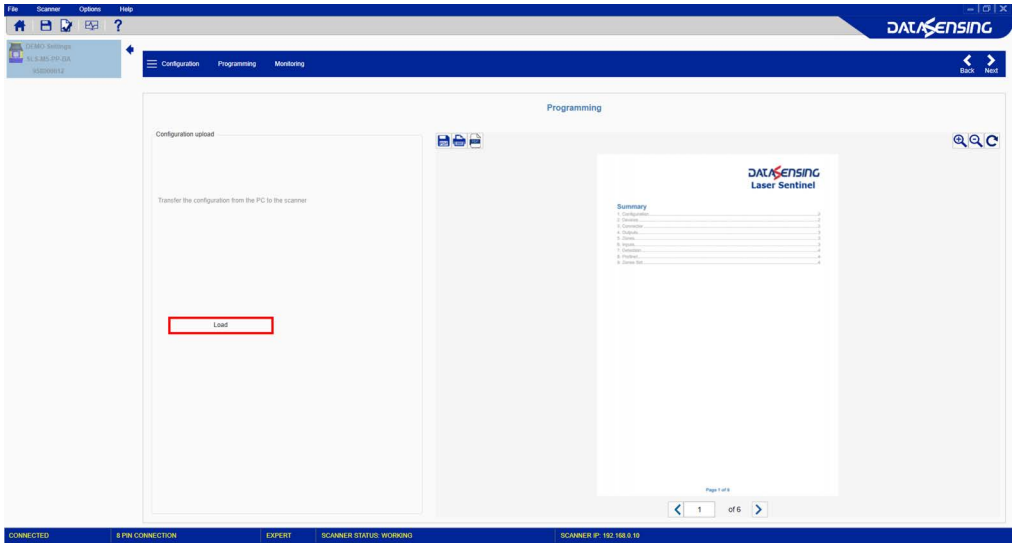
3. Once the configuration is open, click on the Programming item. The Discovery procedure will discover the connected device.



4. Click on the device to load it into the task area.

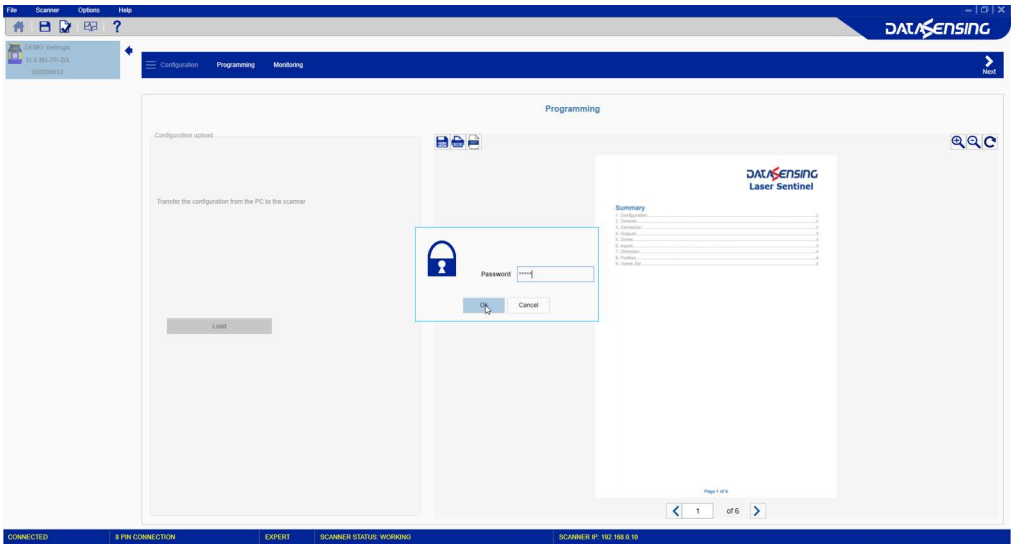


5. Click on the white right-pointing arrow on the upper right side on the main panel. The Programming page will appear. Here you can **Load** the selected configuration to the scanner.

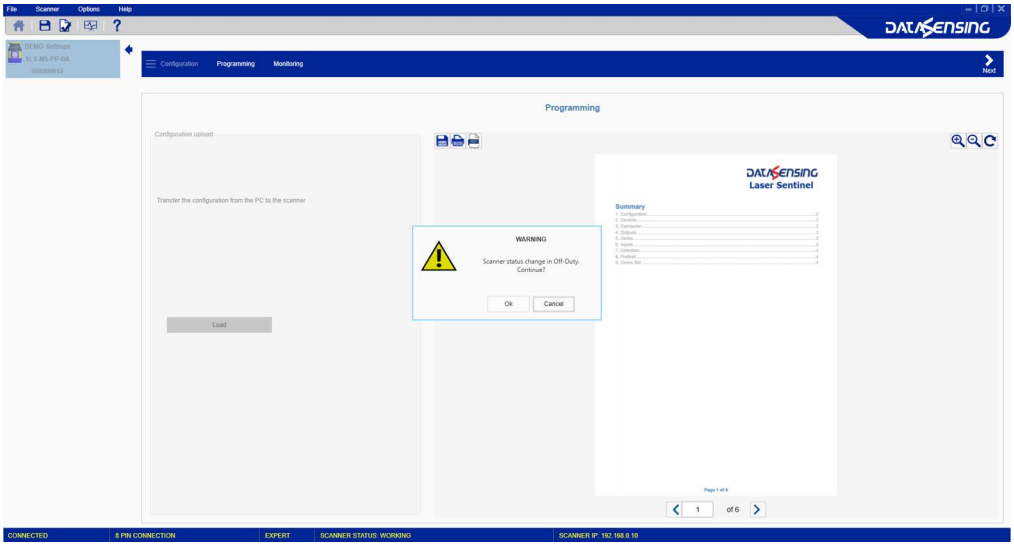


First the configuration will be validated and then you will be prompted to enter the password to change the current configuration to the new one.

6. Enter the password and click OK.



7. The scanner status will now switch to Off-Duty and the user is prompted to continue to load the new configuration onto the scanner.



8. Click on the **Monitoring** item to verify the configuration. See "Monitoring And Controller Simulator (Fieldbus Models)" on page 68.

9. Then click on Programming to **Accept** the new configuration and finalize it. See "Programming" on page 62.

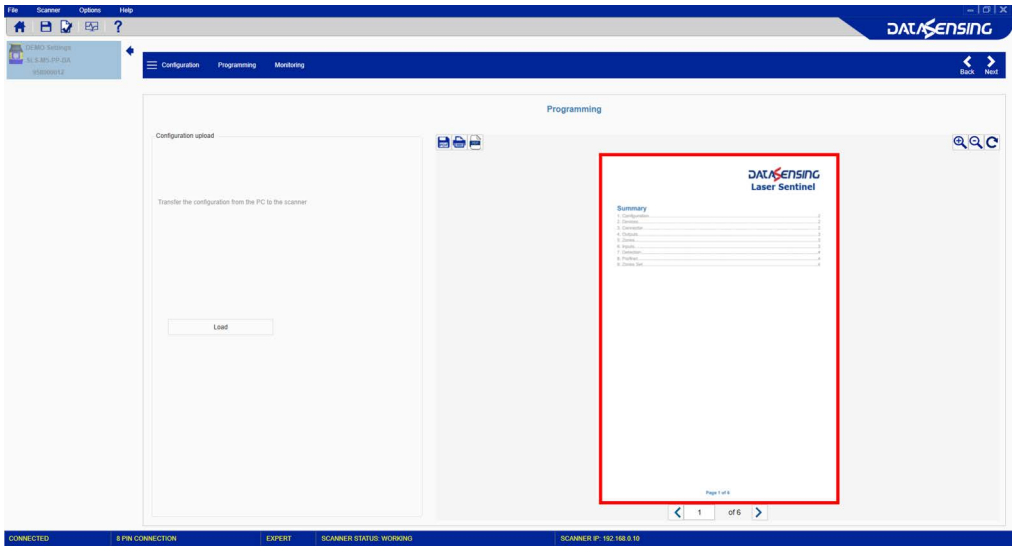
CHAPTER 3
PROGRAMMING AND MONITORING FUNCTIONS

PROGRAMMING

Programming is a DLSentinel function that allows uploading a configuration to the device, generating the Safety Report and validating the uploaded configuration (after testing it through the **Monitoring** function, refer to "Monitoring And Controller Simulator (Fieldbus Models)" on page 68).

The steps below show a proper Programming procedure:

1. Once the configuration has been created or loaded from the PC, enter the **Programming** function.
   A **Report** file is generated by DLSentinel.

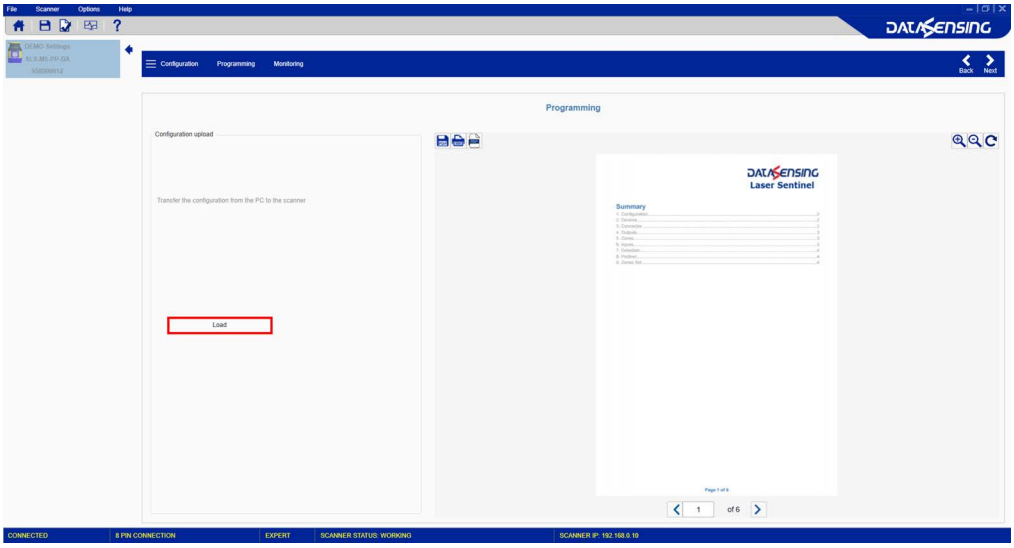


The Safety Report is a file that sums up all the parameters selected for a configuration and is generated by DLSentinel after uploading a configuration. The Report file is displayed on the right side of the panel. It is possible to save it as a PDF file and print it.

Make sure to read the Safety Report and check all the selected parameters.

NOTE: The Safety Report displays the new and the previously used parameters (marked in red).

2. In the **Configuration Upload** section, click on the **Load** button to upload the configuration from the PC to the device. First the configuration will be validated and then you will be prompted to enter the password to change the current configuration to the new one.



While uploading the configuration onto the device, Laser Sentinel will enter the Off status.

For Enhanced models once the new configuration is uploaded, Laser Sentinel will display an icon with a white background like the one below indicating that the configuration is pending acceptance by the user



Abbildung 1 - Example Pending Configuration Acceptance Icon displayed (for Enhanced models).

For Fieldbus models, In the OFF status, the connection to the controller (e.g.PLC) is not guaranteed.

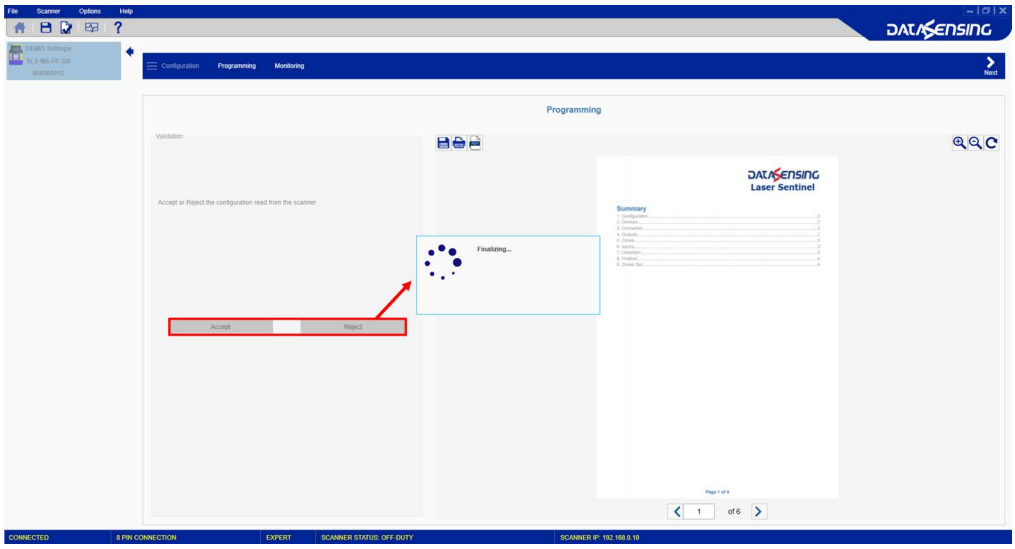
Once the new configuration is uploaded, Laser Sentinel will display an icon with a white background like the one below indicating that the configuration is pending acceptance by the user if the Process Image is set as only output (7 Bytes (SLS output) or 12 Bytes (SLS output)).
For Process Image Input/Output, the WAIT FOR INPUT icon is show on the display and the behaviour of the device can be tested by using the Controller Simulator in the “Monitoring” section.



Abbildung 2 - Example Pending Configuration Acceptance Icon displayed (for Fieldbus models).

3. Test the configuration functioning by entering **Monitoring**. See "Monitoring And Controller Simulator (Fieldbus Models)" on page 68.

4. After testing it and checking the Report, **Accept** or **Reject** the configuration in the **Validation** section.



After **Acceptance**, the configuration will be finalized on the device. Laser Sentinel will display an icon with a black background like the one below indicating that the configuration has been accepted by the user.



Abbildung 3 - Example of configuration accepted icon displayed (for Enhanced models).



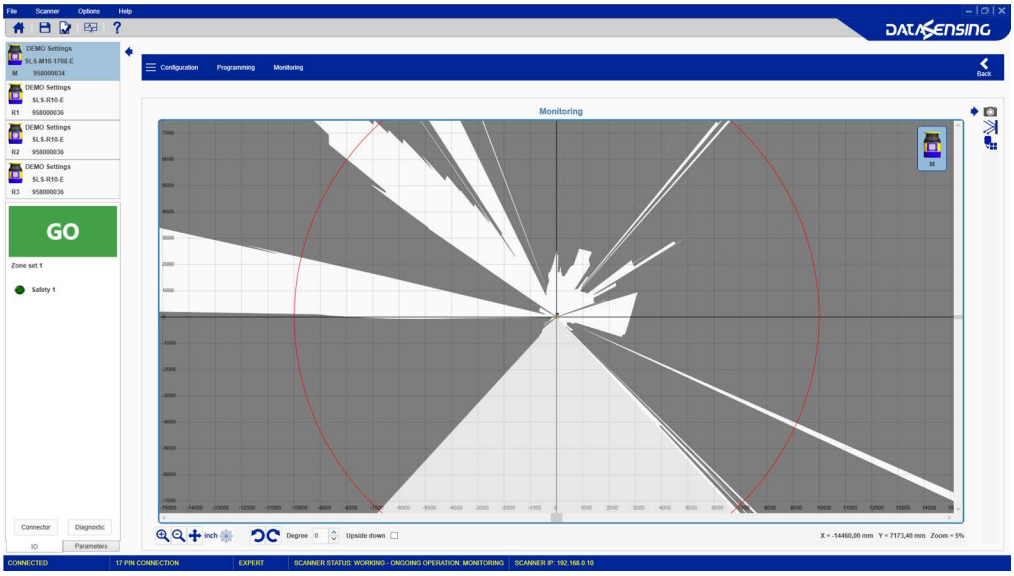
Abbildung 4 - Example of configuration accepted icon displayed (for Fieldbus models).

WARNING: By validating the configuration, you take on responsibility for the created configuration and accept any hazards due to configuration errors.

NOTE: If you Reject the new configuration, the previous configuration will be finalized on the scanner.

MONITORING (ENHANCED MODELS)

Monitoring is a DLSentinel function that allows you to check the proper functioning of the created configuration by monitoring the current working area. You have access to this function only by selecting an online device.



With the Monitoring function, the following information can be checked:

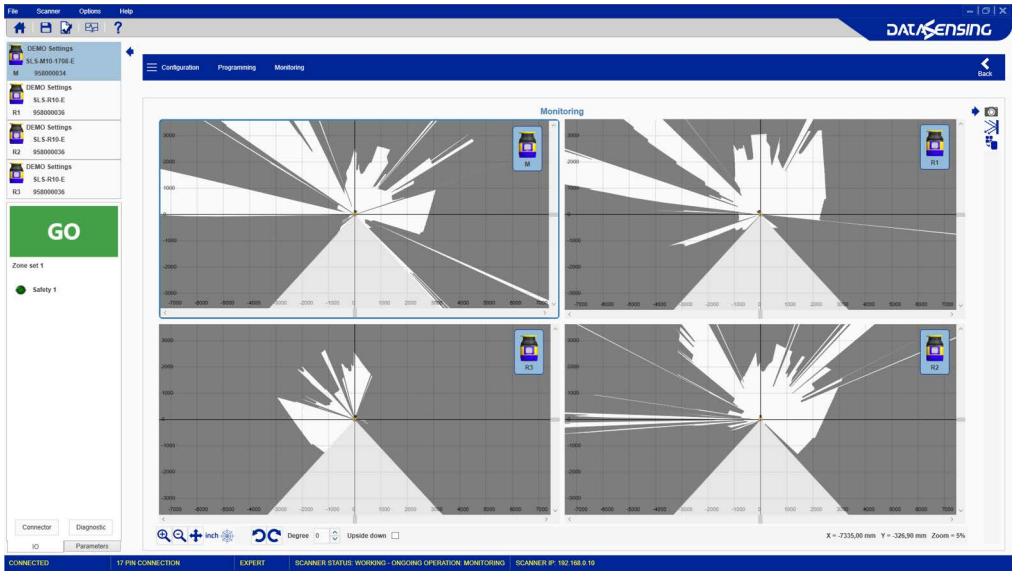
- The OSSDs GO/STOP status.
- The connector pin assignment, colors and functions.
- If the Laser Sentinel detects an object in the Safety and Warning zones.
- Any diagnostic errors that caused the OSSDs Off status.
- The surrounding space detected by the device in real time.
- The switching among the Zone Sets.
- The selected Parameters



On the panel at the lower left corner, DLSentinel shows the device status (if it is correctly functioning). It is also possible to view some parameters, e.g. the pin assignment, the response time the speed encoder if encoders are connected.

NOTE: If Monitoring is selected before uploading a new configuration, it displays the previous configuration and the present OSSDs and Warning status.

For devices with SW release 5.0.0 or newer, when a cluster of devices is connected, it is possible to toggle between a single device view and a full cluster view. The view can be modified by pressing the button on the right side of the screen.



The table below shows the Monitoring menu.

ICON	DESCRIPTION
	Click this button to save the Monitoring info in a text file (.txt).
	Click this button to show reflective objects. These will be shown in purple.
	Click this button to zoom in on the graph. Clicking multiple times continues to zoom in.
	Click this button to zoom out on the graph. Clicking multiple times continues to zoom out.
	Click this button to move (drag) the graph in any direction. Once finished re-click on the button.
	Click this button to toggle the graph unit of measurement between inches and millimeters.
	Click this button to toggle the graph coordinates between Cartesian and Polar.
	Click one of these buttons to rotate the view 45 degrees to the left or to the right.
Upside down	Check this box to flip the view.
	Click this button to switch from single device view to cluster view.
	Click this button to switch from cluster view to single device view.



NOTE: If Errors are detected, the monitoring function displays a popup window with all the detected errors. The device will switch into a Lock status.



NOTE: To go back to Programming, click on the Programming item or on the white left-pointing arrow.

MONITORING AND CONTROLLER SIMULATOR (FIELDBUS MODELS)

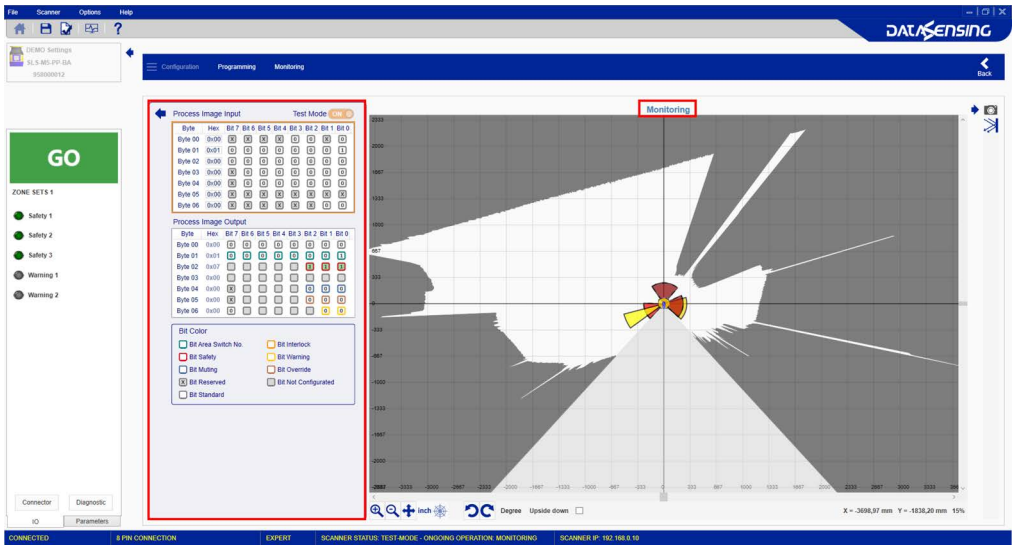
Monitoring is a DLSentinel function that allows you to check the proper functioning of created configuration by monitoring the current working area.

Controller Simulator is a DLSentinel function that allows to simulate the fieldbus protocol without the use of a controller (e.g. PLC). It is possible to monitor the cyclic data sent by the SLS and to send data to the SLS as if the DLSentinel were a fieldbus controller.

Functions activation (e.g. zone set switching, muting, etc..) by Controller Simulator, when enabled, excludes any interaction with the real controller. Any input received by the controller will be neglected as long as the Controller Simulator is enabled.

WARNING: The use of Controller Simulator is recommended for test and simulate the configuration only. It is not recommended while the Laser Sentinel is communicating with a real controller (e.g., PLC).

The access to these two functions is allowed only by selecting an online device.



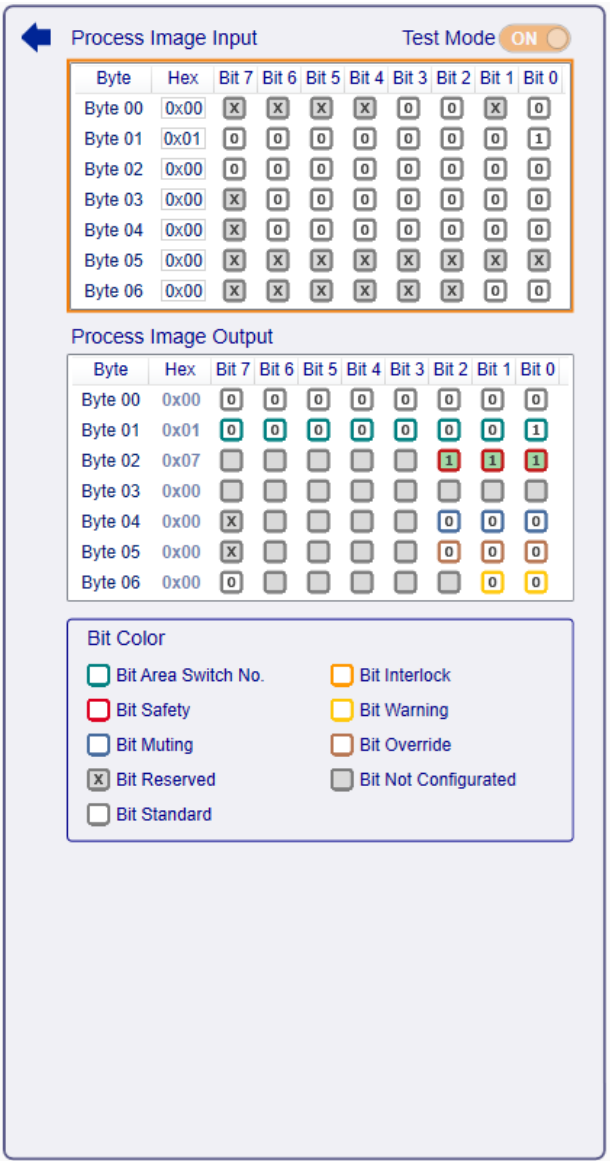
With the monitoring function, the following information can be checked:

- Status of Safety Zone (GO/STOP).
- The connector pin assignment, colors and functions.
- If the Laser Sentinel detects an object in the Safety and Warning zones.
- Any diagnostic errors.
- The surrounding space detected by the device in real time.
- The switching among the Zone Sets.
- The selected Parameters.



On the panel at the lower left corner, DLSentinel shows the device status (if it is correctly functioning). It is also possible to view some parameters, e.g., the pin assignment, the response time. The virtual LEDs of the configured zones (Safety, Warning) reply to the behavior of the virtual LEDs shown in the display of the device (for detailed information, please see the Instruction Manual).

The Controller Simulator on the left side of the detection area of the Laser Sentinel shows the following areas:



1. Test mode - The Controller Simulator can be activated by switching the slider button to On. During the Acceptance phase of a new configuration, the Test Mode is always On and cannot be deactivated.

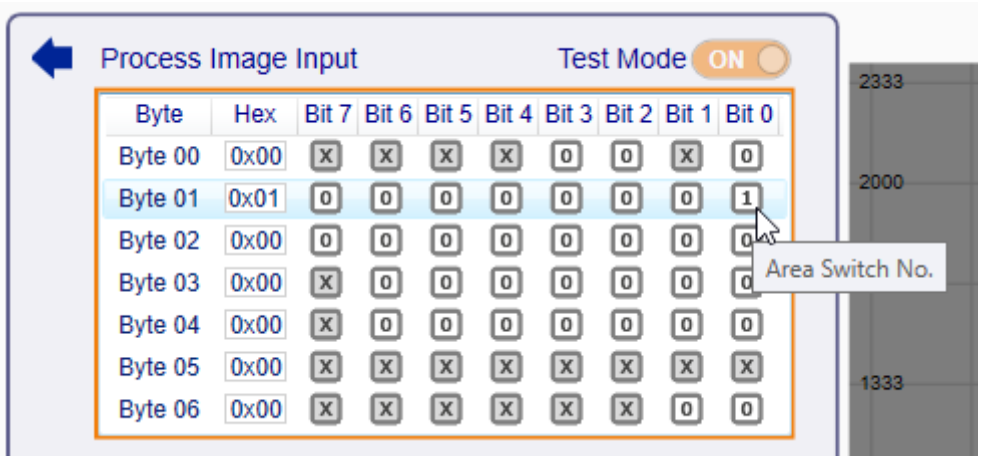
2. Process Image Input - Presents the bitmap of the process image input (sent by the Controller to Laser Sentinel) according to the configuration (e.g., 7 Bytes Input/ Output) defined in the Profinet/Profisafe section.

3. Process Image Output - Presents the bitmap of the process image output (sent by the Laser Sentinel to Controller) according to the configuration (e.g., 7 Bytes Input/Output) defined in the Profinet/Profisafe section.

4. Editable Input Bytes - Presents the editable fields (in hexadecimal format) of the process image input to simulate the controller data sent to the Laser Sentinel

5. Legend - A color legend of the Process Image bitmap

To facilitate the interpretation of the process image, the user can move the cursor to the interested bit and a tooltip will show the meaning of the selected bit.



By activating the test mode, the user can edit the Input Bytes to test some functions of the device before the integration in a fieldbus network with a real controller (e.g., a PLC).

The main functions that can be simulated are:

- Wink.
- Zone set activation (“Area Switch No.”).
- Restart of the safety zone configured with manual restart (“Restart Safety Zone X”).
- Muting activation for the safety zone configured with muting (“Muting Activation Zone X”).
- Override activation for the safety zone configured with override (“Override Activation Zone X”).

WARNING: Shut-off function, Reset With and Without Network cannot be activated when using the Controller Simulator.

NOTE: It is possible to write the reserved bits also, but this action has no effect on the Laser Sentinel.

NOTE: If Monitoring is selected before uploading a new configuration, it displays the previous configuration.

The table below shows the Monitoring menu.

ICON	DESCRIPTION
	Click this button to save the Monitoring info in a text file (.txt).
	Click this button to show reflective objects. These will be shown in purple.
	Click this button to zoom in on the graph. Clicking multiple times continues to zoom in.
	Click this button to zoom out on the graph. Clicking multiple times continues to zoom out.
	Click this button to move (drag) the graph in any direction. Once finished re-click on the button.
	Click this button to toggle the graph unit of measurement between inches and millimeters.
	Click this button to toggle the graph coordinates between Cartesian and Polar.
	Click one of these buttons to rotate the view 45 degrees to the left or to the right.
Upside down	Check this box to flip the view.

NOTE: If Errors are detected, the monitoring function displays a popup window with all the detected errors. The device will switch into a Lock status.

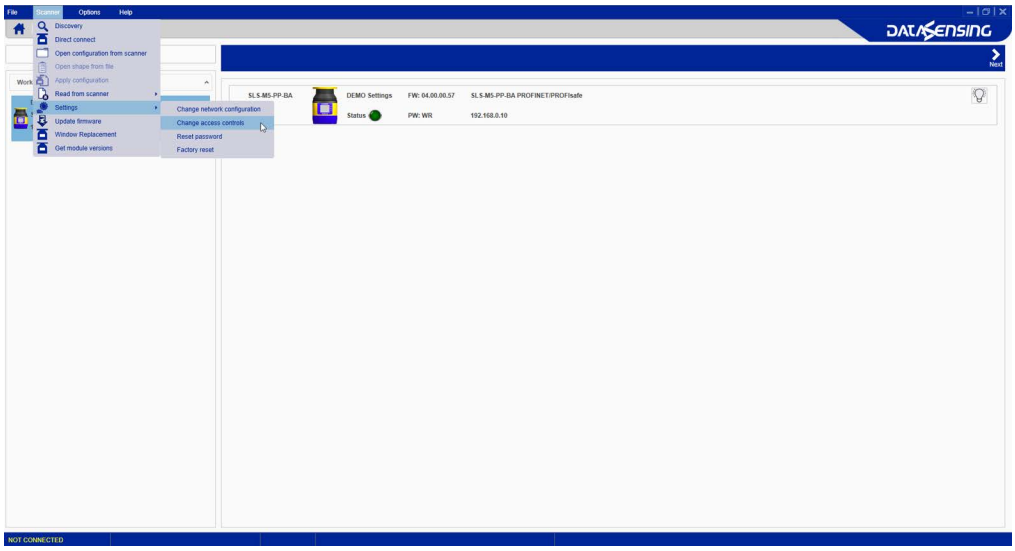
NOTE: To go back to Programming, click on the Programming item or on the white left-pointing arrow.

APPENDIX A
ACCESS CONTROL

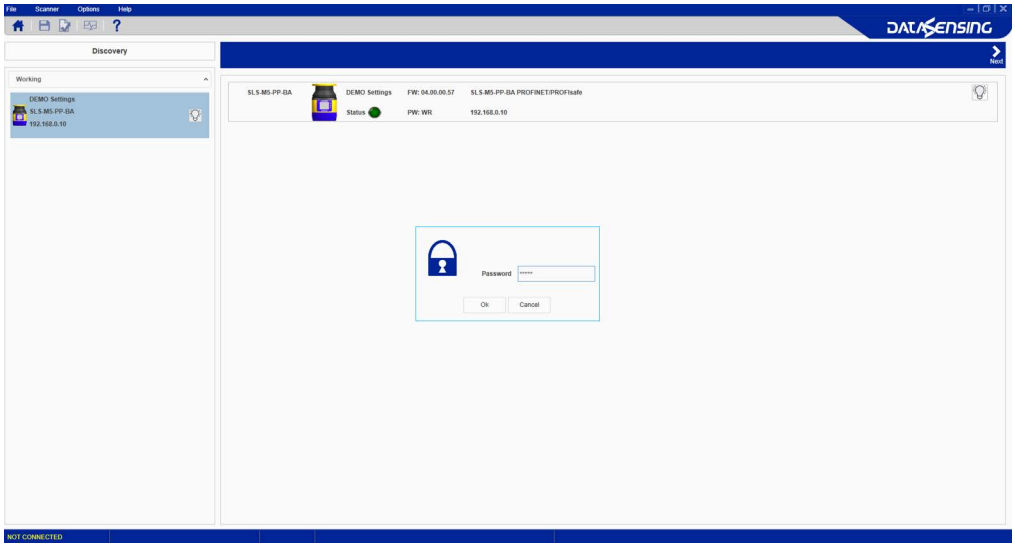
ASSIGN OR CHANGE PASSWORDS

To assign or change the password, the device must be connected (Online).

1. In the DLSentinel Device Selection, click on Scanner and select Settings > Change Access Controls.

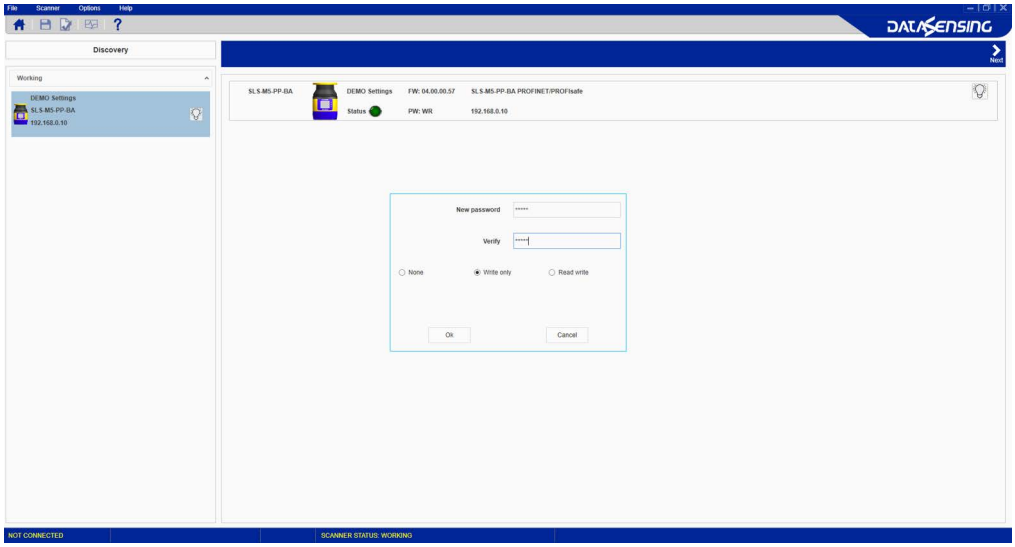


2. To change or assign the password or access type, you must enter the current one. Here the user must enter the DLSentinel password to proceed (default password “**admin**”, if not changed).

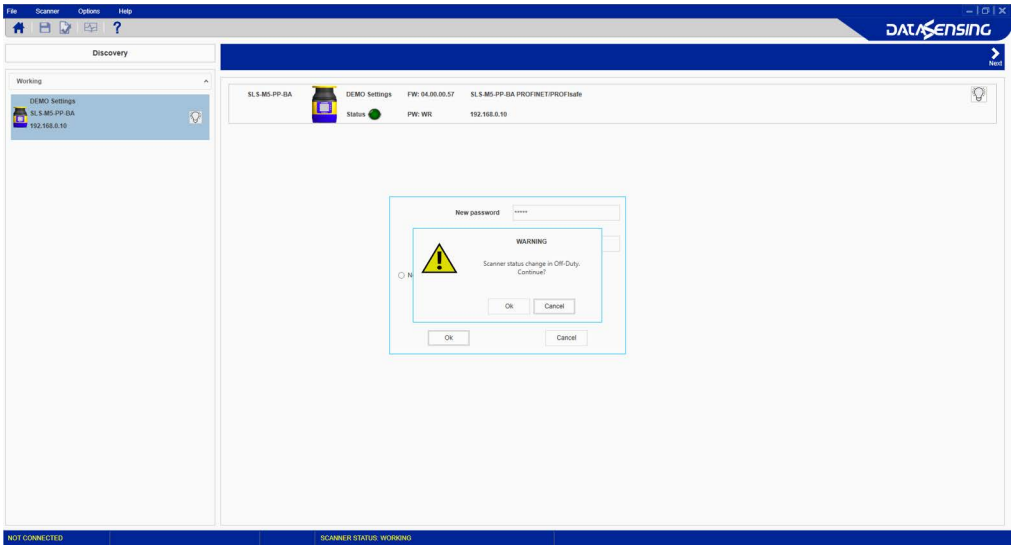


3. Enter the new password twice then choose the password type:

- Write Only (required only when loading the configuration to the device),
- Read / Write (required when connecting and when loading a configuration to the device),
- None (no password required).



4. Click OK to proceed.



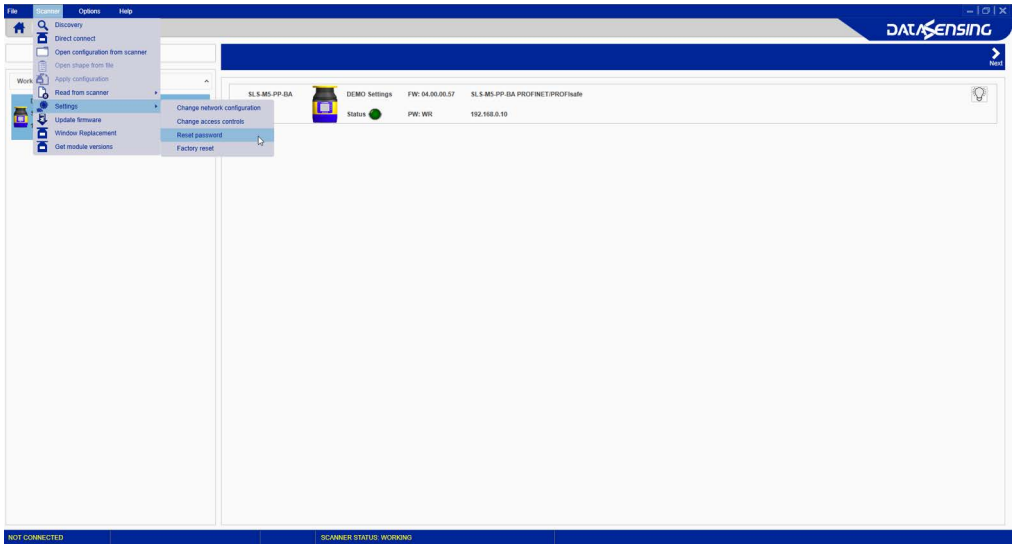
5. The scanner status will now switch to Off-Duty and restart itself.

The password must be 2–7 characters long and consist of numbers, uppercase letters, lowercase letters, and the following special characters: !”$%&/()=’?^\|[{]}+*@#,;.:-_><

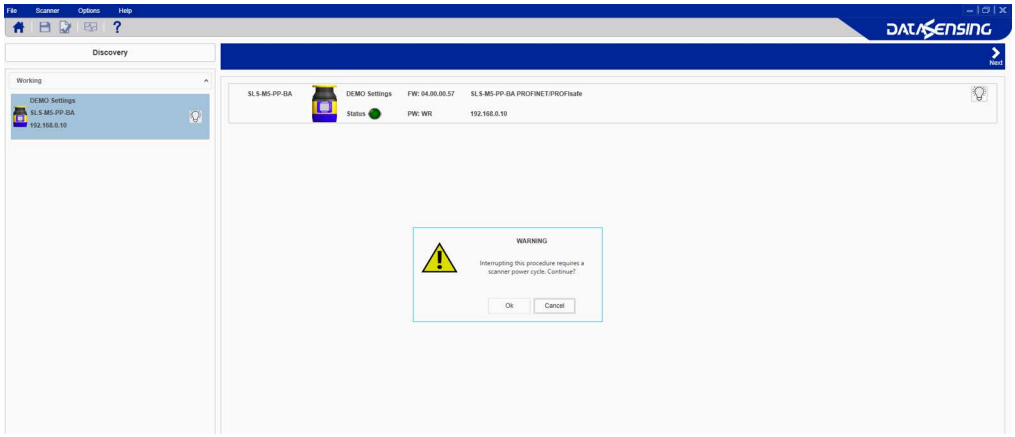
RESET A PASSWORD

To reset a password, the device must be connected (Online).

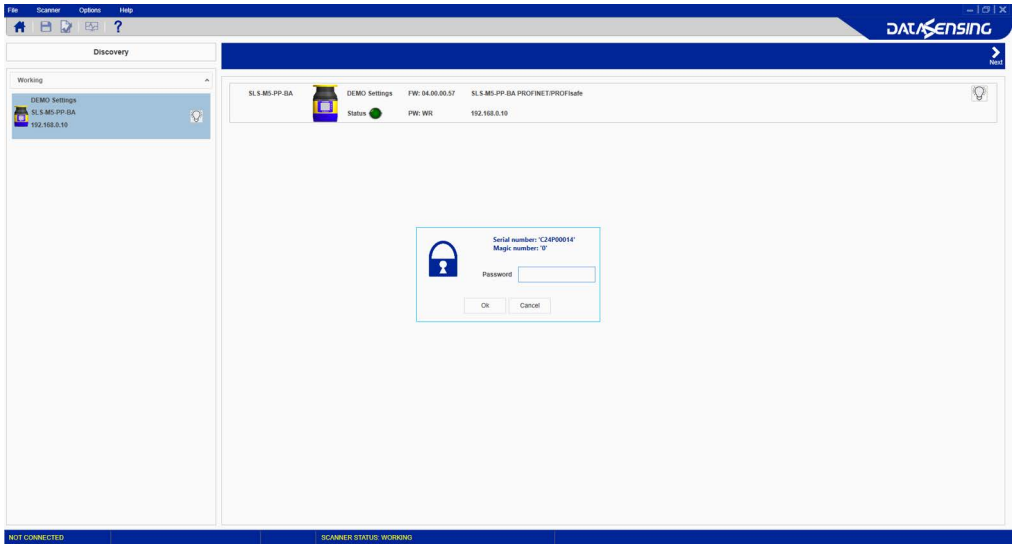
1. In the DLSentinel Device Selection window, click on Scanner and select Settings > Reset Password.



2. The DLSentinel inform that a scanner power cycle is needed.



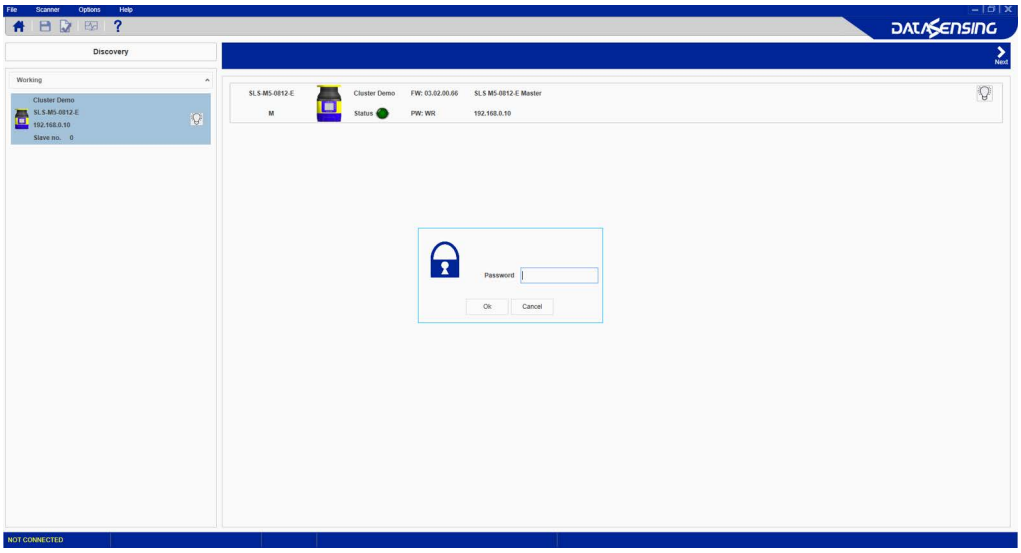
3. Contact our Technical Support and send the serial and the magic number shown. A new password will be communicated to the User.



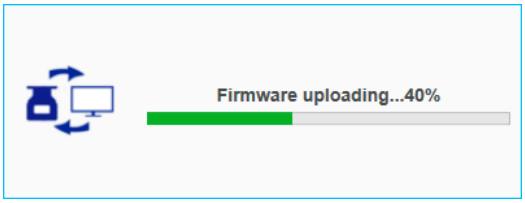
APPENDIX B
FIRMWARE UPDATE

To update the firmware, proceed as follows:

1. Start the DLSentinel GUI and select the new configuration task.
2. Enter the Discovery mode and select an online device.
3. Once the device is selected, click **Scanner** on the menu and choose the firmware update option.
4. Enter the device password (default password "**admin**", if not changed) to access the firmware update option.



5. In the Firmware update section (**Package section**), click on ZIP Archive to search and select a previously downloaded new firmware version (from the Datasensing website).
6. Once the new firmware version is selected, click on Load (**Configuration Upload**). During the Firmware Update the device will go offline.



7. When the firmware version is completely loaded, the user enters the Offline-Test mode to create a configuration and test the new firmware version according to the procedure released with the new firmware and validate it on field following the procedure described in "Checks after Firmware Update" on page 77.

8. If the firmware version is compatible with the device (i.e. the device configuration is correct and with no failures) click on Accept, otherwise click on Reject (**Validation**).

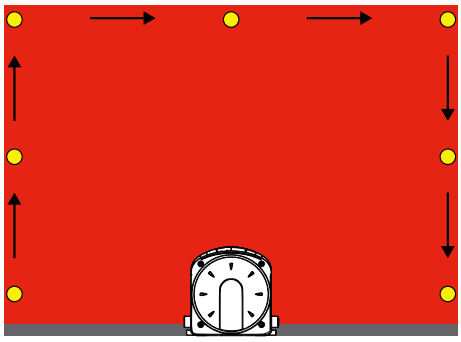
CHECKS AFTER FIRMWARE UPDATE

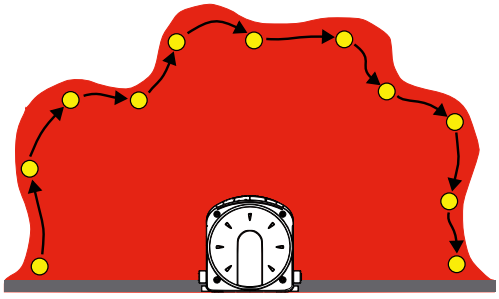
As with any configuration change, safety checks are also required after firmware update and device commissioning as well as before normal duty on field. The safety checks must be carried out by qualified personnel in charge of the machine safety or safety maintenance in general.

The minimum checks are listed below:

- To test the detection capability of the device(s), the user can use a suitable test piece, e.g. an optically dark, opaque cylinder. The effective diameter should match the configured resolution. Datasensing suggests adopting the following procedure:

  Place the test piece on several points at the edges of the safety area.
  Place the test piece on several points inside the area, radially from the edges to the center of the laser scanner.
  The safety laser scanner must detect the test piece at each position and go to STOP.
  Remove the test piece from the controlled area and check that:
  -the machine automatically restarts (in case of Automatic restart), OR
  -the machine restarts only after receiving the restart command (in case of Manual restart).
  The following pictures are examples of detection capability test (the red areas correspond to the configured Safety Areas).





- Power off the safety laser scanner(s). Check that safety outputs automatically switch to OFF status and make sure that the machine cannot start until power is re-applied.
- Together with the mentioned checks, it is recommended to perform a visual check of general functioning using the monitoring tool provided in the Graphic User Interface of the laser scanner.
- Check if the Laser Sentinel shows the interruption of the safety field through the LEDs and/or display.
- It is recommended to follow the same testing approach of detection capability mentioned before also for different safety areas, checking if the device reaction is as expected.

- Evaluate other specific tests to carry out based on the safety risk analysis of your own application.
- If in the end the check reveals a fault or an unexpected behavior, the machine must be shut down immediately. Try to update the software and test the device again following the aforementioned procedure. If the problem persists, contact our Technical Support.

APPENDIX C
FACTORY RESET

The Factory Reset procedure resets the default password (“admin”), the password type (see Appendix A, Access Control), the device IP address and any saved configuration.

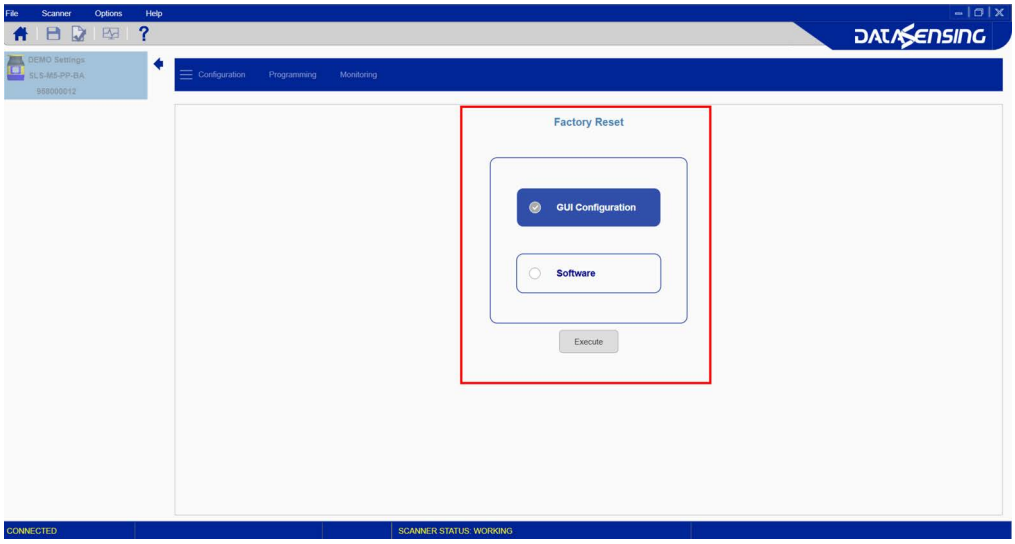
To perform a Factory Reset, proceed as follows:

1. In the DLSentinel Device Selection, click on Scanner and select Settings > Factory Reset.

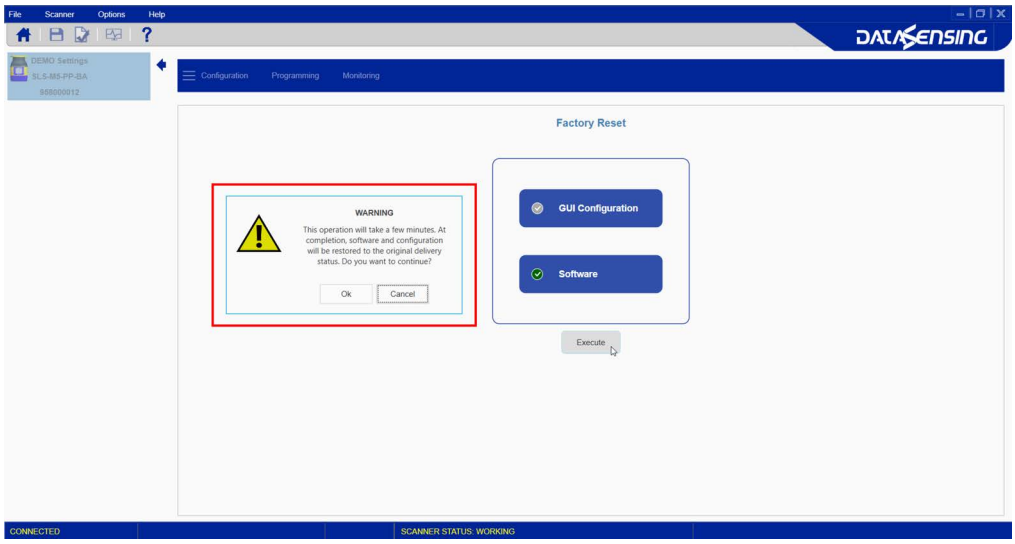
2. A new window will prompt the user to enter the device password (default password “**admin**”, if not changed).

3. A new window allows the user to select and execute the reset for:

- GUI Configuration (default, always selected): the configuration saved in the device is reset.
- Software: the software is restored to the original delivery state (available only on devices with SW release 4.0.0 or later).



4. A message will appear informing the user that the operation will take a few minutes. Subsequently, the device will be restarted. Click OK to proceed.



5. At completion, the Getting Started page will appear, and the device will show a “Waiting Configuration” message (see icon below).



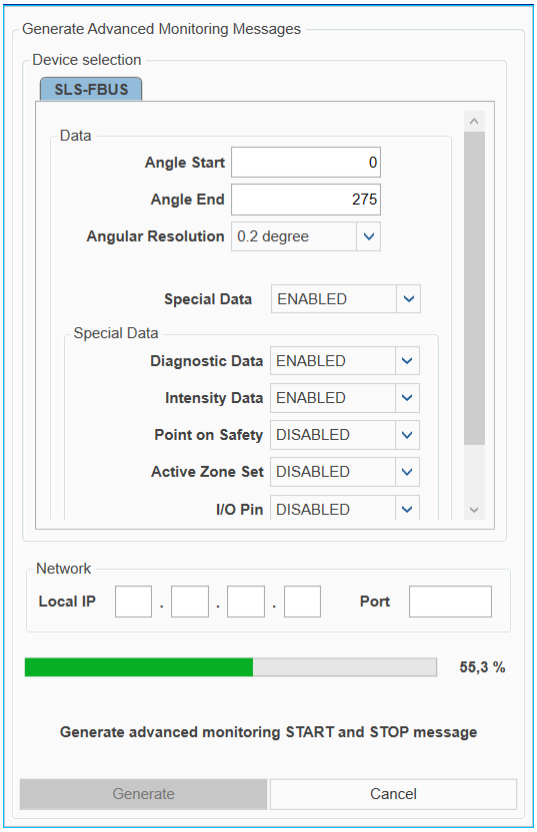
APPENDIX D
ADVANCED MONITORING

The Advanced Monitoring function is available for the following Laser Sentinel models:

- SLS-M5-PP-BA
- SLS-M5-PP-BO
- SLS-M3-1708-E
- SLS-M3-0812-E
- SLS-M5-1708-E
- SLS-M5-E-1708-E
- SLS-R3-E
- SLS-M5-0812-E
- SLS-R5-E
- SLS-SA3-08
- SLS-SA5-08
- SLS-M10-1708-E
- SLS-M10-E-1708-E
- SLS-R10-E
- SLS-M10-0812-E

Activating the Advanced Monitoring function makes it possible to receive measurement distance data and information about the status of the SLS.

To access this function, go to **Options > Advanced Monitoring** and the following window is displayed.



For the device to be monitored, indicate the angle start and end as well as the angular resolution, enable any special data among the available parameters, then enter the local IP and the port of the device to generate the START and STOP messages.

For more information, refer to the Laser Sentinel Advanced Monitoring document.

NOTES

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