

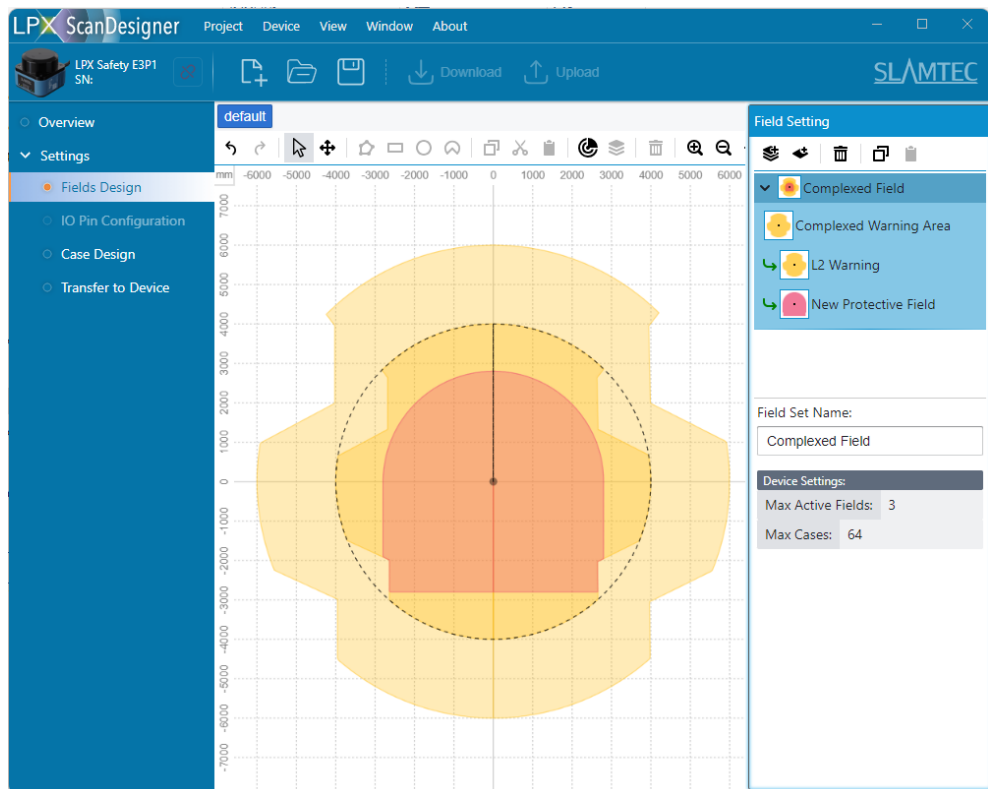
# Field Monitoring Configuration Software

## LPX SCAN DESIGNER

### Instruction Manual

July, 2024

Version 1.1.0



# Contents

<b>1</b>	<b>Software Overview</b>	<b>3</b>
<b>2</b>	<b>Glossary</b>	<b>4</b>
2.1	Monitor Field / Field . . . . .	4
2.2	Field Set . . . . .	4
2.3	Monitor Case / Case . . . . .	4
<b>3</b>	<b>Starting</b>	<b>5</b>
<b>4</b>	<b>Connect to sensor</b>	<b>6</b>
<b>5</b>	<b>Config Fields</b>	<b>7</b>
5.1	Create Monitor fields . . . . .	8
5.2	Avoiding specific areas using the mask mode . . . . .	11
5.3	Adding Fields and Field sets . . . . .	12
5.4	Draw concentric fields using associative (mask) mode . . . . .	13
5.5	Adjust the position and angle of the sensor . . . . .	15
<b>6</b>	<b>Config Monitor Case</b>	<b>17</b>
6.1	Add and edit Monitor Case . . . . .	17
<b>7</b>	<b>General Information Configuration</b>	<b>19</b>
<b>8</b>	<b>Upload and download monitoring cases</b>	<b>20</b>
8.1	Upload the newly created monitoring case . . . . .	20
8.2	Load configured monitoring cases from sensors . . . . .	20
<b>9</b>	<b>Testing Monitoring Scene Configuration</b>	<b>22</b>
<b>10</b>	<b>Document History</b>	<b>24</b>

## List of Tables

## List of Figures

3.1	Overview GUI . . . . .	5
4.1	Devive connecting GUI . . . . .	6
5.1	Create fields from template . . . . .	7
5.2	simple template . . . . .	8
5.3	Draw polygons . . . . .	9
5.4	Draw rectangle . . . . .	9
5.5	Draw circle . . . . .	10
5.6	Draw sector . . . . .	10
5.7	Generate monitoring fields from graphics . . . . .	11
5.8	Using the mask mode . . . . .	12
5.9	Draw concentric fields using associative (mask) mode . . . . .	13

5.10	Change associated field . . . . .	14
5.11	Adding graphics in the association field . . . . .	14
5.12	Select lidar . . . . .	15
5.13	Adjust lidar position . . . . .	16
6.1	Add Monitor case . . . . .	17
6.2	1x resampling timing diagram . . . . .	18
6.3	3x resampling timing diagram . . . . .	18
6.4	Update prompts for fields within a field set . . . . .	18
7.1	General Information Configuration Interface . . . . .	19
8.1	Monitoring case writing interface . . . . .	20
8.2	Monitoring case loading interface . . . . .	21
9.1	Monitoring Scene Test Interface . . . . .	22
9.2	Monitoring Scene Test Result . . . . .	23

## List of Listings



# LPX SCAN DESIGNER

## 1 Software Overview

LPX SCAN DESIGNER is a monitoring field configuration software developed by SLAMTEC for the LPX series LIDAR sensors. With this software, you can easily configure the field to be monitored, and when the sensor is running, the sensor's built-in monitoring program monitors the configured field without the need for external equipment to process and calculate the LIDAR data. You can also configure the lidar's operating parameters, simulate the field monitoring program function, and view the device status in LPX SCAN DESIGNER.

Before using this software for the first time, please make sure to read this document in full to avoid endangering personal safety or causing property damage.

## 2 Glossary

### 2.1 Monitor Field / Field

A monitoring field refers to an field monitored by a sensor. It can contain one or more polygons, circles, sectors, rectangles, etc. A sensor can monitor one or more fields at the same time. For example, LPX-E3P1 can monitor three fields at the same time.

### 2.2 Field Set

Field Sets are fields that sensors monitor simultaneously. An field set can contain one or more fields. When the sensor is working, it will monitor all fields in an field set and output the intrusion status of all fields in the field set.

### 2.3 Monitor Case / Case

The monitoring case is a collection of all status information currently monitored by the sensor. A case contains a field set and the corresponding input and output configuration. A sensor can store one or more cases. For example, the LPX-E3P1 can store up to 64 cases. When the sensor is working, the monitoring case can be switched through the external output to adapt to different working cases.

### 3 Starting

Double-click the installation package and follow the prompts to install. After the installation is complete, double-click the shortcut or SLAMTEC LPX ScanDesigner.exe in the installation directory to start the application. After starting, the program will display the "Overview" interface, where you can see the connected device information and device overview.

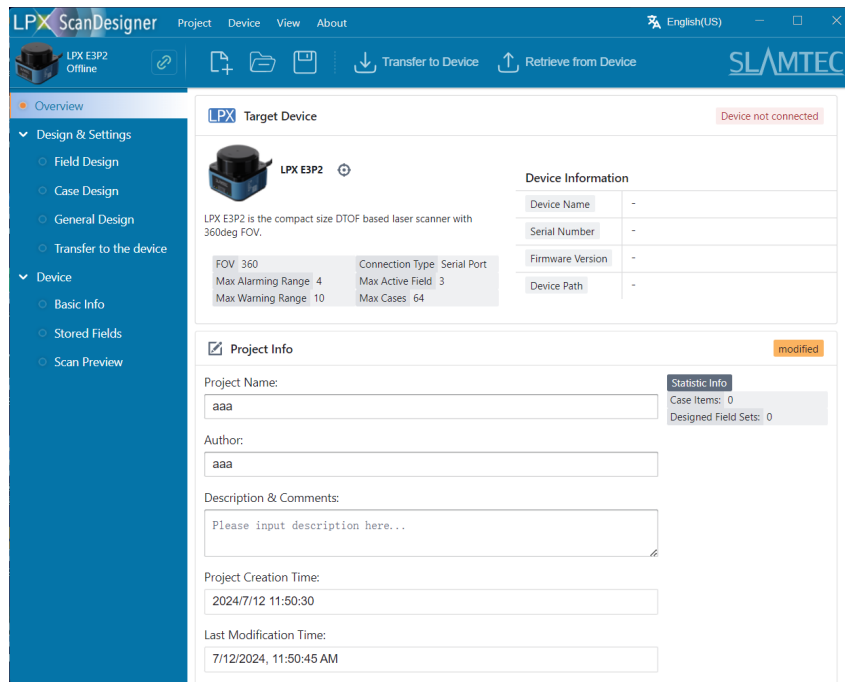


Figure 3.1: Overview GUI

## 4 Connect to sensor

Refer to the sensor's operating guide to connect the power and signal cables, and connect the lidar to the computer via the configuration cable.

Click "Connect to Device" in the upper left corner of the interface to automatically refresh the devices available for connection. Select the device to be connected and click "Connect".

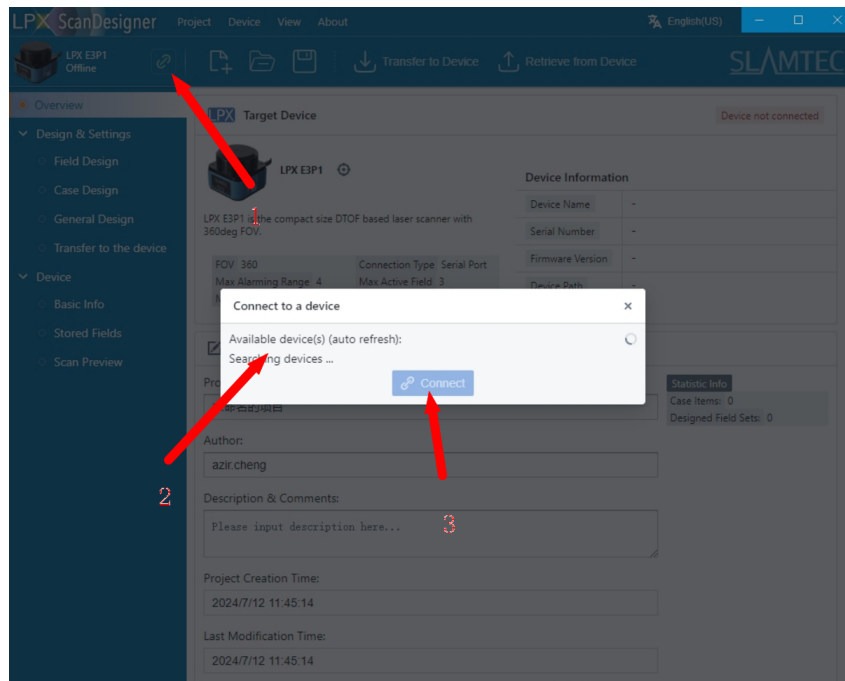


Figure 4.1: Device connecting GUI

After successful connection, the program will read all the configurations stored in the sensor for online debugging.

## 5 Config Fields

Select the "Monitoring Field Design" tab in the "Configuration" page on the left. The "Create Design from Template" interface will pop up by default. Select "Simple Configuration" here to continue.

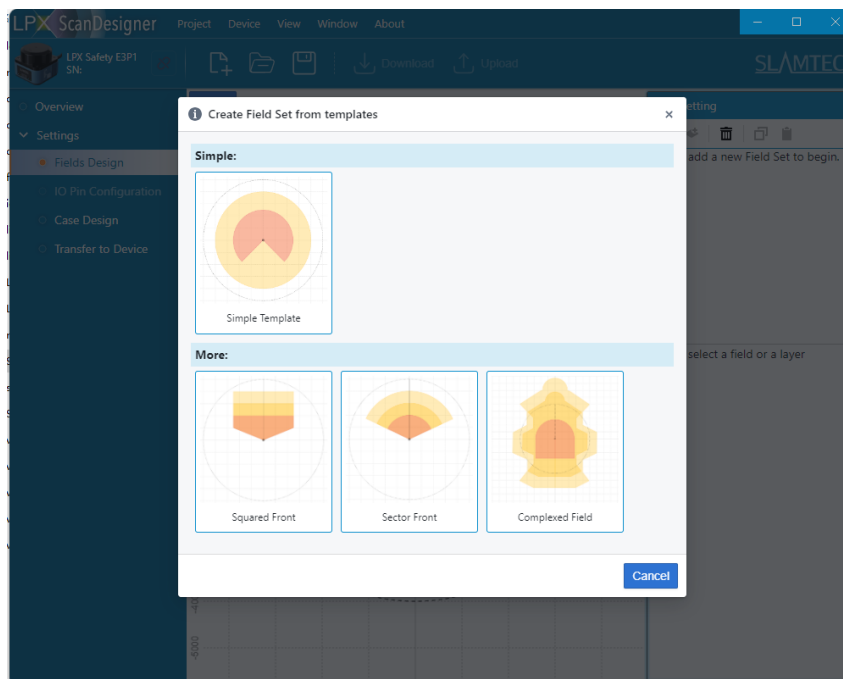


Figure 5.1: Create fields from template

The "Simple Configuration" template provides a field set containing two monitoring fields, which are configured as "Warning Field" and "Protection Field" respectively. The field monitoring software provides a variety of monitoring field types, and you can freely choose the type of each field. The total number of configurable field sets in this software, the number of monitoring fields contained in a single field set, and the configurable monitoring field types are determined by the specific sensor model. Please refer to the data sheet of the corresponding model device for details, or query in the "Overview" page of this program.

This document takes LPX-E3P1 as an example. The sensor supports up to 64 field sets, each with three simultaneously monitored monitoring fields, and each field can be configured as a recognition, warning, or a alarming field. The maximum radius of its warning field is 10 meters, and the maximum radius of the alarming field is 4 meters, and it provides excellent black low-reflectivity object monitoring capabilities.

Select the preset field in the "Field Settings" on the right, and you can see that a circle within the field monitoring range is drawn in the preset monitoring field, and the sensor will monitor the entire field of the circle.



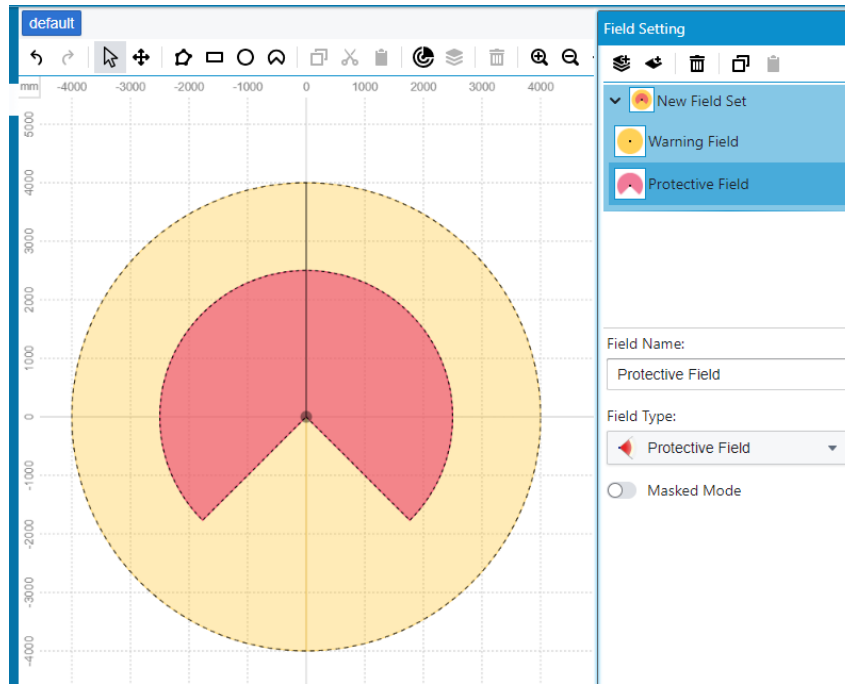


Figure 5.2: simple template

## 5.1 Create Monitor fields

The software provides the function of drawing polygons, rectangles, circles, and sectors.

When drawing a polygon, first select "Draw Polygon" in the top toolbar, click the left mouse button to add the first point, continue to click the drawing field with the left mouse button, and double-click the left mouse button to end the polygon drawing. The software will automatically connect the head and tail of the polygon to form a closed figure. After completing the polygon creation, left-click to adjust the coordinates of each point of the polygon in the right toolbar, and you can also add and delete points.

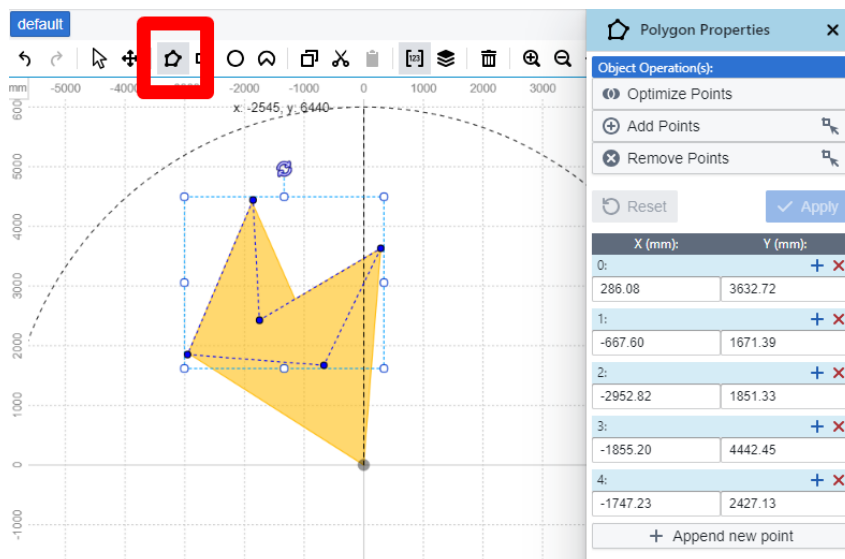


Figure 5.3: Draw polygons

When drawing a rectangle, first select "Draw Rectangle" in the top toolbar, hold down the left button, drag to a satisfactory size and release the left button to complete the drawing. Similarly, click on the newly drawn shape, and you can adjust the starting point coordinates, length, width, and rotation angle of the rectangle in the toolbar on the right, or you can directly drag and adjust in the figure.

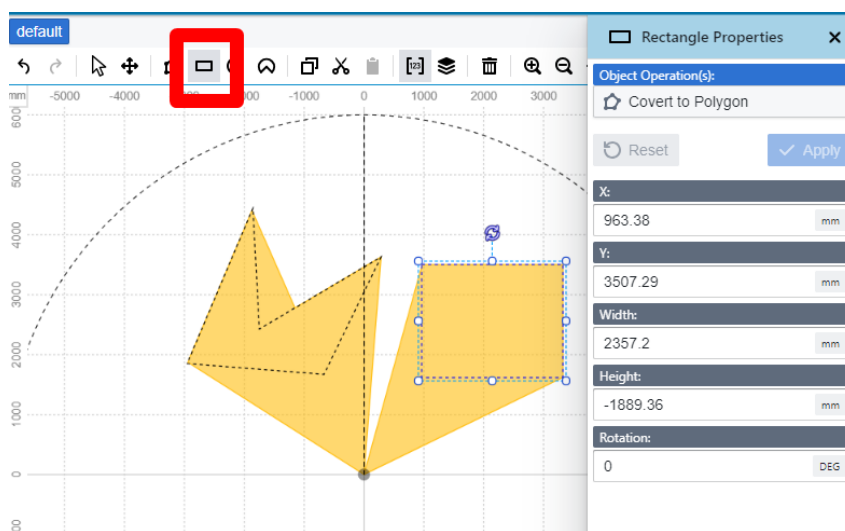


Figure 5.4: Draw rectangle

If you need to draw a circle, select "Draw a circle" in the top toolbar, hold down the left button, drag to a satisfactory size and release the left button to complete the drawing. You can adjust the center coordinates and diameter of the circle in the right toolbar, or you can directly drag and adjust in the figure.

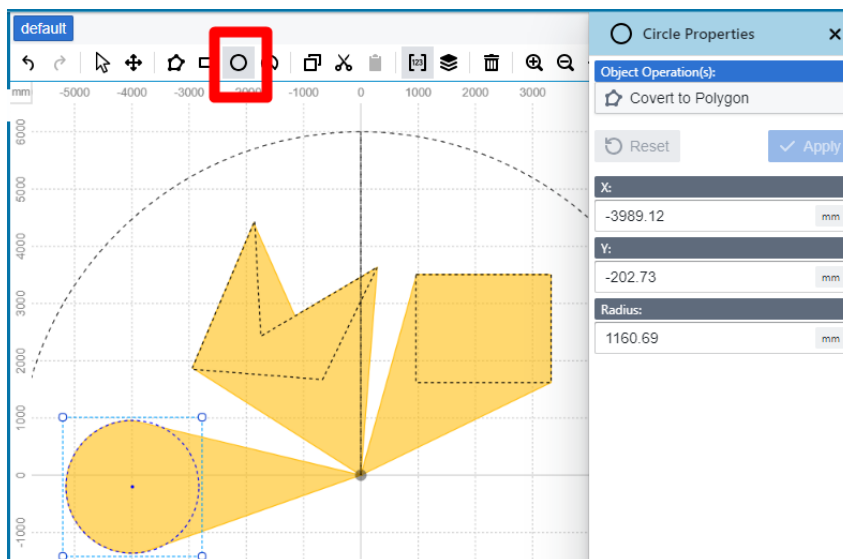


Figure 5.5: Draw circle

Drawing a sector is similar to drawing a circle. You can also adjust the starting angle of the sector in the toolbar on the right.

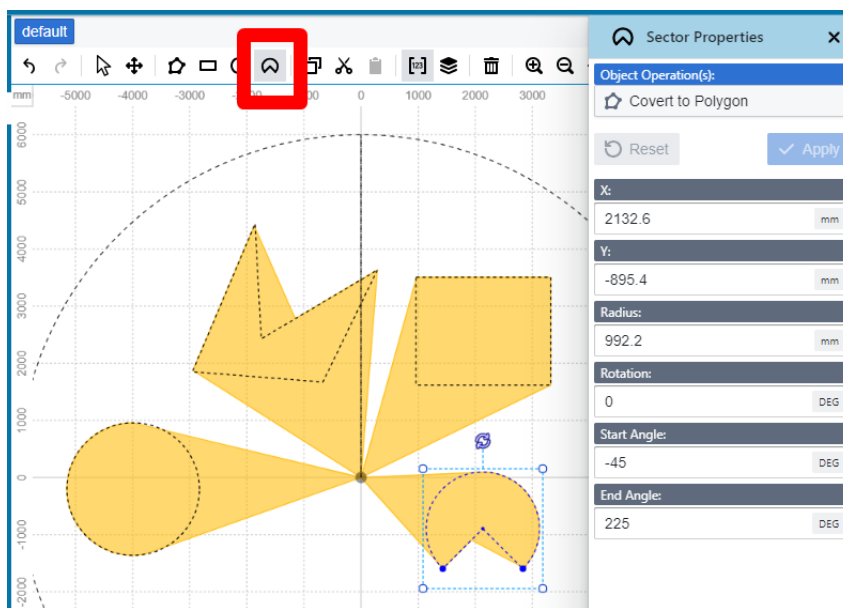


Figure 5.6: Draw sector

The final monitoring range will be clipped according to the maximum range of the monitoring field: for graphics that are completely within the monitoring field, the field inside the graphics and between the graphics and the lidar will be used as the monitoring range; for graphics that are partially within the monitoring field, the part outside the monitoring field will not be used as the monitoring range; for graphics that are completely outside the monitoring field, no related monitoring range will be generated.

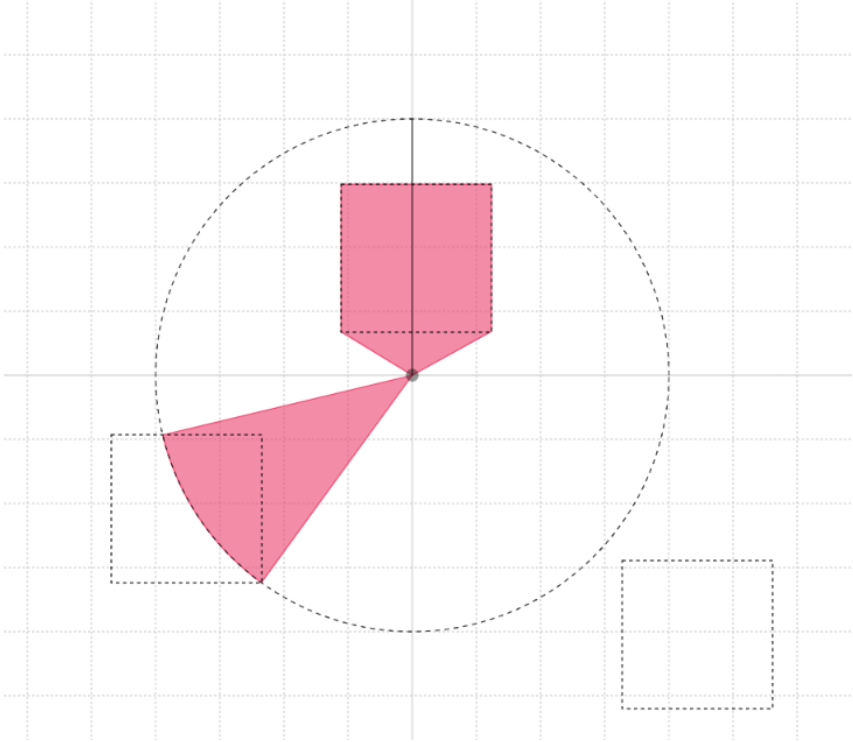


Figure 5.7: Generate monitoring fields from graphics

### 5.2 Avoiding specific areas using the mask mode

Select the "Mask Area" mode in the toolbar to draw a mask area in the figure. The radar will not monitor objects within the mask area.

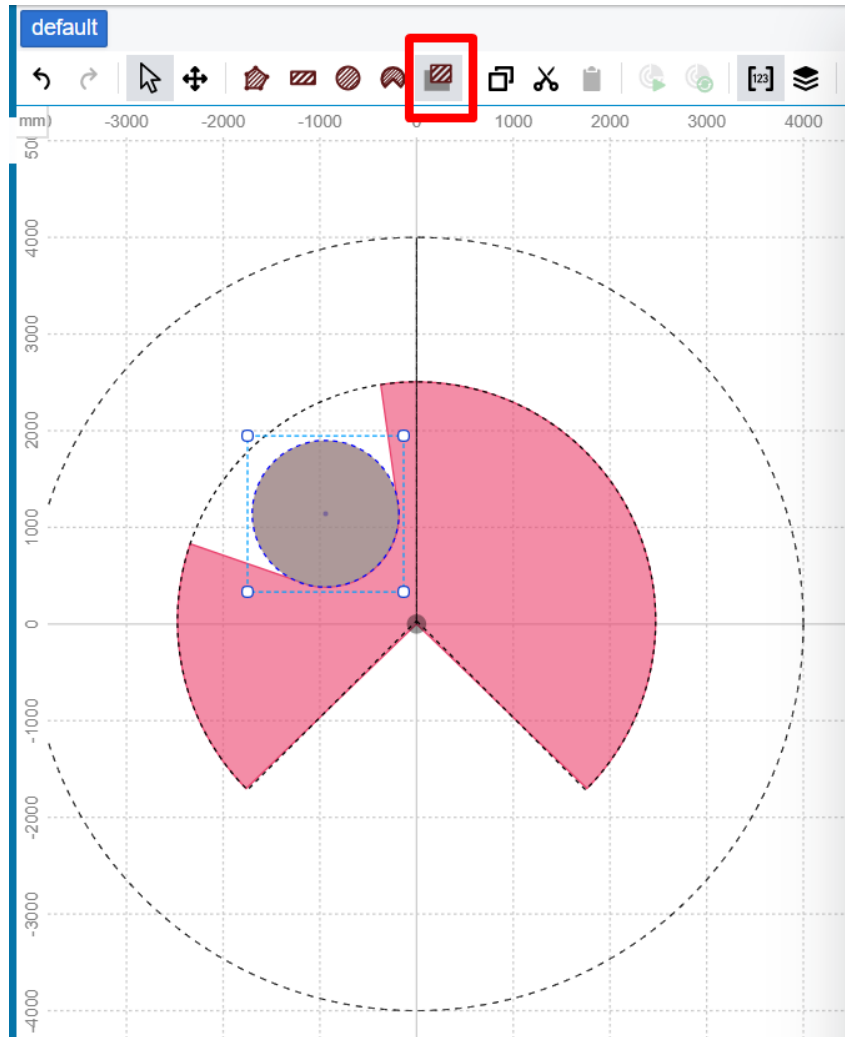


Figure 5.8: Using the mask mode

You can use the above-mentioned polygons, rectangles, circles, sectors, and other shapes to draw the mask area. The mask area will be clipped within the monitoring area.

### 5.3 Adding Fields and Field sets

When no graphics are selected, the toolbar on the right is "Field Settings", where you can create, delete, or copy fields or field sets.

For the created fields and field sets, you can rename them to easily identify the monitoring purpose of the current field or field set.

The maximum number of field sets that can be created and the number of fields in each field set are limited by the currently connected sensor model. The maximum number of field sets will not exceed the maximum number of field sets supported by the current sensor model, and the number of fields in each field set will not exceed the maximum number of simultaneously

activated fields supported by the current sensor model.

## 5.4 Draw concentric fields using associative (mask) mode

In obstacle avoidance cases, it is often necessary to generate cases with different ranges based on the same shape. You can use the association (mask) function of this software to draw concentric fields.

First draw the maximum monitoring field range in the current field, add an field to the current field set in "Field Settings", turn on the association (mask) mode below, and select the pre-fill type. The software provides multiple types of circular filling, forward filling, and proportional filling. Select the required filling type, and then set the filling distance in the figure or in the toolbar on the right.

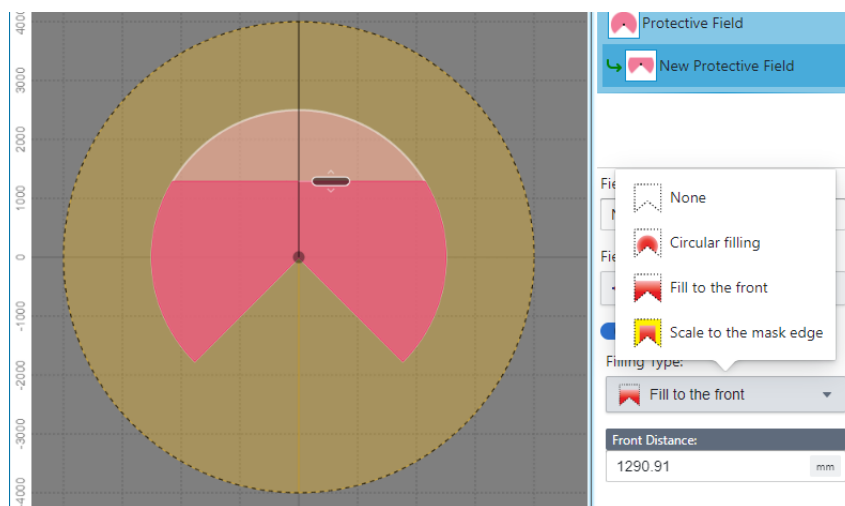


Figure 5.9: Draw concentric fields using associative (mask) mode

By dragging the newly added field, you can change the field it is associated with.

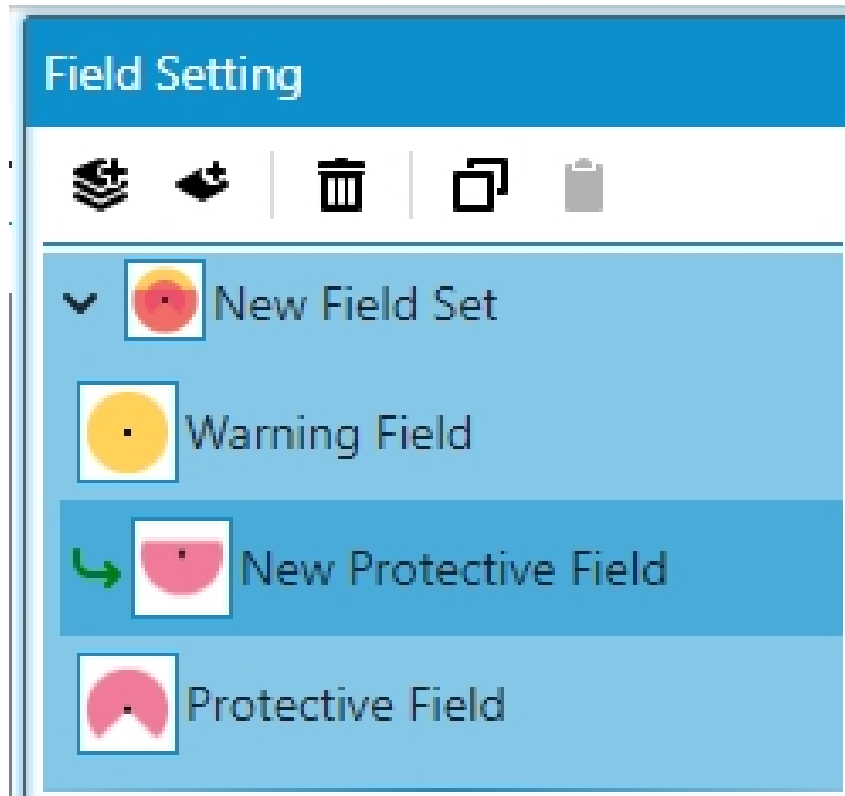


Figure 5.10: Change associated field

You can still draw additional monitoring range graphics in this mode.

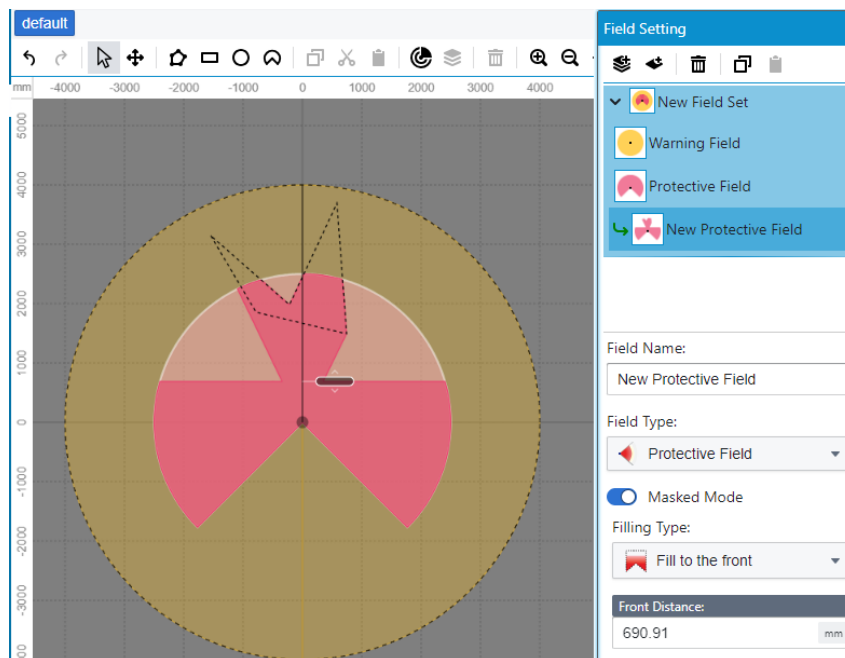


Figure 5.11: Adding graphics in the association field

Note that the extent of the field generated in this way will still not exceed the maximum size

of the current field mode.

## 5.5 Adjust the position and angle of the sensor

When the center of the drawn graphic is different from the actual lidar installation orientation, you can adjust the monitoring field with one click by adjusting the direction and position of the lidar.

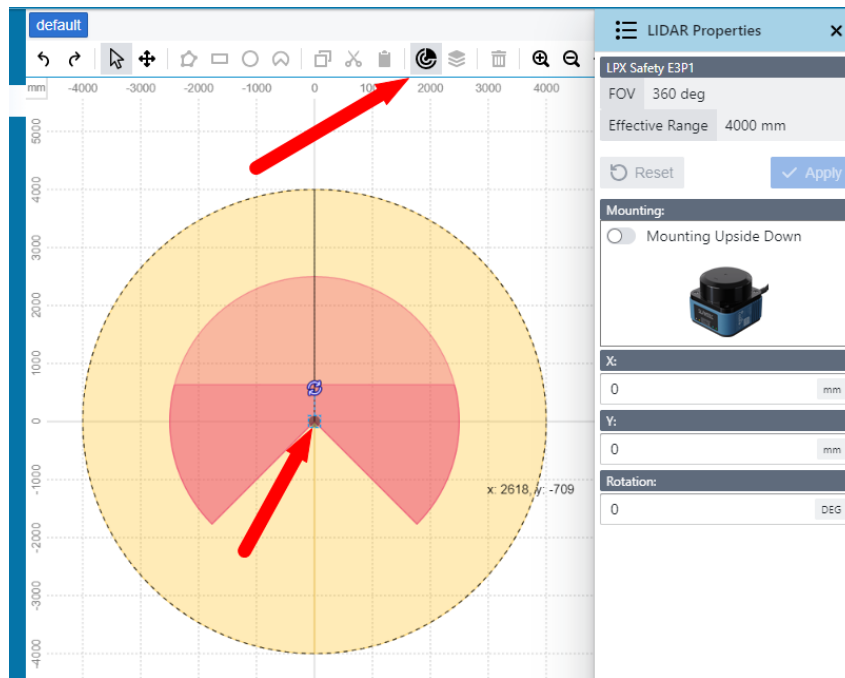


Figure 5.12: Select lidar

Select "Edit Lidar Placement Parameters" in the top toolbar or select the lidar in the picture (default is at the coordinate origin), and the lidar's coordinates, rotation angle, and installation direction (upright or inverted) can be adjusted in the right toolbar. The monitoring field in the software will be regenerated with the new orientation of the lidar.



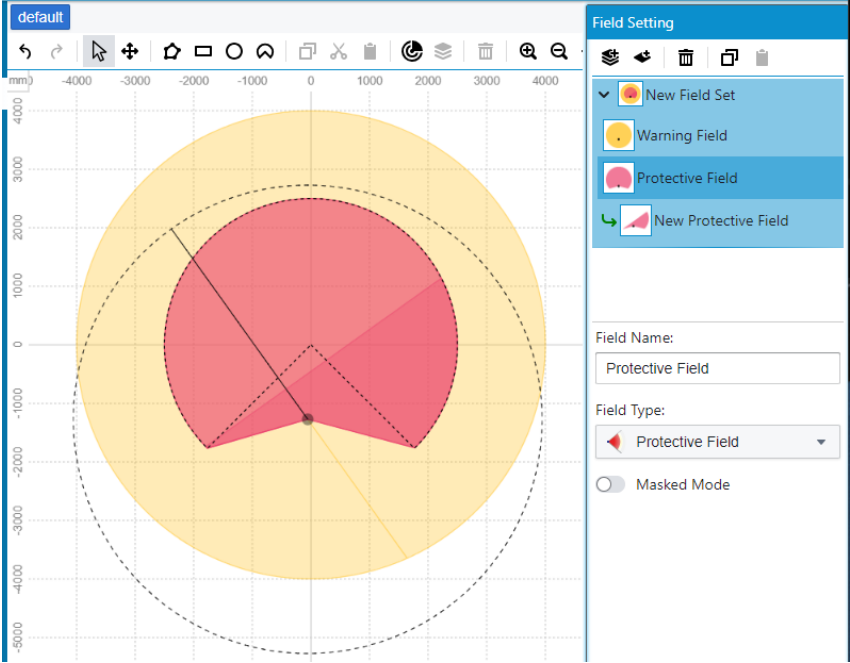


Figure 5.13: Adjust lidar position

## 6 Config Monitor Case

The monitoring case is the actual output mode of the configured monitoring field, including parameters such as the number of resampling times, output delay, hold time, and output ports corresponding to different fields in the current monitoring field. By configuring the monitoring case, you can flexibly control the monitoring signal output parameters you need.

Select "Case Design Configuration" in the left tab to start configuring the monitoring case.

### 6.1 Add and edit Monitor Case

Click "Add New Case" to create a monitoring case. You can also create a new monitoring case by copying an existing monitoring case.

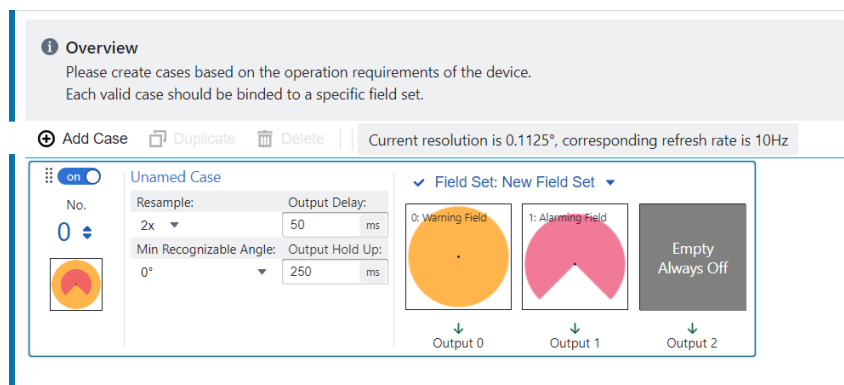


Figure 6.1: Add Monitor case

For the monitoring case you created, you can rename it to easily identify the monitoring purpose of the current monitoring case. The instance number corresponds to the number of instances called in the sensor (starting from 0).

The "Multi-sampling" option can adjust the number of resampling. A high number of resampling helps improve the accuracy of monitoring applications, but it also increases the output delay. The "Angular Resolution" option can adjust the monitoring resolution of the instance. Different resolutions can adapt to monitoring objects of different sizes. "Output Delay" is the delay from the sensor identifying an object within the monitoring range to the output signal; "Output Hold" is the delay from the disappearance of the object to the cancellation of the signal output (in extreme cases, the output signal will be triggered only after the object disappears. At this time, the output signal will be used as the starting point, and the output hold time will be delayed once before stopping the output, that is, the minimum signal hold time). If the currently connected sensor does not support the adjustment of an option, the option will remain fixed and cannot be edited.

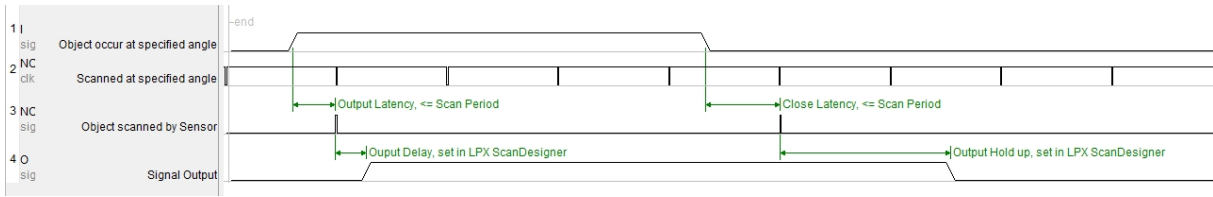


Figure 6.2: 1x resampling timing diagram

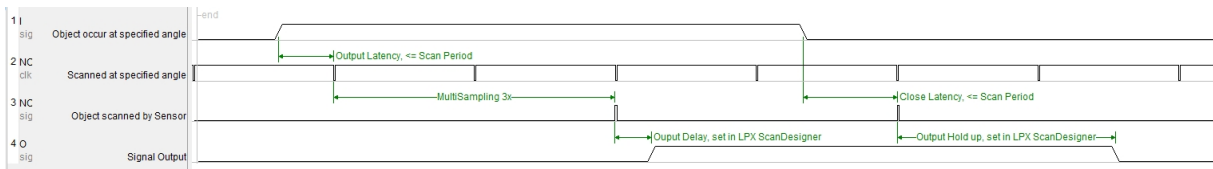


Figure 6.3: 3x resampling timing diagram

On the right, you can bind the field set corresponding to the monitoring case. The corresponding order of the fields in the field set and the output ports defaults to the order of arrangement in the field set. If you need to change the port corresponding to the field, just drag it to the port you want to configure. If the order of the fields in the field set corresponding to the instance changes, or if a field set is added or deleted, a warning symbol will appear at the corresponding position in the current instance. Pay attention to update the current instance.

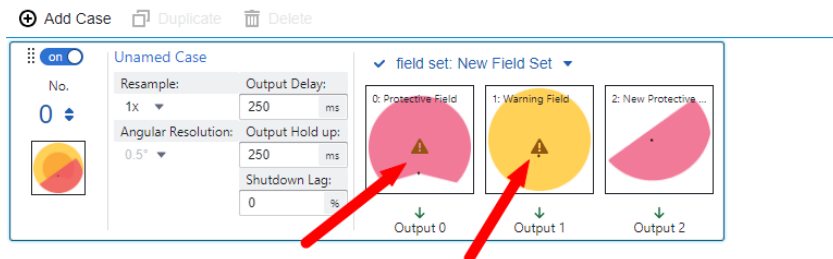


Figure 6.4: Update prompts for fields within a field set

## 7 General Information Configuration

Click on "General Information Configuration" on the left to jump to the general information configuration interface, as shown below:

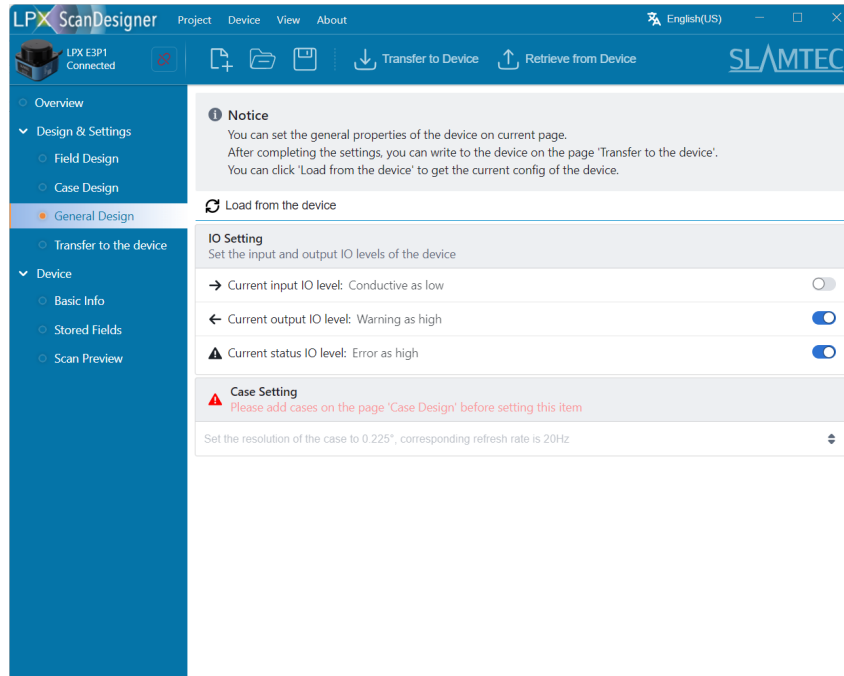


Figure 7.1: General Information Configuration Interface

Depending on the sensor model, the available options for general information configuration may vary. Taking E3P2 as an example, you can configure parameters such as angular resolution, refresh rate, and output/input IO levels for the sensor in this tab.

## 8 Upload and download monitoring cases

### 8.1 Upload the newly created monitoring case

Click "Write to Device" on the left to jump to the monitoring case writing interface, as shown below:

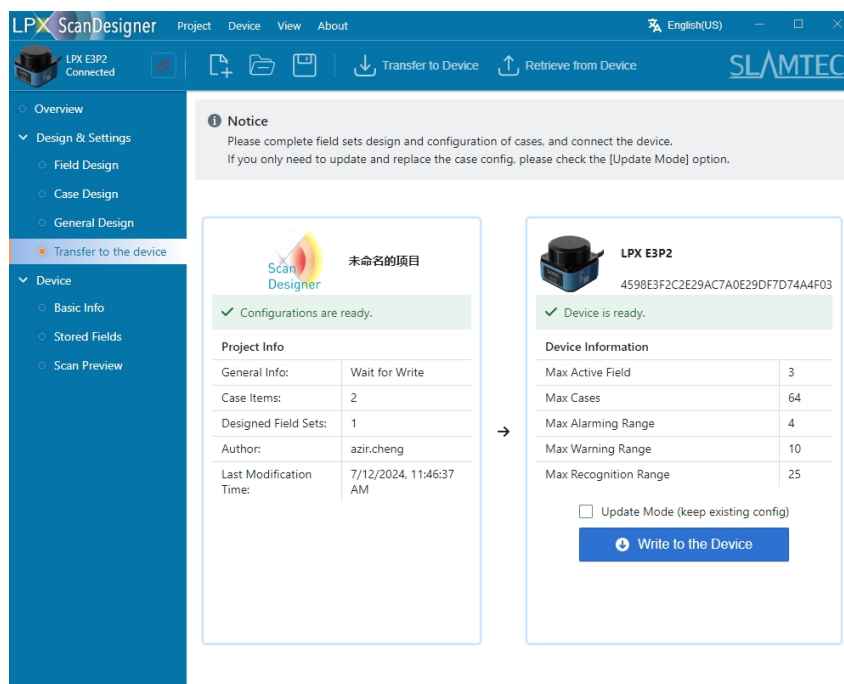


Figure 8.1: Monitoring case writing interface

The left side is the newly created monitoring case, and the right side is the currently connected device. You can choose whether to use the "Update Mode" to update the monitoring case according to your needs.

When writing to the device using the update mode, only the newly designed instance data will be updated without erasing the existing data in the sensor.

When the update mode is not used, all the data in the sensor will be erased, and then the monitoring case data to be written will be written.

### 8.2 Load configured monitoring cases from sensors

Click on "Stored Area Information" on the left to see all the area group configurations read from the sensor when it is connected. If a new configuration is written, you can click "Load from Device" to reload all the configurations stored in the device.

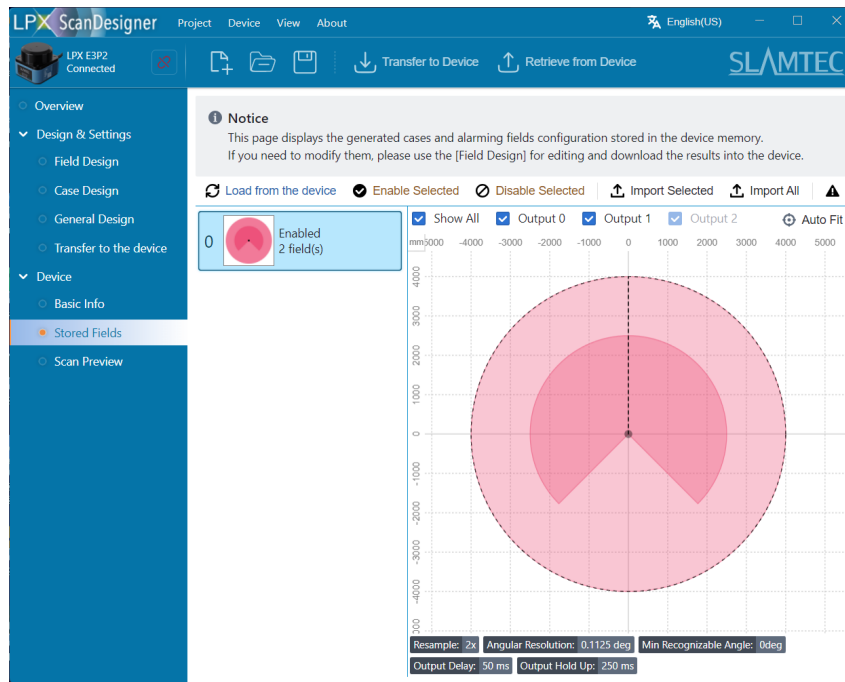


Figure 8.2: Monitoring case loading interface

Click on the monitoring case to be modified, and click "Import selected to editor", you can view the imported case in the "Monitoring field design" interface, modify it as needed, and configure it to an existing or new case in the "Case design configuration", and then click "Write to device" to write it to the device.

## 9 Testing Monitoring Scene Configuration

After completing the above monitoring scene configuration, you can perform validity verification according to this section.

Ensure that the sensor is powered and connected properly. Click "Scan Preview" to enter the scene configuration test, as shown below:

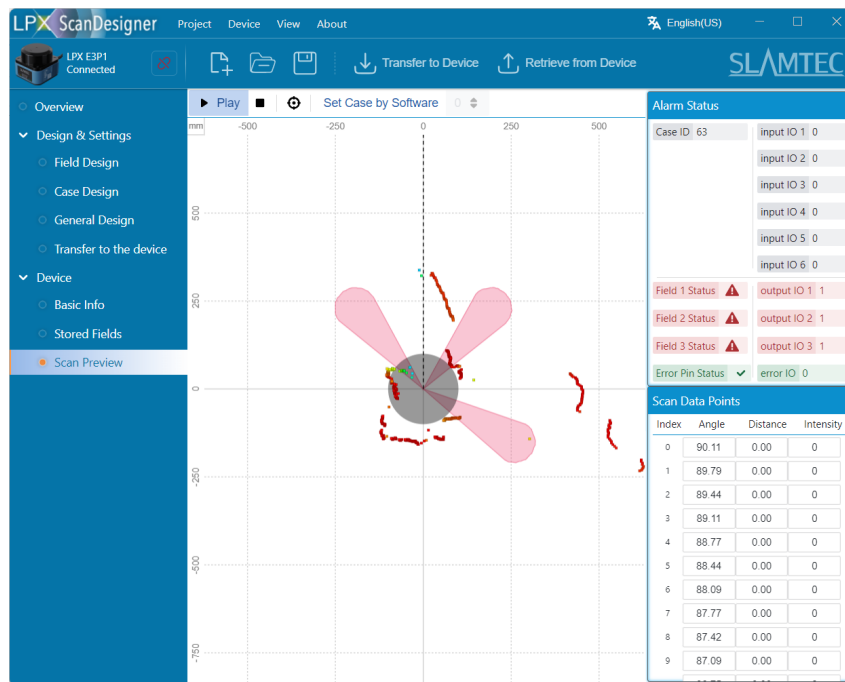


Figure 9.1: Monitoring Scene Test Interface

Click "Start Scan" and the sensor will start working and output real-time point cloud images and the enabled scene graphics in the sensor. You can move obstacles to the designated areas and observe the sensor status displayed in the right menu to complete the monitoring scene test.

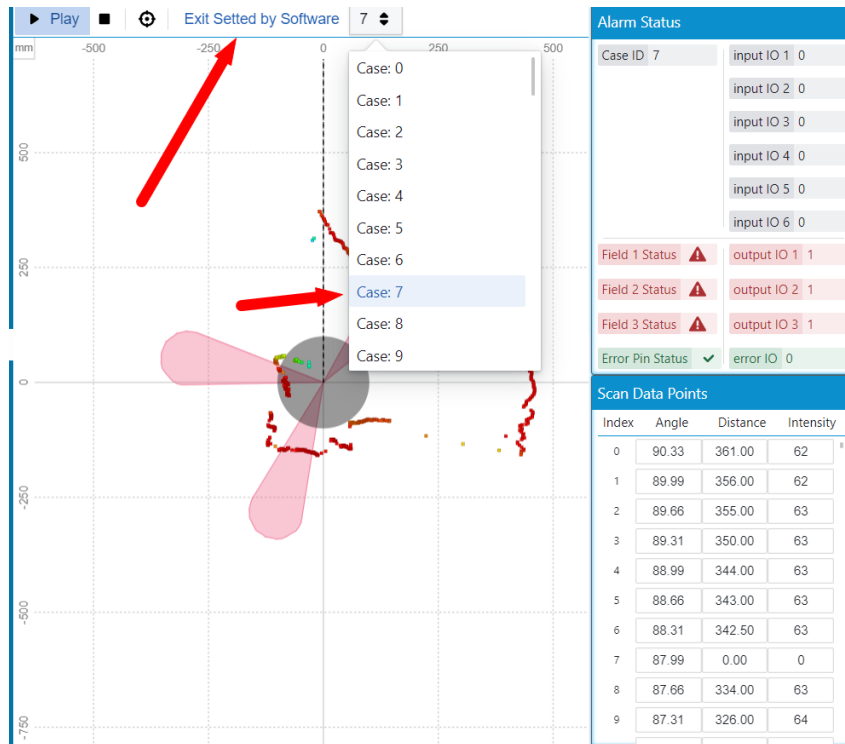


Figure 9.2: Monitoring Scene Test Result

At the same time, you can also switch to the scenes stored in the sensor for monitoring scene testing using the software. Click the "Software Set Scene" button in the toolbar and select the scene to be tested from the dropdown box to switch to the corresponding scene. At this time, the input status on the right will not change, but the sensor has switched to the corresponding scene internally. After clicking the "Exit Software Set Scene" button or leaving the current page, the sensor will automatically disable the software set scene function and restore the automatic scene configuration based on the input conditions.



## 10 Document History

Date	Version	Description
2024-03-11	0.1.0	Initial version of document
2024-07-11	0.1.1	Update to ScanDesigner 1.1.0

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