ZiVID

Zivid Studio User Guide

SDK 2.13
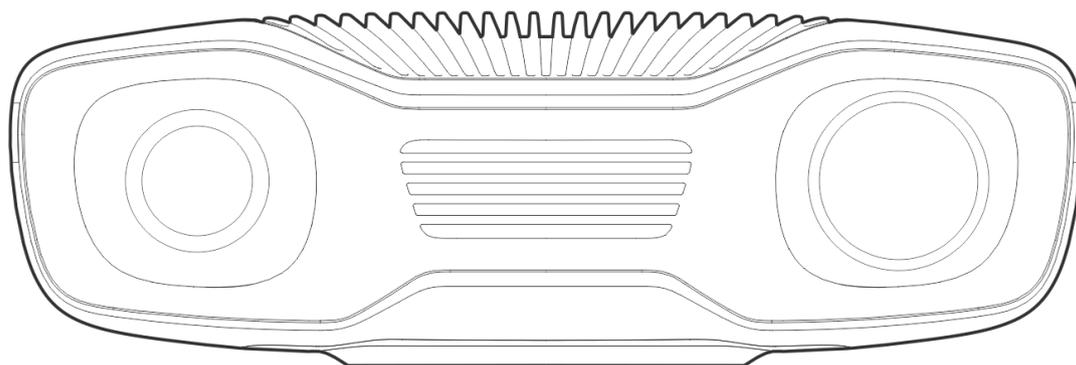
Table of Contents

1. Studio Guide

Zivid Studio is the graphical user interface (GUI) for the Zivid SDK. This allows the user to explore the functionality of Zivid cameras and the capturing of 3D point clouds.
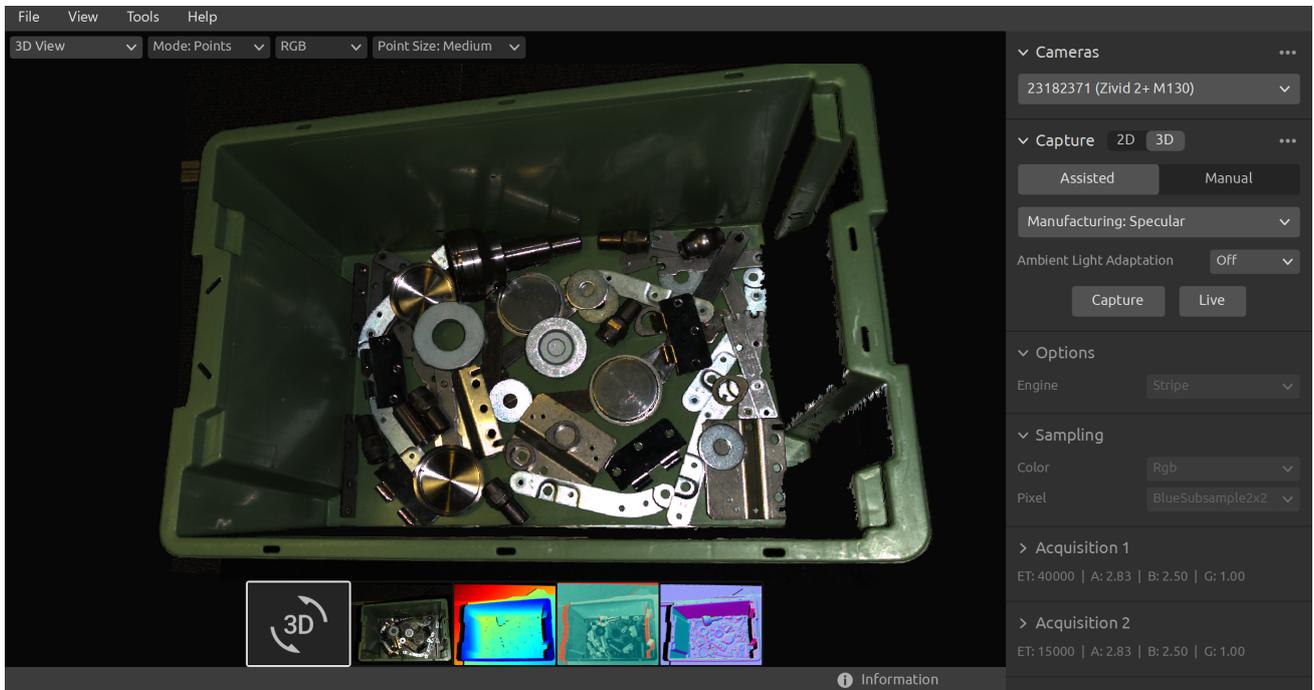
Use Zivid Studio to learn and understand how the majority of functions available in the Zivid SDK work. This is useful when developing your application. Among others, you can:

- Capture point clouds.
- Capture color images.
- Visualize point clouds, color images, depth maps, SNR (Signal-to-Noise-Ratio) maps, and normal maps.
- Analyze and evaluate 3D data quality.
- Determine the correct capture settings for your target objects and scenes.
- Configure the camera network configuration.
- Perform infield calibration of the camera.

2.   Control Panel

The control panel is located on the right side of Zivid Studio. It contains three main sections:

- Cameras
- Capture
- Settings and Filters

2.1.   Cameras

This section is used to scan for, configure, connect to, and disconnect from available cameras.

Cameras	Function
List all cameras	Open the Cameras menu and list all cameras.
Scan for connected cameras	Show all cameras plugged into the PC and list them by model and serial number.
Connect	Connect to the camera selected in the drop-down menu. Zivid Studio can connect to a single camera at a time.
Configure this camera	Open the Cameras menu and configure the IP, subnet mask and mode of the selected camera.
Disconnect from active camera	Disconnect from the active camera.

> **ⓘ Note**
>
> If multiple cameras are physically connected, they will all appear in this section. However, Zivid Studio only supports establishing a connection with a single camera at a time. To capture with multiple cameras using Zivid Studio, start another instance of Zivid Studio.

Firmware Update

Each SDK version is matched with camera firmware, and the SDK will make sure that the camera runs compatible firmware. When Zivid Studio connects to a camera, it will check whether the camera has matching firmware. If the firmware does not match, you will get prompted to update the firmware on your camera. Read more about Firmware Update .
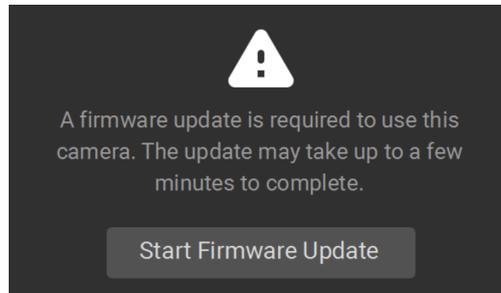
2.2. Capture

This section is used to capture 3D and 2D images. Here you can control and configure the camera settings. This section has two modes:

- 3D capture
- 2D capture

3D Capture

The 3D capture has two modes:

- Assisted Mode
- Manual Mode

Assisted Mode

The assisted modes are:

- Presets
- Auto (Scene analysis)

Presets

This mode is the easiest to use.

Part of the Zivid SDK is the presets, a set of pre-tuned settings. These presets are aimed to simplify tuning of the camera parameters and are an alternative to Capture Assistant . While Capture Assistant tries to optimize exposure settings for any scene depending on a time budget, presets are specifically tuned for the following categories:

- Consumer Goods
- Parcels
- Manufacturing
- Inspection

Within each category, you will find various presets. These are separated by scene complexity, working distance or by the typical type of material property of objects within that. Different cameras have different presets based on what they are commonly used for.
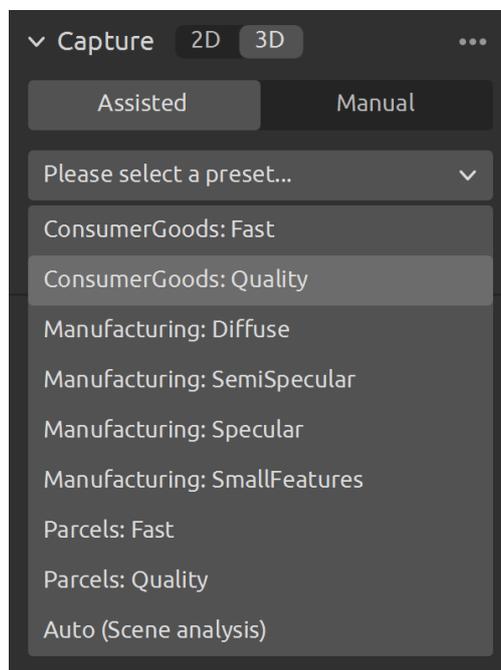
Once a preset is selected the ambient light adaptation can be chosen.
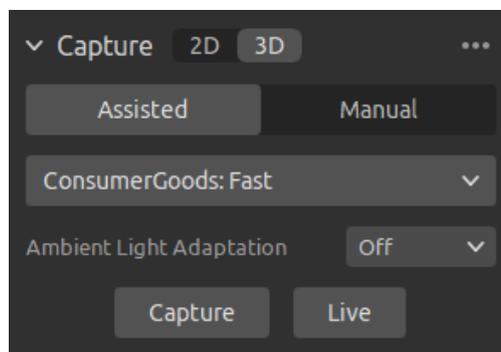
> **ℹ Note**
>
> Ambient light adaptation can increase acquisition and capture time. Default presets do not adapt to any ambient light frequency.

Check Presets Settings to learn more.

Auto (Scene analysis)

This mode also very easy to use.

- Specify Max Capture Time
- Click Analyze & Capture
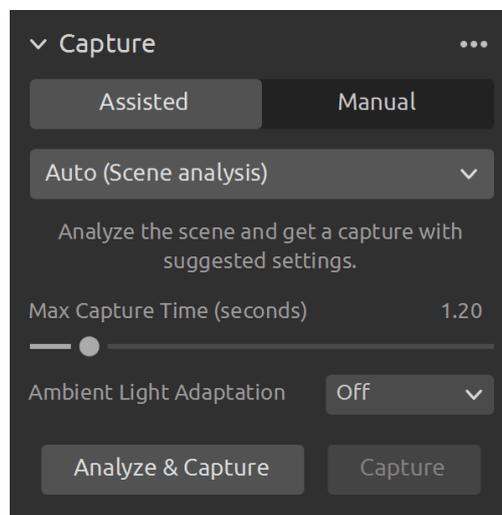
This triggers the camera to analyze the scene and output the camera settings required to cover as much of the dynamic range in the scene as possible. Immediately after this, the camera performs a second capture using these settings.

- Capture performs a capture with the settings suggested by the assisted capture, without additional scene analysis.
- Ambient Light Adaptation is used when ambient light (AC powered) is mixed with the camera's projector. Select your power grid frequency from the drop-down menu:
  - 60 Hz is typically used in Japan, Americas, Taiwan, South Korea, and the Philippines.

- 50 Hz is typically used elsewhere.

|		
⌄ Cameras ⋯	**⌄ Cameras** ⋯	**⌄ Cameras** ⋯
23421GFC (Zivid 2+ L110) ⌄	23421GFC (Zivid 2+ L110) ⌄	23421GFC (Zivid 2+ L110) ⌄
⌄ Capture 2D 3D ⋯	**⌄ Capture** 2D 3D ⋯	**⌄ Capture** 2D 3D ⋯
Assisted | Manual	Assisted | Manual	Assisted | Manual
Auto (Scene analysis) ⌄	Auto (Scene analysis) ⌄	Auto (Scene analysis) ⌄
Analyze the scene and get a capture with suggested settings.	Analyze the scene and get a capture with suggested settings.	Analyze the scene and get a capture with suggested settings.
Max Capture Time (seconds) 1.20	Max Capture Time (seconds) 1.20	Max Capture Time (seconds) 1.20
Ambient Light Adaptation Off ⌄	Ambient Light Adaptation 50 Hz ⌄	Ambient Light Adaptation 50 Hz ⌄
Analyze & Capture | Capture	Analyze & Capture | Capture	Analyze & Capture | Capture
		> Options
		> Sampling
		> Acquisition 1
		ET: 20000 | A: 2.47 | B: 2.50 | G: 1.69
		> Acquisition 2
		ET: 10000 | A: 4.55 | B: 2.50 | G: 1.00

Acquisition and filter settings appear at the bottom right corner of the "Capture" section after camera captures.

Manual Mode

In the manual mode, users must configure all settings and filters manually.

Capture and Live

- The Capture button captures a single acquisition or a multi-acquisition HDR with the specified settings, which is then displayed.
- The Live button triggers continuous captures, which enables you to view the scene in real-time.

⌄ Capture ⋯
Assisted | Manual
Capture | Live
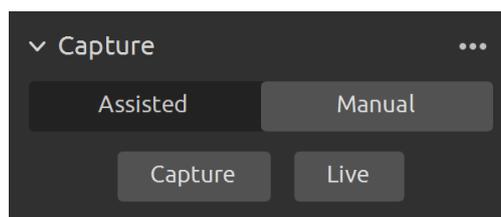
For high dynamic range scenes, it is necessary to use multi-acquisition HDR. In this mode, the camera captures one image per acquisition. Each image captured uses the settings configured for the specific acquisition. These images are then automatically merged into a single, high-quality HDR frame.
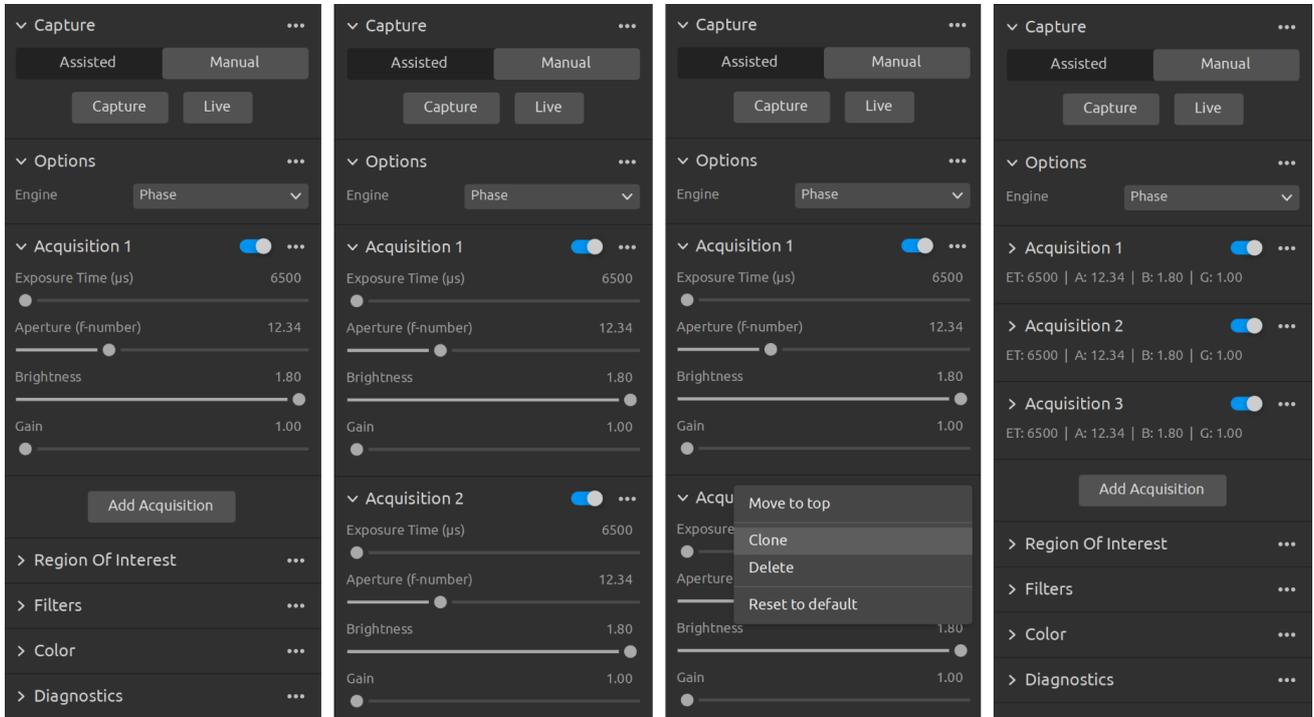
Once you select the manual mode, you can click the Add Acquisition button to add additional acquisitions. By default, each new acquisition added uses the settings of the previous acquisition. You can clone a specific acquisition by clicking on the three dots next to that acquisition and then on the Clone acquisition option. Use the same menu to reset acquisition settings or delete individual acquisitions. Disable or enable acquisitions with the checkbox.

Click the Capture button to capture an image with the acquisition settings specified; unchecked acquisitions are ignored by the capture.

You can also use the Assisted mode to get suggested settings, and then switch to the Manual mode to fine-tune these settings manually. For more information about the settings panel see Settings and Filters .

2D Capture

The 2D capture only has a manual mode, where the user configures 2D capture settings manually.

Capture and Live

- The Capture button captures a single acquisition with the specified settings, which is then displayed.
- The Live button triggers continuous captures, which enables you to view the scene in real-time.

2.3. Settings and Filters

All of the settings and filters listed here apply to 3D capture. Acquisition settings are also used in 2D capture. No filters are available for 2D capture. Some other settings are also available for 2D capture.

Engine (only 3D)

The Vision Engine is the backbone of the point cloud computation. It controls the pattern projecting , imaging, and processing of the images of the projected pattern to generate the final 3D point cloud.

Options	Function
Engine	Choose between different pattern projections.
Reset to default	Reset the Engine to the default value.
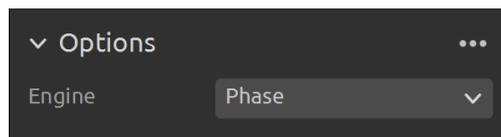
Check Vision Engine to learn more.

Sampling

Setting	Function
Color (only 3D)	Selectively include or exclude color information in the captured point cloud.
Pixel	Choose the light color of the projected patterns and sampled pixels; this affects the point cloud resolution.
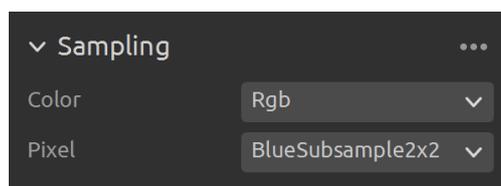
Check Sampling to learn more.

Exposure Settings

| Setting	Function
Exposure Time	The duration a single camera image is exposed to light.
Aperture Step/F-number	The opening that controls the amount of light to the camera sensor through the lens.
Brightness	The output power (the amount of light) emitted by the LED projector.
Gain	The amplification of the signal from the camera sensor.
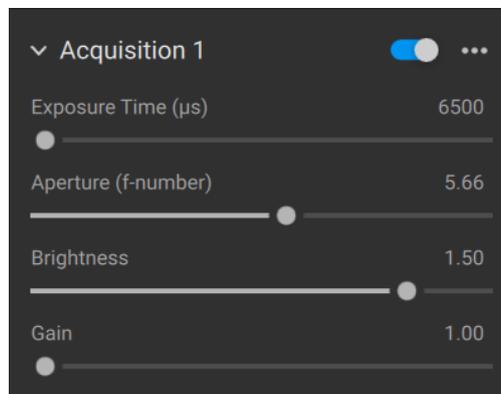
To learn how to tune settings check Capturing High Quality Point Clouds .

Region Of Interest (only 3D)

Setting	Function
Box	Create and configure a box in 3D and remove the points outside the box.
Depth	Remove points outside a user-defined depth range.

Check Region Of Interest to learn more.

Filters (only 3D)

Setting	Function
Cluster Filter	Remove floating points and isolated clusters from the point cloud.
Hole Repair	Fill in removed points, by interpolation between the remaining points.
Noise Filter	Remove or correct points where the projected pattern signal-to-noise-ratio is low.
Outlier Filter	Remove points if the distance to their neighboring pixels within the small local region is larger than the threshold specified in mm.
Reflection Filter	Remove points impacted by reflections and thus erroneous.
Gaussian Smoothing	Perform Gaussian smoothing on the point cloud.
Contrast Distortion	Correct and/or remove points affected by blurring in the camera lens.

Filters

Cluster
Removal

MaxNeighborDistance   10.00

MinArea   100.00

Hole
Repair

HoleSize   0.20

Strictness   2

Noise
Removal

Threshold   5.00

Suppression

Repair

Outlier
Removal

Threshold (mm)   10.00

Reflection
Removal

Mode   Global

Smoothing
Gaussian

Sigma   1.00

Experimental

ContrastDistortion
Correction

Strength   0.30

Removal

To learn how to tune filters check Capturing High Quality Point Clouds .

Color

| Setting	Function
Balance	The color temperature of ambient light affects the appearance of the color image. Adjust blue, green, and red color balance to make color images look natural.
Gamma	The output color image can appear too dark. Adjust the brightness of the color image.
Color Mode (only 3D)	Control how the color image is computed. The options are Automatic, ToneMapping, or UseFirstAcquisition.
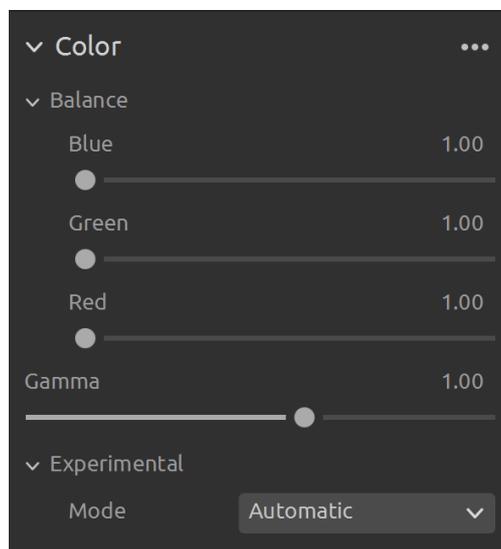
To learn how to tune color settings check Optimizing Color and Color Balance .

Diagnostics (only 3D)

The diagnostics setting is used to collect extra diagnostic data from a capture. When this setting is enabled the additional data will be saved in the .zdf file. It is recommended to only enable it when reporting issues to Zivid's support team.
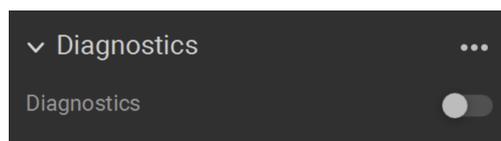
> ⚠ **Caution**
>
> Diagnostics increases the capture time, the RAM usage, and the size of the .zdf file.

3. Available Views

There are five views available at the bottom of Zivid Studio. These views show the following features:

- The point cloud
- The color image
- The depth map
- The SNR map
- The normal map

To navigate between views you can either

- Use the keyboard shortcuts 1 through 5
- Change manually at the bottom of the GUI by clicking on the thumbnails
- Select from the drop-down menu in the top left corner

3.1. Point Cloud

This view displays the point cloud of the scene after a capture or after loading a ZDF file.

- Use the left mouse button to rotate the point cloud.
- Use the right mouse button to pan.
- Zoom in or out by rolling the mouse wheel or, if available, by the middle mouse button followed by dragging the mouse.

Turning color (C & D) and mesh (M) on and off in this view helps evaluate the point cloud quality. The point size is also adjustable through the drop-down menu at the top left. Adjusting the point size is for example helpful for inspecting areas where textures are important.
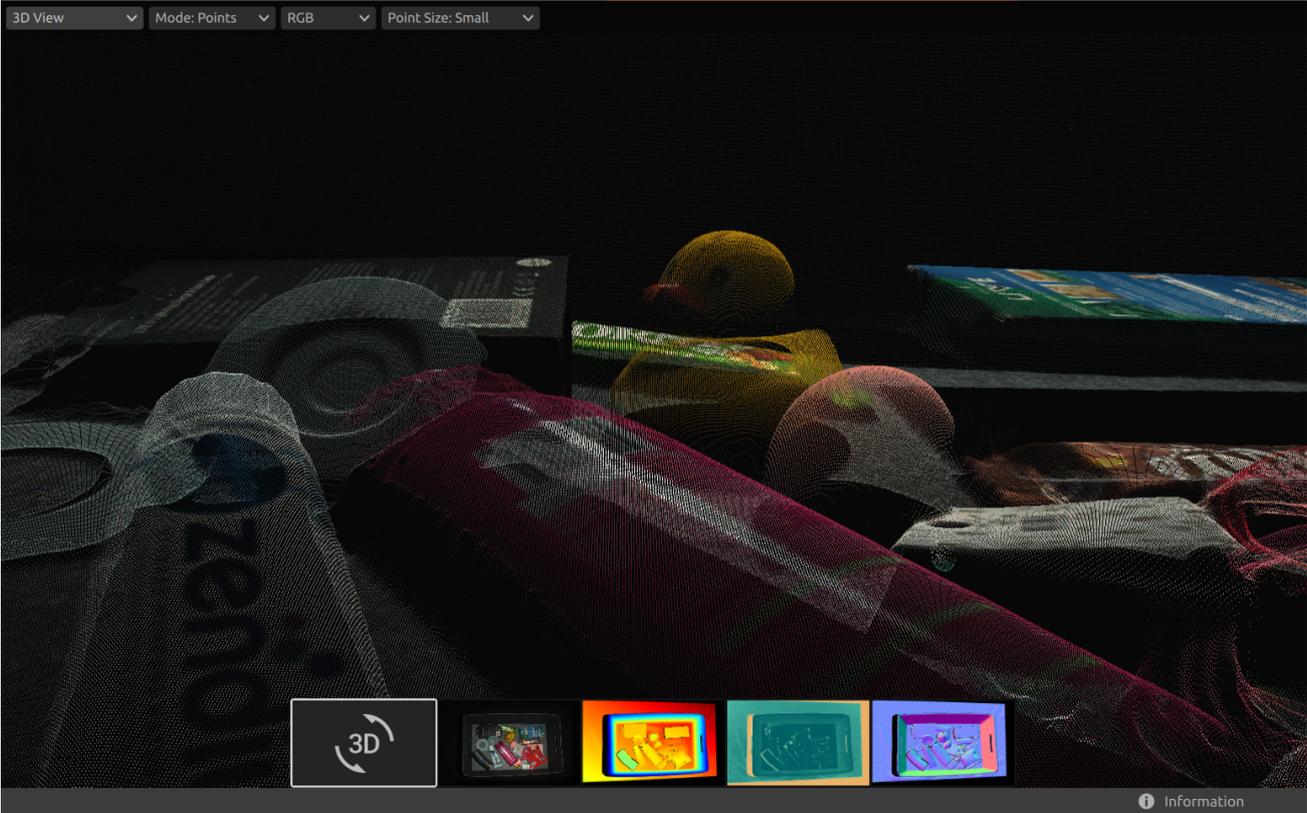
3.2. Color

This view displays the color image of the scene after a capture or after loading a ZDF file.

- Position the mouse pointer over a pixel in the image to get image coordinates, RGB, and SNR values . The pixel values are displayed in the status bar in the bottom left corner of the window.
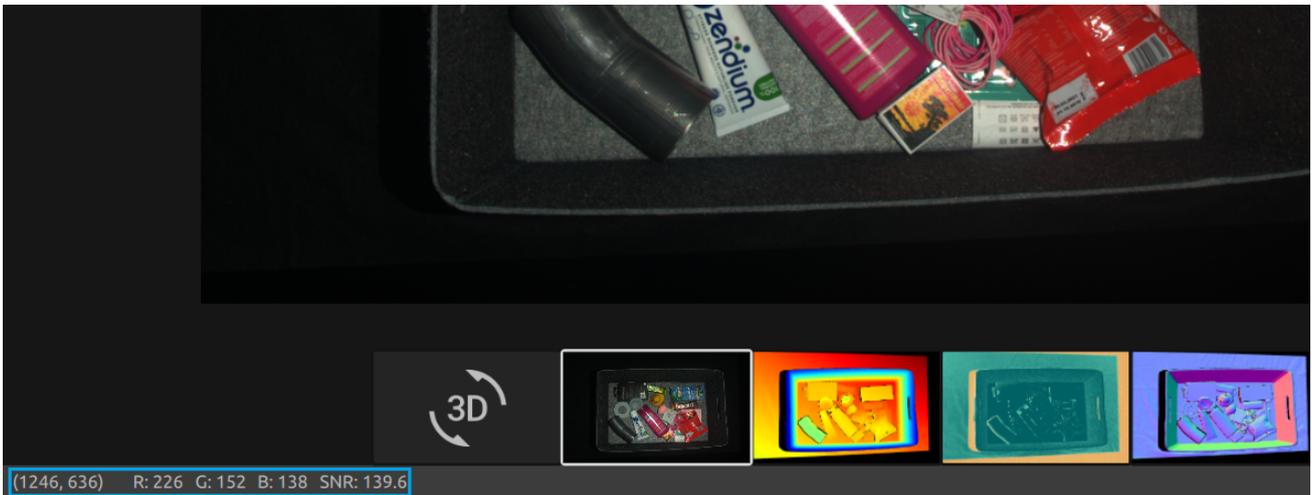
- Zoom in or out by rolling the mouse wheel or, if available, by the middle mouse button followed by dragging the mouse.
- Use the left mouse button to pan the view.

## 3.3. Depth

This view displays the depth image of the scene after a capture or after loading a ZDF file.

- Position the mouse pointer over a pixel in the image to get image coordinates, XYZ, and SNR values . The pixel values are displayed in the status bar in the bottom left corner of the window.
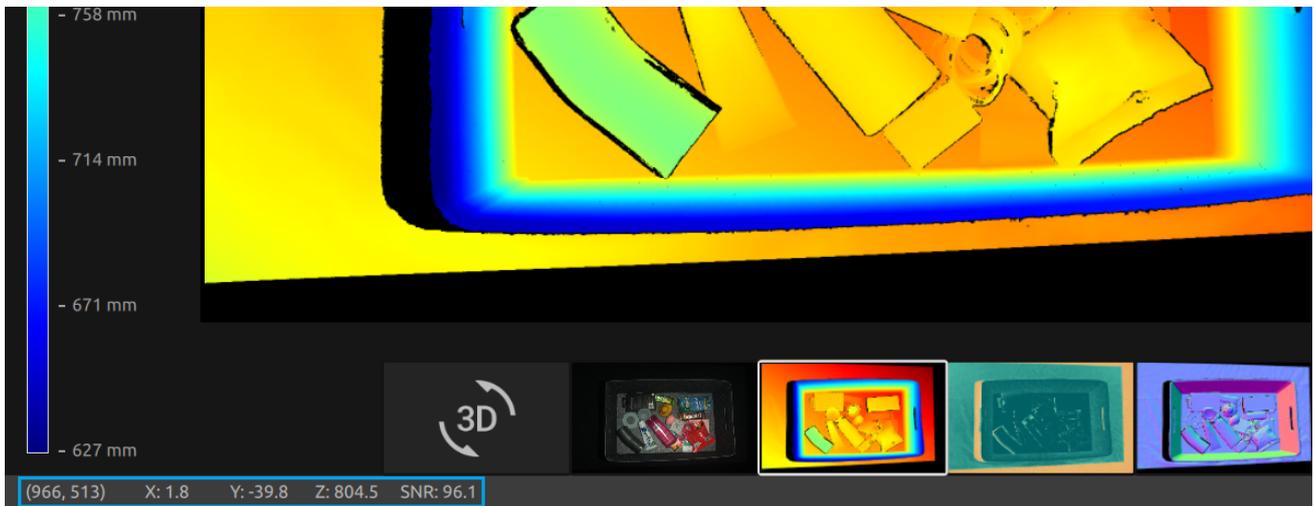
- Use the drop-down menu located at the top left corner of the view to modify the Z range.
- Use zoom and pan functionalities in the same way as described in the Color View .

The color scale represents the distance variation along the z-axis from the camera to the surfaces of the imaged objects.
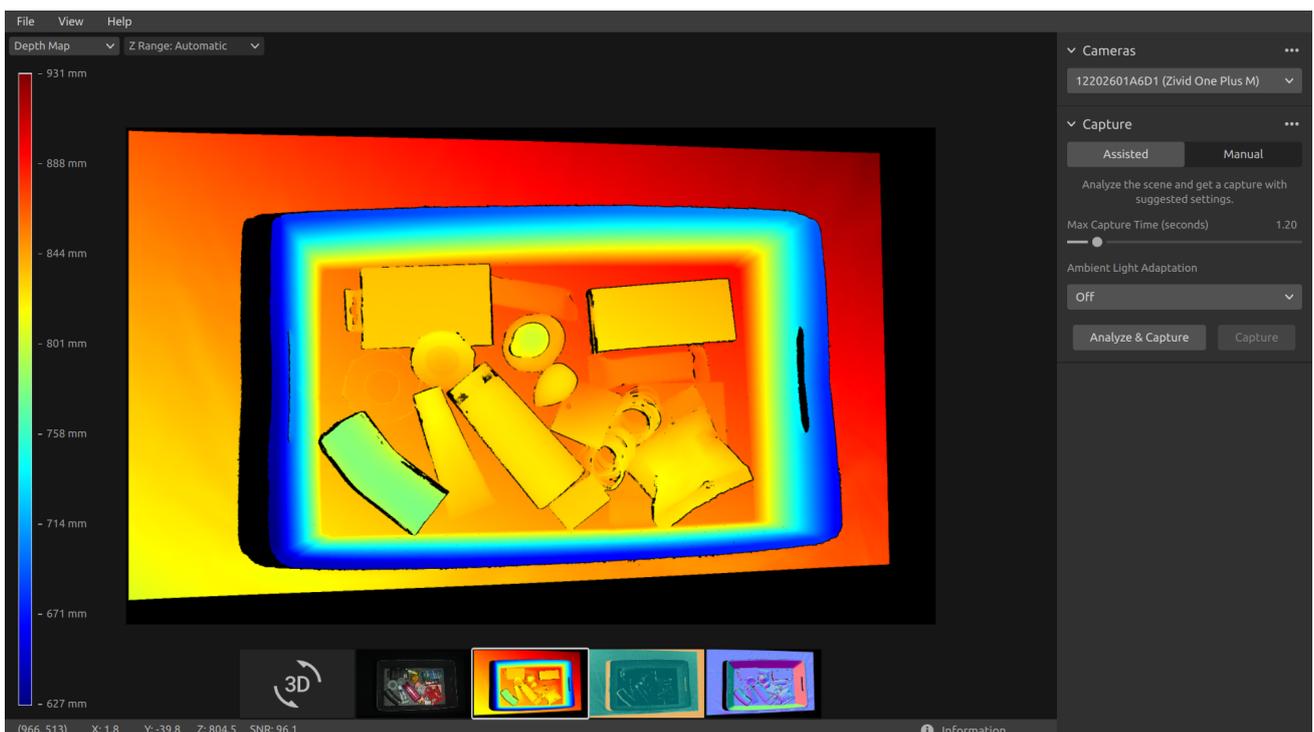
3.4. Signal-to-Noise-Ratio

This view displays the SNR map of the scene after a capture or after loading a ZDF file.

- Position the mouse pointer over a pixel in the image to get image coordinates and SNR values . The pixel values are displayed in the status bar in the bottom left corner of the window.
- Use zoom and pan functionalities in the same way as described in the Color View .
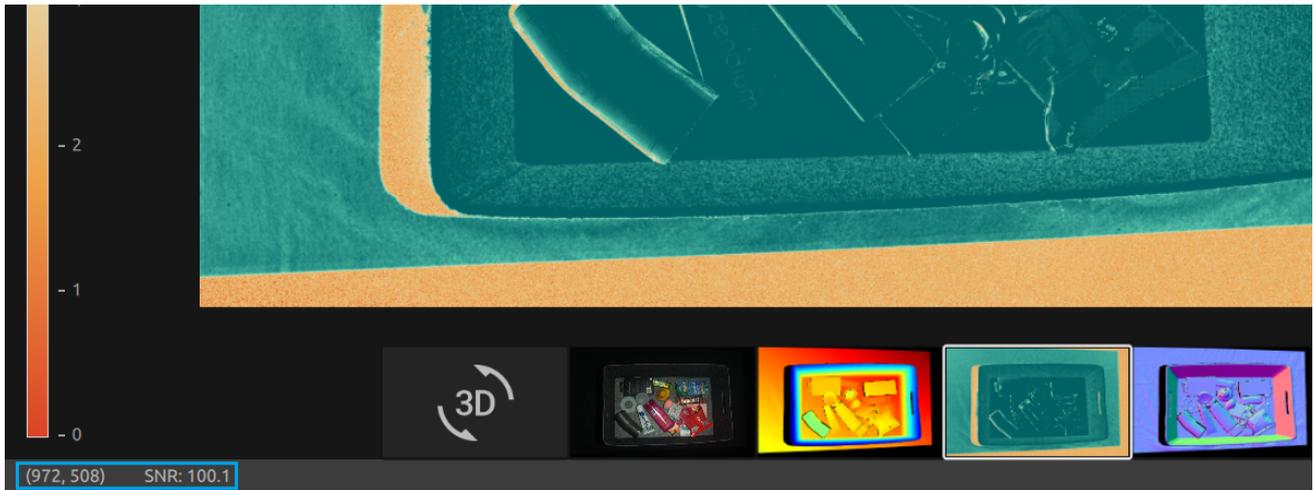
The color scale represents the variation in the SNR values . A pixel found at the higher end of the color scale represents a point associated with strong signal quality. For a point associated with a pixel found at the lower end of the color scale the ratio is more influenced by noise. Hence, these points involves higher uncertainty. For a detailed explanation, see the SNR values Article .
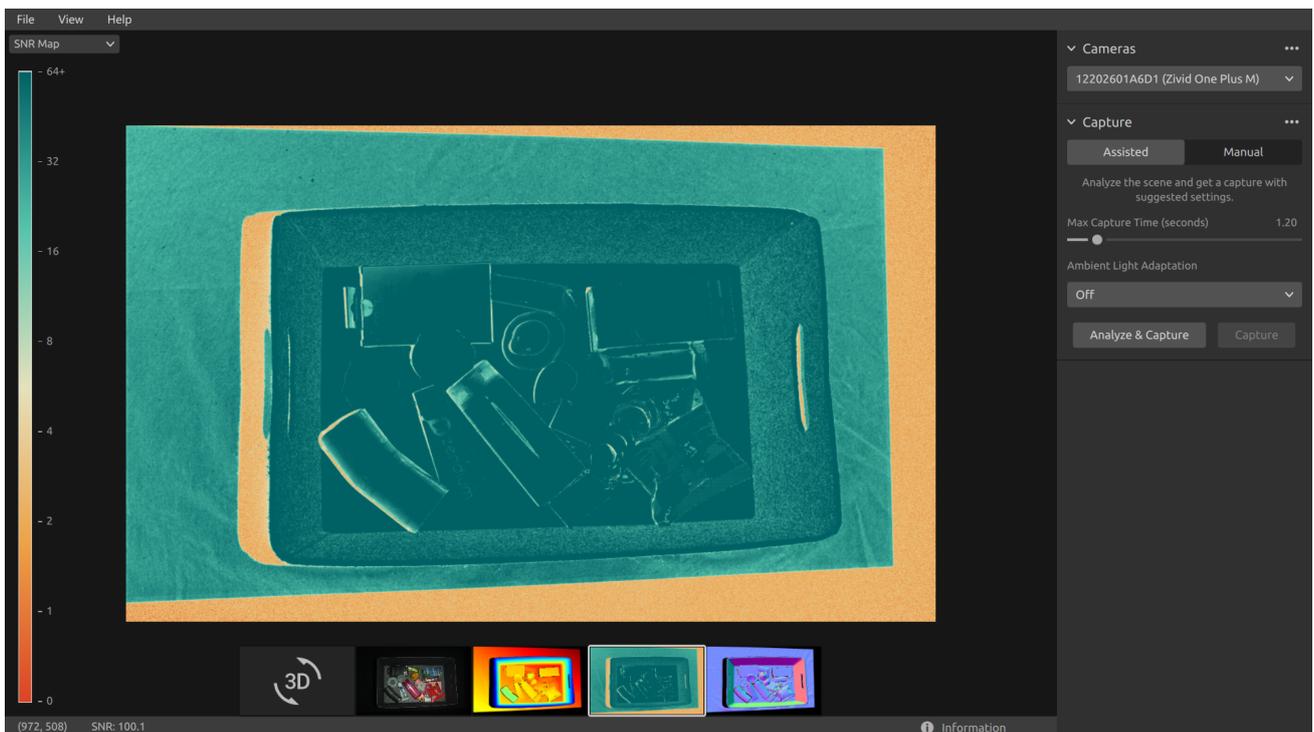
3.5. Normals

This view displays the normal map of the scene after a capture or after loading a ZDF file.

- Position the mouse pointer over a pixel in the image to get image coordinates, normal coordinates, and SNR values . The pixel values are displayed in the status bar in the bottom left corner of the window.
- Use zoom and pan functionalities in the same way as described in the Color View .
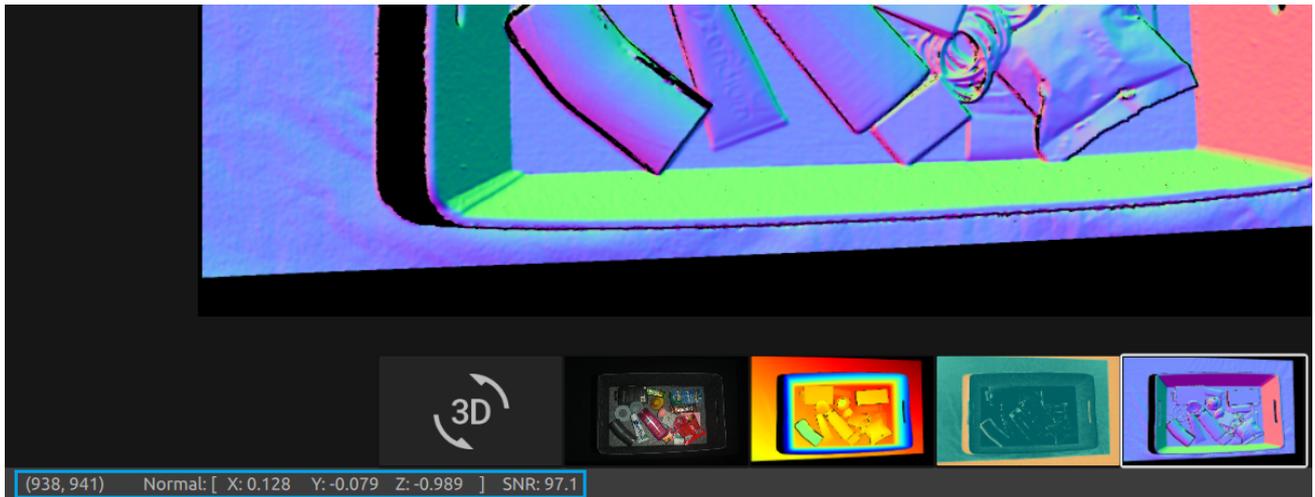
The normal map provides a 2D representation of the surface normals of a scene where RGB color components describe the normal vectors. For an introduction to normals, see the Normals Article .

The relationship between the normal vectors and the color components are well visualized in the normal map by the bin walls and floor. This is because all the points on each surface have the normal vectors pointing more or less in the same direction.

The color convention of the normal map is negatively aligned with the camera coordinate system . Hence, normal vectors represented by blue pixels point perpendicular towards the camera. Looking at the normal map, the blue pixels can be seen on the bin floor. These normals point in the negative direction of the Z-axis of the camera coordinate system. The status bar in the bottom left corner is then close to [0, 0, -1]. An example is outlined in the below image.

Furthermore, the right bin wall is dominated by red pixels. These normals are negatively aligned with the X-axis of the camera coordinate system. This means that the surface has normal vectors pointing towards the left in the scene. Likewise, the bottom bin wall is colored green since the normals are pointing upwards in the scene. Hence, the status bar would respectively read close to [-1, 0, 0] for a red pixel and close to [0, -1, 0] for a green pixel.
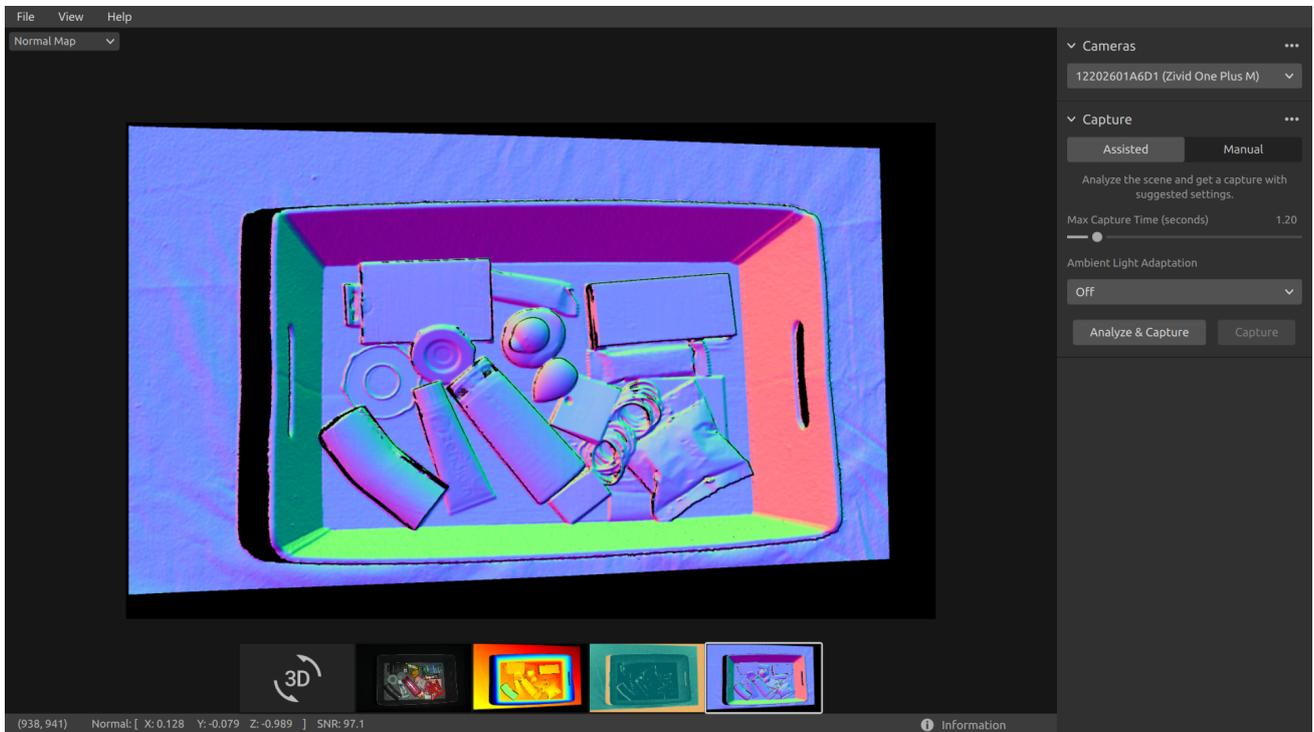
As a result, the normal map is useful for seeing planes in the point cloud. The normal map is also helpful in inspecting surface curvatures, surface textures, and transitions between objects as the color gradients describe these well.

Dropdowns & Information

For each available view, there are dropdowns in the top left corner.

In the Point Cloud view, the dropdowns allow one to easily:

- Toggle between Points and Mesh.
- Change the point cloud color between RGB, Green, and Color.
- Change the Point Size between Small, Medium, and Large.
- Show Region of Interest Box (when ROI is used)

In the Depth Map view, it is possible to:

- Change the Z Range in mm between Automatic and Fixed.
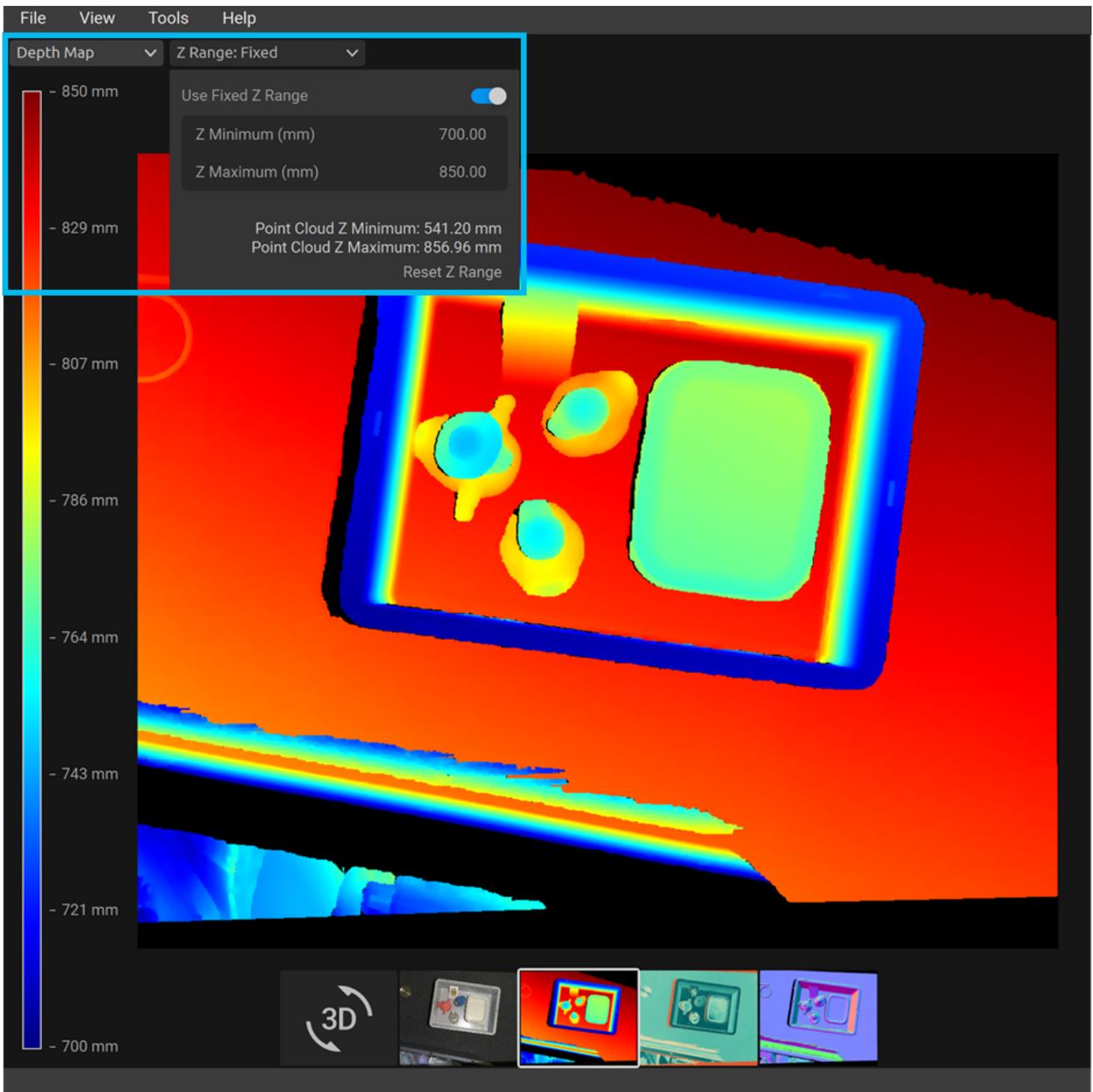
4.   Toolbar

The toolbar is located at the top of Zivid Studio. It consists of drop-down menus to handle files, control the GUI, configure cameras and get information about the Zivid software.

File	View	Cameras	Tools	Help	
Open					Ctrl+O
Save					Ctrl+S
Export					Ctrl+E
Save Color Image					
Save Depth Map					
Import Capture Settings					Ctrl+Shift+I
Export 2D Capture Settings					Ctrl+Alt+Shift+E
Export 3D Capture Settings					Ctrl+Shift+E
Exit					Alt+F4

| View	Cameras	Tools	Help	
☐ Histogram				H
☐ Information				Shift+I
☑ Reset 3D View When Opening Files				
Reset View				Backspace
Reset UI Layout				
Enter Full Screen Mode				F11

Cameras	Tools	Help	
All Cameras			Ctrl+Shift+C

Tools	Help
Infield Correction	

Help
View Help Online
About Zivid Studio

4.1.   File

Zivid Studio offers various saving options for point clouds, color images, and settings to disk.

Save/Export Point Cloud

To save the point cloud in file ZDF format:

- Click on File → Save
- Navigate to the location where you want to save the point cloud
- Write down the file name
- Click Save

> ❗ **Note**
>
> ZDF is the native Zivid file format that includes point cloud, color image, and depth image data, and is the preferred file format for the Zivid Customer Success Team.

To export to one of our supported point cloud formats , unordered or ordered Polygon (PLY), ASCII (XYZ), or Point Cloud Data (PCD) [1] file format:

- Click on File → Export
- Navigate to the location where you want to save the point cloud
- Write down the file name
- Click Save

[1] PCD is by default exported as unorganized points but can be configured to be exported as organized points. See Organized Pcd Format Label for a tutorial on how to export PCD as organized points.

Open Point Cloud

Opening a point cloud in Zivid Studio is only supported for ZDF file format:

- Click on File → Open
- Navigate to the location of your ZDF file
- Click Open

You can also drag and drop a ZDF file into Zivid Studio.

Save Color Image

You can also save the 2D color image in one of our supported image formats , PNG, BMP and JPG. For all formats, you can choose between sRGB and linear RGB color space.

- Click on File → Save Color Image
- Navigate to the location where you want to save the color image
- Write down the file name
- Select image format type and color space
- Click Save

Save Depth Map

You can also save the colored depth map in PNG format.

- Click on File → Save Depth Map
- Navigate to the location where you want to save the depth map
- Write down the file name
- Click Save

Export Settings

It is possible to save all settings to disk.

- Click on File → Export Capture Settings
- Navigate to the location where you want to save the settings
- Write down the file name

- Click Save

Import Settings

To import the settings in Zivid Studio:

- Click on File → Import Capture Settings
- Navigate to the location of your settings file
- Click Open

You can also drag and drop a YML file into Zivid Studio to import the settings.

4.2. View

Histogram

To show the 2D image histogram:

- Click on View → Histogram
- Swap between Linear and Logarithmic to change scales
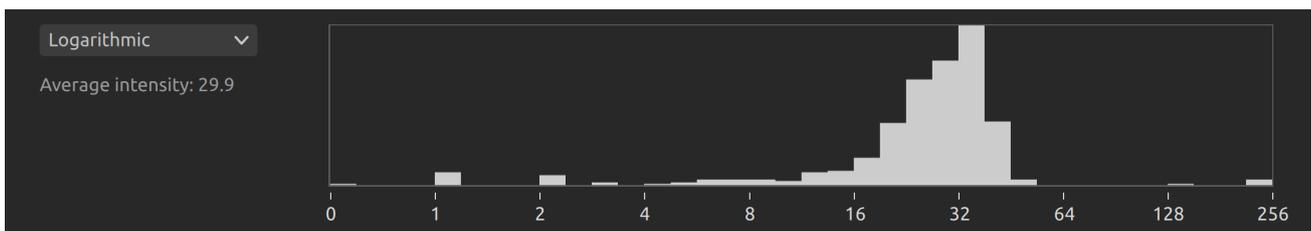
Read more about the Histogram .

Information

To open the information panel:

- Click View → Information or Information in the bottom right corner

It is available only after you load a point cloud from a ZDF file or capture a point cloud or a color image.

The top part of the Information panel shows Acquisition Time, Capture Time, and Point Cloud / Color Image Size.
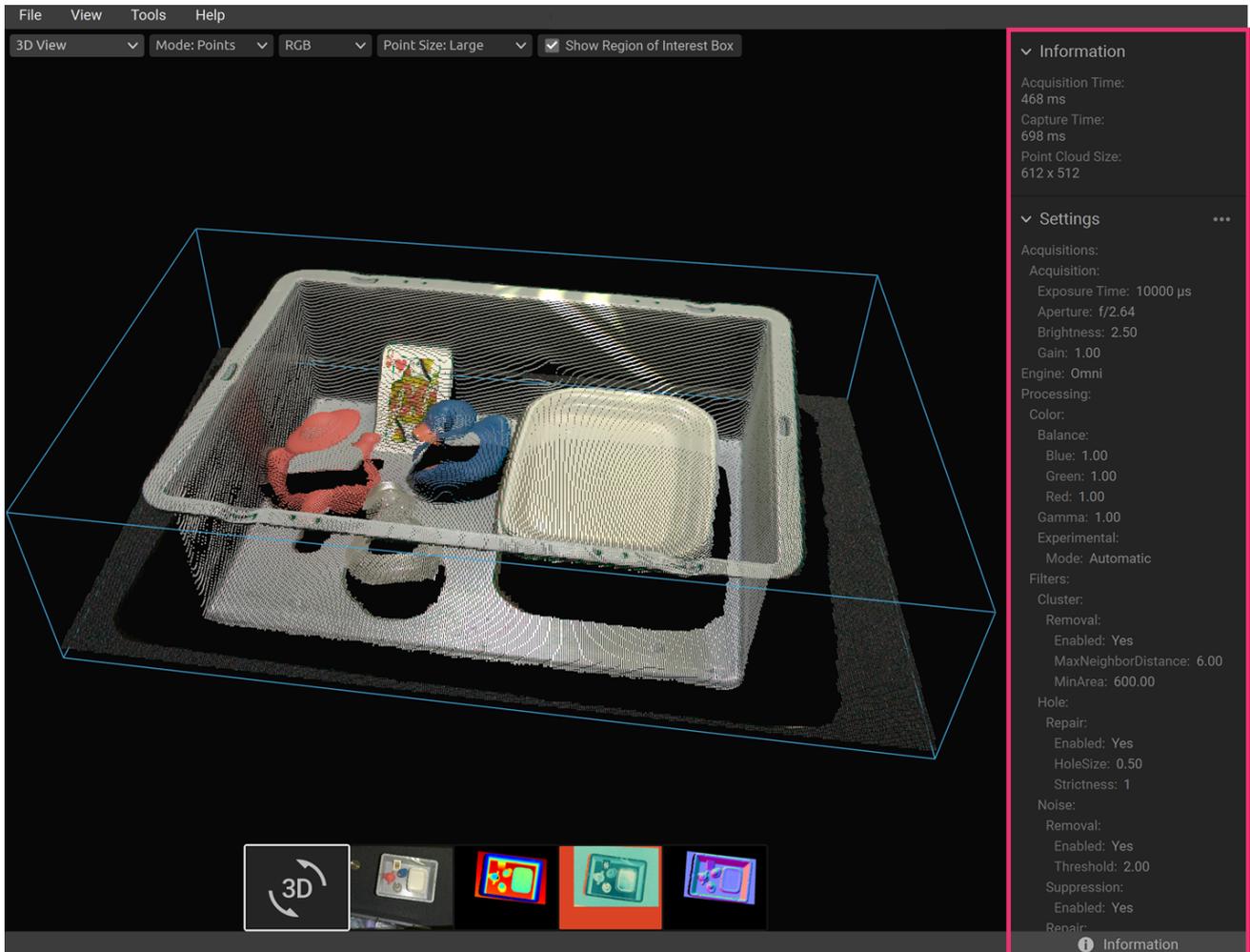
The bottom part shows the settings that were used in the capture. It is possible to save these settings to a file or apply them for use in the next capture.
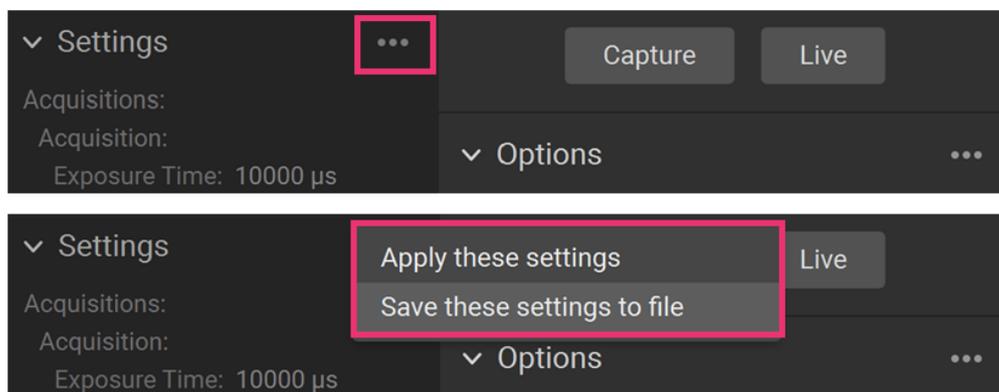
4.3. Cameras

All Cameras

To open the Cameras menu:

- Click on Cameras → All Cameras

This will list all discovered cameras and their serial numbers, models, IP addresses and statuses.
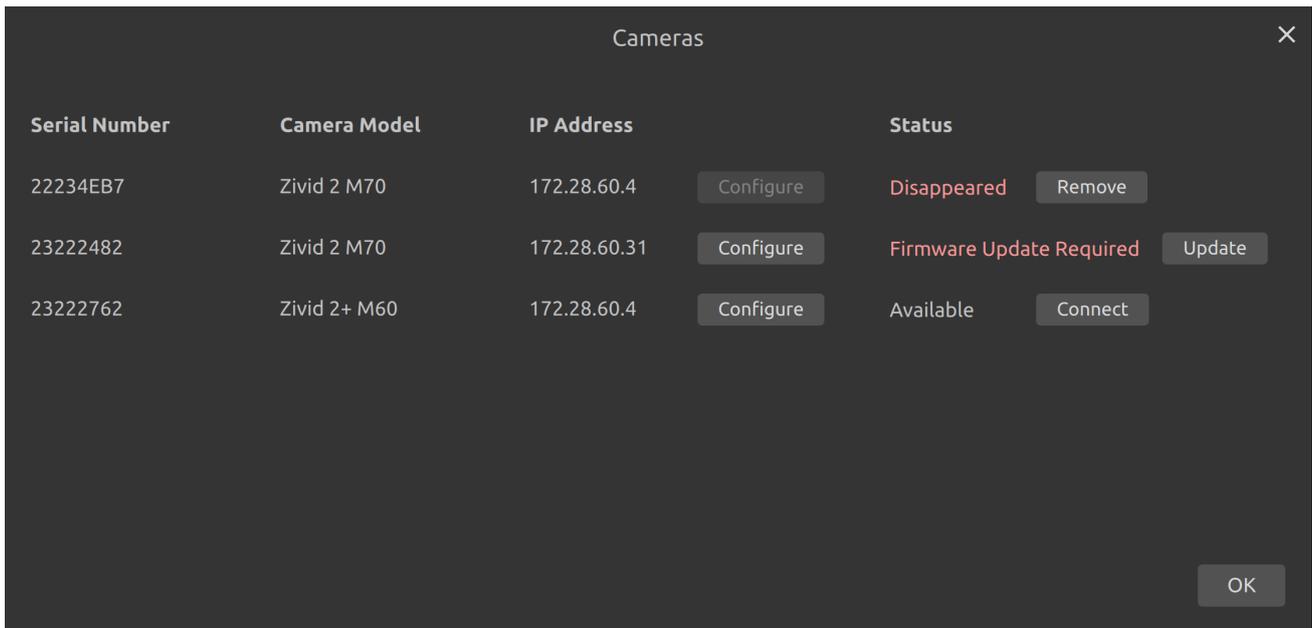
Serial Number	Camera Model	IP Address		Status	
22234EB7	Zivid 2 M70	172.28.60.4	Configure	Disappeared	Remove
23222482	Zivid 2 M70	172.28.60.31	Configure	Firmware Update Required	Update
23222762	Zivid 2+ M60	172.28.60.4	Configure	Available	Connect

The status-field allows the following actions:

- Connect to connect to the camera if it is available
- Disconnect to disconnect from the camera if it is connected
- Update to update the firmware of the camera if it is available but needs a firmware update
- Remove to remove the camera from the list if it is no longer found

You can change the network configuration of any discovered camera by clicking Configure . This will open the camera network configuration.

Here you can set the camera to use DHCP or a specific static IP address, and apply the configuration to the camera by clicking Apply . The status of the camera may change after applying the network configuration.

4.4. Tools

Infield Correction

To open the Infield Correction tool:

- Click on Tools → Infield Correction
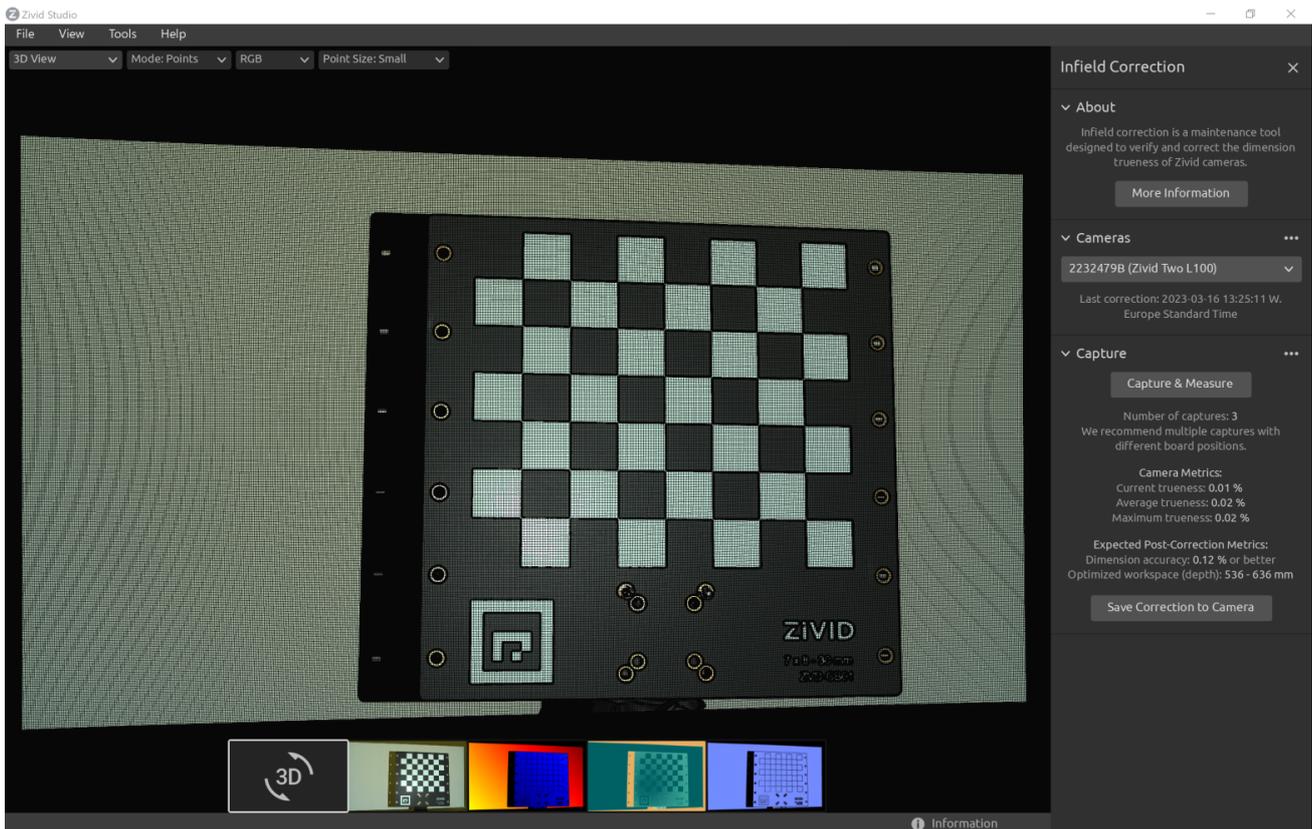
Infield Correction functionality overview

- Last correction shows the last date and time an infield correction was written to the camera.
- Capture & Measure captures to determine the local dimension trueness error of the point cloud where the Zivid calibration board is placed.
- Current Camera Metrics shows the local dimension trueness error for the last capture taken with Capture & Measure , as well as the average and the maximum for all the captures.
- Current trueness shows the local dimension trueness error for the last capture taken with Capture & Measure .
- Average trueness shows the average of the local dimension trueness errors for all the captures taken with Capture & Measure so far.
- Maximum trueness shows the maximum of the local dimension trueness errors for all the captures taken with Capture & Measure so far.
- Expected Post-Correction Metrics shows the estimated post-correction error within 1σ statistical uncertainty over the working distances the images were captured at.

- Save Correction to Camera writes to the camera the parameters for improving the accuracy of the point cloud determined from the captures of the Zivid calibration board taken with Capture & Measure .
- Reset Camera Correction removes any infield correction that has been applied in previous correct instances. It is not required to do a reset before doing a new infield correction.

Learn more about Infield Correction .

4.5.   Dropdown Menus

File	Shortcut	Function
Open	`Ctrl + O`	Load a ZDF file. .zdf is the native Zivid file format that includes point cloud, color image, and depth image data.
Save	`Ctrl + S`	Save a point cloud, color image, and depth image data to a ZDF file, the native Zivid file format.
Export	`Ctrl + E`	Export a point cloud data to a file in unordered or ordered Polygon (PLY), ASCII (XYZ), or Point Cloud Data (PCD) [1] file format.
Save Color Image	N/A	Save a color image to a file in PNG, BMG, or JPG file format.
Save Depth Map	N/A	Save a colored depth map to a file in PNG file format.
Import Capture Settings	`Ctrl + Shift + I`	Load saved capture settings from a file in YML into Zivid Studio
Export 2D Capture Settings	`Ctrl + Alt + Shift + E`	Save current 2D capture settings from Zivid Studio into a file in YML.
Export 3D Capture Settings	`Ctrl + Shift + E`	Save current 3D capture settings from Zivid Studio into a file in YML.
Exit	`Alt + F4`	Exit Zivid Studio.

View	Shortcut	Function
Histogram	`H`	Open the Histogram, a tool for analyzing pixel intensity distribution on an image.
Information	`Shift + I`	Open the Information panel to display capture information such as camera model, acquisition time, capture time and settings used. Provides ability to apply or save settings from previous captured point cloud.
Reset View	`Backspace`	Reset the point cloud, color image, and depth image view back to the default view.
Reset 3D view when opening files	N/A	Enable/disable 3D view reset when opening files.
Reset UI Layout	N/A	Reset the layout of the Zivid Studio window.
Enter/Exit Full Screen Mode	`F11`	Toggle between full and regular screen mode.

Cameras	Shortcut	Function
All Cameras	`Ctrl + Shift + C`	Open the Cameras menu to list and configure all discovered cameras.

Tools	Function
Infield Correction	Open Infield Correction , a maintenance tool designed to verify and correct the dimension trueness of Zivid cameras.

Help	Function
View Help Online	URL to the Zivid Knowledge Base.
About Zivid Studio	Detailed information about Zivid, third-party software licenses and system info.

5. Quick Reference Index

File	Shortcut	Function
Open	`Ctrl + O`	Load a ZDF file. .zdf is the native Zivid file format that includes point cloud, color image, and depth image data.
Save	`Ctrl + S`	Save a point cloud, color image, and depth image data to a ZDF file, the native Zivid file format.
Export	`Ctrl + E`	Export a point cloud data to a file in unordered or ordered Polygon (PLY), ASCII (XYZ), or Point Cloud Data (PCD) [1] file format.
Save Color Image	N/A	Save a color image to a file in PNG, BMG, or JPG file format.
Save Depth Map	N/A	Save a colored depth map to a file in PNG file format.
Import Capture Settings	`Ctrl + Shift + I`	Load saved capture settings from a file in YML into Zivid Studio
Export 2D Capture Settings	`Ctrl + Alt + Shift + E`	Save current 2D capture settings from Zivid Studio into a file in YML.
Export 3D Capture Settings	`Ctrl + Shift + E`	Save current 3D capture settings from Zivid Studio into a file in YML.
Exit	`Alt + F4`	Exit Zivid Studio.

[1] PCD is by default exported as unorganized points but can be configured to be exported as organized points. See Organized Pcd Format Label for tutorial on how to export PCD as organized points.

View	Shortcut	Function
Histogram	`H`	Open the Histogram, a tool for analyzing pixel intensity distribution on an image.
Information	`Shift + I`	Open the Information panel to display capture information such as camera model, acquisition time, capture time and settings used. Provides ability to apply or save settings from previous captured point cloud.
Reset View	`Backspace`	Reset the point cloud, color image, and depth image view back to the default view.
Reset 3D view when opening files	N/A	Enable/disable 3D view reset when opening files.
Reset UI Layout	N/A	Reset the layout of the Zivid Studio window.
Enter/Exit Full Screen Mode	`F11`	Toggle between full and regular screen mode.

Cameras	Shortcut	Function
All Cameras	`Ctrl + Shift + C`	Open the Cameras menu to list and configure all discovered cameras.

Tools	Function
Infield Correction	Open Infield Correction , a maintenance tool designed to verify and correct the dimension trueness of Zivid cameras.

Help	Function
View Help Online	URL to the Zivid Knowledge Base.
About Zivid Studio	Detailed information about Zivid, third-party software licenses and system info.

Function	Shortcut
Navigate to 3D View	`1`
Navigate to Color Image	`2`
Navigate to Depth Map	`3`
Navigate to SNR Map	`4`
Navigate to Normal Map	`5`
Enable/disable Monochrome (Green) point cloud color	`C`
Enable/disable Depth Map point cloud color	`D`
Enable/disable Mesh in point cloud	`M`
Increase point size	`Ctrl + Alt + +`
Decrease point size	`Ctrl + Alt + -`

Cameras	Function
List all cameras	Open the Cameras menu and list all cameras.
Scan for connected cameras	Show all cameras plugged into the PC and list them by model and serial number.
Connect	Connect to the camera selected in the drop-down menu. Zivid Studio can connect to a single camera at a time.
Configure this camera	Open the Cameras menu and configure the IP, subnet mask and mode of the selected camera.
Disconnect from active camera	Disconnect from the active camera.

Capture	Shortcut	Function
2D	`Shift + 2`	Switch to 2D capture mode.
3D	`Shift + 3`	Switch to 3D capture mode.
Assisted Mode	`Shift + M`	Switch to assisted capture mode.
Please select a preset...	N/A	Opens a list of predefined settings, the last in the list `Auto(Scene Analysis)`, is the only one that will not always produce the same settings.
Max Capture Time (seconds)	N/A	Maximum capture time in seconds for assisted capture.
Ambient Light Adaptation	N/A	Specify if and to what ambient light frequency the assisted capture is to adapt.
Analyze & Capture	N/A	Analyze the scene using the Capture Assistant and then capture with the suggested settings.
Capture	`F5`	Trigger a single acquisition or a multi-acquisition HDR with the settings specified in the checked acquisitions; unchecked acquisitions are ignored.
Manual Mode	`Shift + M`	Switch to manual capture mode.
Live	`Shift + F5`	Trigger a continuous capture that allows viewing the scene in real-time.
Stop (Live)	`Esc`	Stops the continuous capture that allows viewing the scene in real-time.
Expand all acquisitions	N/A	Expand the settings on all acquisitions.
Collapse all acquisitions	N/A	Collapse the settings on all acquisitions.
Reset to default	N/A	Reset the control panel to the default state.

Setting	Function
Engine	Choose between different pattern projections.
Reset to default	Reset the Engine to the default value.

Setting	Function
Color	Selectively include or exclude color information in the captured point cloud.
Pixel	Choose the light color of the projected patterns and sampled pixels; this affects the point cloud resolution.

Setting	Function
Exposure Time	The duration a single camera image is exposed to light.
Aperture Step/F-number	The opening that controls the amount of light to the camera sensor through the lens.
Brightness	The output power (the amount of light) emitted by the LED projector.
Gain	The amplification of the signal from the camera sensor.
Toggle switch	Enable/disable the selected acquisition.
Clone acquisition	Add a new frame resembling the setting of the selected acquisition.
Delete acquisition	Delete the selected acquisition.
Add acquisition	Add a new frame resembling the setting of the last acquisition.
Reset acquisition to default	Reset the selected acquisition settings to default value.

Setting	Function
Box	Create and configure a box in 3D and remove the points outside the box.
Depth	Remove points outside a user-defined depth range.

Setting	Function
Cluster Filter	Remove floating points and isolated clusters from the point cloud.
Hole Repair	Fill in removed points by interpolating remaining surrounding points.
Noise Filter	Remove or correct points where the projected pattern signal-to-noise-ratio is low.
Outlier Filter	Remove points if the distance to their neighboring pixels within the small local region is larger than the threshold specified in mm.
Reflection Filter	Remove points impacted by reflections and thus erroneous.
Gaussian Smoothing	Perform Gaussian smoothing on the point cloud.
Contrast Distortion	Correct and/or remove points affected by blurring in the camera lens.
Reset to default	Reset the filters to the default state.

Color	Function
Blue color balance	The color temperature of ambient light affects the appearance of the color image. Setting white balance by adjusting blue color balance makes the color image look natural. The blue color balance parameter ranges between 1.0 and 8.0.
Green color balance	The color temperature of ambient light affects the appearance of the color image. Setting white balance by adjusting green color balance makes the color image look natural. The green color balance parameter ranges between 1.0 and 8.0.
Red color balance	The color temperature of ambient light affects the appearance of the color image. Setting white balance by adjusting red color balance makes the color image look natural. The red color balance parameter ranges between 1.0 and 8.0.
Gamma	The output color image can appear too dark. Adjust the brightness of the image.
Color Mode	Control how the color image is computed. The options are Automatic, ToneMapping, or UseFirstAcquisition.
Reset to default	Resets blue, green, and red color balance to default values.

Setting	Function
Resampling Mode	Upsample or downsample the point cloud based on the selected resampling mode.

6. Support

For more information, visit:

support.zivid.com

The Zivid Knowledge Base offers solutions to frequently encountered issues and questions concerning Zivid products, encompassing both software and hardware aspects. Additionally, you'll discover comprehensive articles exploring our camera technology, best practices, and various 3D imaging techniques, including structured light. These resources aim to enhance your understanding and utilization of our product.

7. About Zivid

Zivid is a market-leading provider of 3D machine vision cameras and software for next generation robotics and industrial automation systems. Its Zivid 2+ and Zivid 2 products are regarded as the world's most accurate real-time 3D color cameras and bring human-like vision to the smart factories and warehouses of Industry 4.0.

To find out more about Zivid, visit:

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