

Zivid Studio User Guide



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1. Introduction

Zivid Studio is the graphical user interface (GUI) for the Zivid SDK. This allows the user to explore the functionality of the Zivid Cameras and the capturing of high definition 3D point clouds.



Use Zivid Studio to learn and understand how the majority of functions available in the Zivid SDK works. This is useful when developing your application. You can:

- Capture point clouds.
- Visualize point clouds, color images (2D), and depth maps (Z axis).
- Analyze and evaluate 3D data quality.
- Determine correct settings and filters for your target objects and scenes.
- Save point clouds and color images to disk.

2. Control Panel

The control panel is located on the right side in the Zivid Studio GUI. It contains two sections:

- Camera
- Capture

2.1 Camera

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

➤ Camera Scan for connected cameras ► On cameras found. Connect the Zivid camera to the USB3 port on your PC.	✓ Cameras ··· 19200CB2 (Zivid One Plus M) ✓ Connect ►	 Cameras 19200CB2 (Zivid One Plus M) Capture Assisted Mode 	 	Camera Scan for connected cameras J9200CB; Disconnect from active camera Capture Assisted Mode v		
Camera	Function					
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.					
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 firmware on your camera.



2.2 Capture

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

- Assisted Mode
- Manual Mode

Assisted Mode

This mode is the easiest to use.

- Specify the maximum capture time
- Click "Analyze & Capture"

✓ Capture	•••						
Assisted Mode	~						
Analyze the scene and get a capture with suggested settings.							
Max Capture Time (seconds) 1.20							
Ambient Light Adaptation							
Off	~						
Analyze & Capture 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.

• The "Capture" button performs a capture with the settings suggested by the assisted capture, without additional scene analysis.

✓ Cameras		✓ Cameras		✓ Cameras		✓ Cameras •••
1925D813 (Zivid One Plus M)	~	1925D813 (Zivid One Plus M)	~	1925D813 (Zivid One Plus M)	\mathbf{v}	1925D813 (Zivid One Plus M) 🗸 🗸 🗸
✓ Capture		✓ Capture		✓ Capture		 Capture Expand all acquisitions
Assisted Mode	\sim	Assisted Mode	~	Assisted Mode	\sim	Assisted / Collapse all acquisitions
Analyze the scene and get a capture with suggested settings.		Analyze the scene and get a capture wi suggested settings.	th	Analyze the scene and get a capture with suggested settings.		Analyze Reset to default
Max Capture Time (seconds) 1	.20	Max Capture Time (seconds)	1.20	Max Capture Time (seconds) 1.	.20	Max Capture Time (seconds) 1.20
Ambient Light Adaptation		Ambient Light Adaptation		Ambient Light Adaptation		Ambient Light Adaptation
Off	\sim	50 Hz	~	50 Hz	~	50 Hz 🗸
Analyze & Capture Capture		Analyze & Capture Capture	:	Analyze & Capture Capture		Analyze & Capture Capture
				> Acquisition 1		> Acquisition 1
				ET: 10000 A: 12.70 B: 1.80 G: 1.00 BP: 0	Off	ET: 10000 A: 12.70 B: 1.80 G: 1.00 BP: Off
				> Acquisition 2		> Acquisition 2
				ET: 10000 A: 7.37 B: 1.80 G: 1.00 BP: O	off	ET: 10000 A: 4.02 B: 1.80 G: 1.21 BP: Off
				> Acquisition 3		> Acquisition 3
			ET: 10000 A: 4.28 B: 1.80 G: 1.19 BP: O	off	ET: 10000 A: 3.16 B: 1.80 G: 2.41 BP: Off	

"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 the normal in the rest of the world.

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.

Exposure settings

Setting	Function	
Exposure Time The duration a single camera image is exposed to light.		
Aperture	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.	



Filters

Setting	Function
Noise Filter	Remove points where the projected pattern signal-to-noise-ratio is below the spec- ified threshold.
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	Corrects and/ or removes points affected by blurring in the camera lens.



Color

The color temperature of ambient light affects the appearance of the color image. Set the white balance by adjusting blue, green, and red color balance to make color images look natural.

✓ Color	•••
✓ Balance	
Blue	1.00
Green	1.00
Red	1.00
•	

Gamma

The output color image can appear too dark. Set the Gamma to adjust the brightness of the color image.

Single and Live Captures

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

✓ Capture •••						
Manual M	~					
	Single	Live				

HDR

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.

✓ Capture •••						
Manual Mode						
	HDR	Live				

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

✓ Capture		✓ Capture		✓ Capture	•••	✓ Capture	•••
Manual Mode	~	Manual Mode	~	Manual Mode	~	Manual Mode	
Single Live		HDR Live		HDR Live		HDR Live	
✓ Acquisition 1	• …	✓ Acquisition 1	•••	 Acquisition 1 		> Acquisition 1	• …
Exposure Time	6500	Exposure Time	6500	Exposure Time	6500	ET: 6500 A: 12.70 B: 1.80 G: 1.00	
Aperture (f-number)	12.70	Aperture (f-number)	12.70	Aperture (f-number)	12.70	> Acquisition 2	• •••
Brightness	1.80	Brightness	1.80	Brightness	1.80 ——— ●	ET: 6500 A: 12.70 B: 1.80 G: 1.00	
Gain	1.00	Gain	1.00	Gain	1.00	> Acquisition 3	• …
		-				ET: 6500 A: 12.70 B: 1.80 G: 1.00	
Add Acquisition		✓ Acquisition 2	•••	 Acquisi Clone acquisition 		Add Acquisition	
Add Acquisición		Exposure Time	6500	Exposure Til Delete acquisition			
> Filters		Aperture (f-number)	12.70	Aperture (f- Reset acquisition to d	lefault	> Filters	
> Color	•••	Brightness	1.80	Brightness	1.80	> Color	
		Gain	1.00	Gain	1.00		
		Bidirectional Patterns	•	Bidirectional Patterns			

You can also use the Assisted mode to get suggested settings, and then switch to the Manual mode to fine tune these settings manually.

3. Available Views

There are three available views to choose from at the bottom of the Zivid Studio GUI.



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 (D) on and off in this view helps evaluate the point cloud quality.



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.

– 978 mm					
- 872 mm				and (1997)	
– 765 mm			(3D)		
(789, 925) X: -63.	2 Y: 121.5 Z: 1070.2	SNR: 129.9	Point Cloud	Color	Depth

- 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.



4. Toolbar

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



4.1 Save and Open

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:

Note

.zdf is the native Zivid file format that includes point cloud, color image, and depth image data.

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

Note ZDF 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)¹file format:

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

Open Point Cloud

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

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

Tip

Drag and drop a ZDF file to load the point cloud to Zivid Studio - added in Zivid SDK 2.5.

Save Color Image

You can also save the 2D color image in PNG, BMP, and JPG file format:

- Click on File \rightarrow Save Color Image
- Navigate to the location where you want to save the color image
- 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

¹PCD is by default exported as unorganized points but can be configured to be exported as organized points. Check out the Zivid Knowledge Base for tutorial on how to export PCD as organized points.

Import Capture Settings			×				
\leftarrow \rightarrow \checkmark \uparrow \blacksquare \rightarrow This PC \rightarrow OS (\leftarrow \rightarrow \checkmark \uparrow] > This PC \rightarrow OS (C:) \rightarrow Users \rightarrow Public \rightarrow My Zivid Settings \checkmark \heartsuit						
Organize New folder			III • 🔟 🕐				
Name	Date modified Type	Size					
Settings.yml	5/30/2020 12:58 PM YML File	2 KB					
File name: Settings.	yml		YML (*.yml)				
			Open Cancel				

Import Settings

To import the settings in Zivid Studio:

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

Tip

Drag and drop a YML file to import the settings to Zivid Studio - added in Zivid SDK 2.5.

Settings can be loaded using the Zivid SDK as well.

4.2 Dropdown Menus

File	Shortcut	Function
Open	Ctrl+O	Load a ZDF filezdf 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) file format.
Save Color Image		Save a color image to a file in PNG, BMG, or JPG file format.
Import Capture Settings	Ctrl+Shift+I	Load saved capture settings from a file in YML into Zivid Studio.
Export Capture Settings	Ctrl+Shift+E	Save current capture settings from Zivid Studio into a file in YML.
Exit	Alt+F4	Exit Zivid Studio.
View	Shortcut	Function
Histogram	Н	Open the Histogram, a tool for analyzing pixel intensity distribu- tion on an image.
Information	Shif+I	Open the Information panel to display capture information such as camera model, 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		Enable/disable 3D view reset when opening files.
Monochrome (Green)	С	Enable/disable monochrome (green) point cloud color.
Depth Map	D	Enable/disable depth map point cloud color.
Mesh	М	Generate surfaces in the point cloud. Creates a 3D mesh appear- ance.
Reset UI Layout		Reset the layout of the Zivid Studio window.
Enter / Exit Full Screen Mode	F11	Toggle between full and regular screen mode.
Help		Function
View help online		URL to the Zivid Knowledge Base.
Legal Notice		Detailed information on Zivid and third-party software licenses.
System Info		Information on the system used by the Zivid software.

5. Quick Reference Index

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Legal Notice		Detailed information on Zivid and third-party software licenses.
System Info		Information on the system used by the Zivid software.

Camera	Function
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.
Disconnect	Disconnect from the active camera.
Capture	Function
Assisted Mode	Switch to assisted capture mode.
Max Capture Time (seconds)	Maximum capture time in seconds for assisted capture.
Ambient Light Adaptation	Specify if and to what ambient light frequency the assisted capture is to adapt.
Analyze & Capture	Trigger assisted capture to analyze the scene, then another cap- ture, with the settings suggested by assisted capture.
Capture	Trigger capture with the settings that have already been sug- gested by the assisted capture.
Manual Mode	Switch to manual capture mode.
Single	Trigger a single acquisition with the settings specified in the checked frame.
Live	Trigger a continuous capture that allows viewing the scene in real- time.
HDR	Trigger a multi-acquisition HDR capture with the settings specified in the checked acquisitions; unchecked acquisitions are ignored.
Expand all acquisitions	Expand the settings on all acquisitions.
Collapse all acquisitions	Collapse the settings on all acquisitions.
Reset to default	Reset the control panel to the default state.
Acquisition	Function
Acquisition Exposure Time	Function The duration a single camera image is exposed to light.
Acquisition Exposure Time Aperture	Function The duration a single camera image is exposed to light. The opening that controls the amount of light to the camera sensor through the lens.
Acquisition Exposure Time Aperture Brightness	Function The duration a single camera image is exposed to light. The opening that controls the amount of light to the camera sensor through the lens. The output power (the amount of light) emitted by the LED projector.
Acquisition Exposure Time Aperture Brightness Gain	Function The duration a single camera image is exposed to light. The opening that controls the amount of light to the camera sensor through the lens. The output power (the amount of light) emitted by the LED projector. The amplification of the signal from the camera sensor.
Acquisition Exposure Time Aperture Brightness Gain Toggle switch	Function The duration a single camera image is exposed to light. The opening that controls the amount of light to the camera sensor through the lens. The output power (the amount of light) emitted by the LED projector. The amplification of the signal from the camera sensor. Enable/disable the selected acquisition.
Acquisition Exposure Time Aperture Brightness Gain Toggle switch Clone acquisition	Function The duration a single camera image is exposed to light. The opening that controls the amount of light to the camera sensor through the lens. The output power (the amount of light) emitted by the LED projector. The amplification of the signal from the camera sensor. Enable/disable the selected acquisition. Add a new acquisition resembling the setting of the selected acquisition.
Acquisition Exposure Time Aperture Brightness Gain Toggle switch Clone acquisition Delete acquisition	Function The duration a single camera image is exposed to light. The opening that controls the amount of light to the camera sensor through the lens. The output power (the amount of light) emitted by the LED projector. The amplification of the signal from the camera sensor. Enable/disable the selected acquisition. Add a new acquisition resembling the setting of the selected acquisition. Delete the selected acquisition.
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Acquisition Exposure Time Aperture Brightness Gain Toggle switch Clone acquisition Delete acquisition Add acquisition to default	Function The duration a single camera image is exposed to light. The opening that controls the amount of light to the camera sensor through the lens. The output power (the amount of light) emitted by the LED projector. The amplification of the signal from the camera sensor. Enable/disable the selected acquisition. Add a new acquisition resembling the setting of the selected acquisition. Delete the selected acquisition. Add a new acquisition resembling the setting of the last acquisition. Reset the selected acquisition settings to default values.
Acquisition Exposure Time Aperture Brightness Gain Toggle switch Clone acquisition Delete acquisition Add acquisition to default Filters	Function The duration a single camera image is exposed to light. The opening that controls the amount of light to the camera sensor through the lens. The output power (the amount of light) emitted by the LED projector. The amplification of the signal from the camera sensor. Enable/disable the selected acquisition. Add a new acquisition resembling the setting of the selected acquisition. Delete the selected acquisition. Add a new acquisition resembling the setting of the last acquisition. Reset the selected acquisition settings to default values. Function
AcquisitionExposure TimeApertureBrightnessGainToggle switchClone acquisitionDelete acquisitionAdd acquisitionReset acquisition to defaultFiltersNoise Filter	Function The duration a single camera image is exposed to light. The opening that controls the amount of light to the camera sensor through the lens. The output power (the amount of light) emitted by the LED projector. The amplification of the signal from the camera sensor. Enable/disable the selected acquisition. Add a new acquisition resembling the setting of the selected acquisition. Delete the selected acquisition. Add a new acquisition resembling the setting of the last acquisition. Reset the selected acquisition settings to default values. Function Remove points where the projected pattern signal-to-noise-ratio is below the specified threshold.
AcquisitionExposure TimeApertureBrightnessGainToggle switchClone acquisitionDelete acquisitionAdd acquisitionReset acquisition to defaultFiltersNoise FilterOutlier Filter	Function The duration a single camera image is exposed to light. The opening that controls the amount of light to the camera sensor through the lens. The output power (the amount of light) emitted by the LED projector. The amplification of the signal from the camera sensor. Enable/disable the selected acquisition. Add a new acquisition resembling the setting of the selected acquisition. Delete the selected acquisition. Add a new acquisition resembling the setting of the last acquisition. Reset the selected acquisition settings to default values. Function Remove points where the projected pattern signal-to-noise-ratio is below the specified threshold. Remove points if the distance to their neighboring pixels within the small local region is larger than the threshold specified in mm.
AcquisitionExposure TimeApertureBrightnessGainToggle switchClone acquisitionDelete acquisitionAdd acquisitionAdd acquisition to defaultFiltersNoise FilterOutlier FilterReflection Filter	Function The duration a single camera image is exposed to light. The opening that controls the amount of light to the camera sensor through the lens. The output power (the amount of light) emitted by the LED projector. The amplification of the signal from the camera sensor. Enable/disable the selected acquisition. Add a new acquisition resembling the setting of the selected acquisition. Delete the selected acquisition. Add a new acquisition resembling the setting of the last acquisition. Reset the selected acquisition settings to default values. Function Remove points where the projected pattern signal-to-noise-ratio is below the specified threshold. Remove points if the distance to their neighboring pixels within the small local region is larger than the threshold specified in mm. Remove points impacted by reflections and thus erroneous.

Contrast Distortion	Corrects and/ or removes 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.
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.
Red color balance	The color temperature of ambient light affects the appearance of the color image. Setting white balance by adjusting red color bal- ance makes the color image look natural.
Gamma	Adjust the brightness of the color image.
Reset to default	Reset the blue, green, and red color balance to the default state.

6. Support and Troubleshooting

For more information, visit:

support.zivid.com



The Zivid Knowledge Base provides answers for commonly seen issues and questions related to Zivid products, for both software and hardware. You will also find in depth articles about our camera technology, best use practices, different types of 3D imaging methods and structured light, to get a better understanding for how to use this 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 One⁺ and Zivid Two 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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