

ziVID

Zivid 3 User Guide

Rev 1.0



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1. Regulatory Information

The Zivid 3 camera is compliant to international product compliance standards and regulations as listed below. All product compliance for this product is documented in test reports and certificates referencing type number ZVC-02. All compliance-testing referred is performed by accredited 3rd party laboratories. Please contact Zivid for access to certificates, declarations of conformity or other publicly available compliance documents.

Product Safety

- **International** : Standard IEC 62368-1.
- **EU/EFTA (EEA)** : Standard EN 62368-1 and Directive 2014/35/EU (LVD)
- **USA** : Standard UL 62368-1
- **Canada** : Standard CAN/CSA-C22.2 NO. 62368-1
- **Australia & New Zealand** : Standard AS/NZS 3820 and National Differences AS/NZS 62368.1

Electromagnetic Compatibility (EMC)

- **International** : Standards CISPR 32 and CISPR 35, IEC 61000-3-2 and IEC 61000-3-3 (Note 1)
- **EU/EFTA (EEA)** : Standards EN 55032, EN 55035, EN 61000-3-2, EN 61000-3-3 and Directive 2014/30/EU (EMC) (Note 1)
- **USA** : Standard FCC CFR 47 Subpart 15B (Note 2 and 3)
- **Canada** : Standard ICES-003 (Note 4)
- **South Korea** : Standards KS C 9832 and KS C 9835
- **Australia & New Zealand** : Standards EN 55032 (ACMA)

Photobiological and Laser Safety

- **International** : Standards IEC 60825-1 and IEC 62471-5 (Note 6)
- **EU/EFTA (EEA)** : Standards EN 60825-1 and EN 62471-5
- **USA** : Standards 21 CFR 1040.10 & 21 CFR 1040.11 and Laser Notice No. 56 and 57 (Note 7)

Ingress protection

- **EU/EFTA (EEA)** : Standard EN 60529 (IP65) (Note 9)

Environmental Compliance

- **EU/EFTA (EEA)** : Directive 2011/65/EU with amd. (EU) 2015/863 (RoHS). Regulation (EC) No 1907/2006 (REACH)
- **USA** : TSCA PBT and TSCA PFAS

Notes

- **EMC Class B limits**

The product has been tested according to CISPR32/EN 55032 and complies with Class B limits.

- **USA - FCC CFR 47 Subpart 15B, Class B Compliance Statement**

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

- **USA - FCC CFR 47 Subpart 15B, Class B Interference Statement**

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

- **Canada - ICES-003, EMC Class B limits**

This Class B digital apparatus complies with Canadian ICES-003. Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

- **Signal protection**

Do not install Zivid cameras and cables next to high voltage devices that can generate high levels of electromagnetic disturbance. Do not route camera cabling through the same trunks/ conduits with AC power cables and cables emitting high levels of disturbance.

- **Photobiological Safety for image projectors**

The complete product is tested according to standard IEC 60825-1 (cl.4.4 - Laser products designed to function as conventional lamps) and found to comply with Laser Class 1. The entire product is also tested according to standard IEC 62471-5 and found to comply with Risk Group 2.

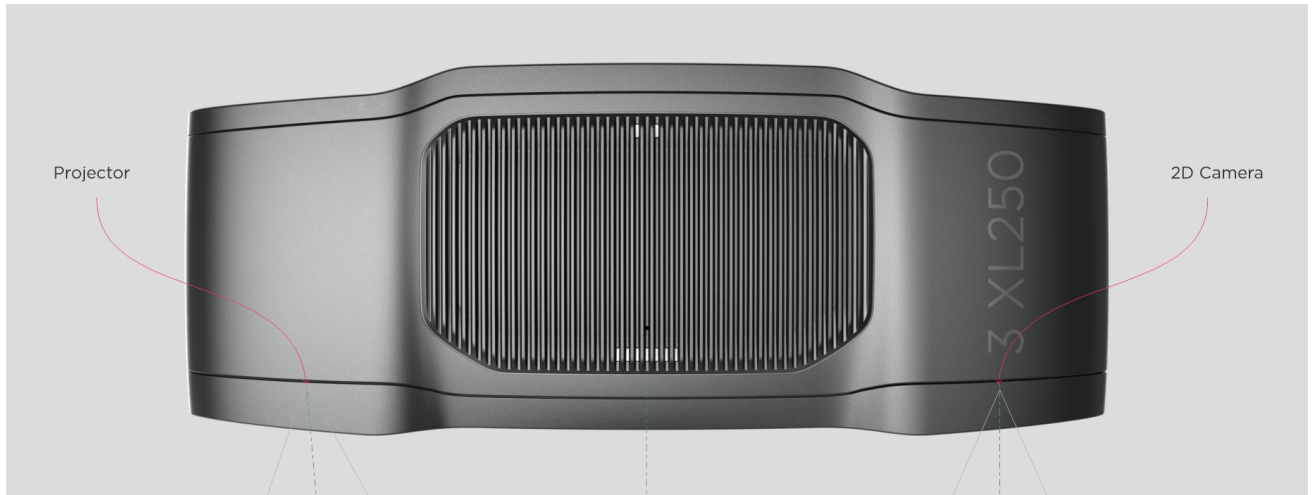
- **USA - Compliance with FDA Performance Standards**

This product complies with FDA performance standards for laser products except for conformance as a Risk Group 2 LIP as defined in IEC 62471-5: Ed. 1.0. For more information see Laser Notice 56 and 57, dated May 8, 2019.

- **Do not stare into the beam**

As with any bright light source, do not stare into the beam, RG2 IEC 62471-5.

The image projector is an integral part of the product:



Avoid the use of optical aids such as binoculars or telescopes inside the beam projected through the projector (lamp aperture).

- **Fan-duct**

The camera's fan-duct is outside the IP65 classified enclosure (the fan itself is classified as minimum IP65).

General Warnings

- **Mounting**

Read the mounting instructions before installation and follow these thoroughly. Use the intended mounting accessories and hardware. Mounting the camera incorrectly could result in hazardous situations, malfunctions, or damage to the camera.

- **Controls and adjustments**

Caution - Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure. Testing and approvals specified in this document have been performed using the parameters and adjustments described. Additional fault conditions and abnormal operations are evaluated throughout the compliance process. Nevertheless, use-, control- or adjustments of the camera, not anticipated at the time of approval and not specified in this document, may result in hazardous radiation exposure.

- **Ambient temperature**

Do not use the product in areas where ambient temperature exceeds the specified range given in the datasheet. This could cause overheating, result in hazardous situations, malfunctions or damage to the camera.

- **Cooling clearance**

Zivid cameras use active and passive cooling, allow some space around the device for airflow, and do not block the air opening on its front and rear sides. See the datasheets for the operating temperature range for your camera.

- **Do not open or modify**

The device contains no user-serviceable parts inside. Do not try to open or modify this product. This will:

- Void the regulations listed above.
- Might limit the intended use of the equipment.

- Might cause hazardous situations.
- Might expose you to hazardous light emission, above the levels of eye safety.
- Might cause electrical- and fire hazards due to exposure of hazardous electrical power levels.
- Might lead to harmful interference with other equipment or radio communication.
- Might cause damage to the system.

- **Power supply and cables**

We strongly recommend using Zivid Power Supply and Zivid's Cables with all Zivid cameras to ensure compliance with Safety and EMC emission and immunity standards.

Product marking (Rating label)

- **Label Artwork**



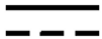
- **Warnings**

Class 1 Laser Product, RG2 Image Projector, CAUTION: Do not stare into the beam

Appareil a Laser de Classe 1, RG2 Projecteur d'image, ATTENTION: Ne pas observer fixement le faisceau, RG2

Do not open - No pas ouvrir

- **Explanation of symbols**

Symbol	Explanation
	The product must be supplied from a DC power source.
	After the product's end of life, it must be handled according to any national laws and regulations for electronic waste. Do not discard the product as unsorted waste.
	Read the user manual.

- **Location**



2. Unboxing

In the Zivid box you will find:

- Zivid 3 3D camera

Optional/as ordered:

- 24V power supply (M12-5 female)
- Power cables (straight connector) , available in 5 m, 10 m, and 20 m
- Power extension cable (M12-5 female, angled connector) , available in 3 m
- Ethernet (CAT-6A) cables (straight connector) , available in 5 m, 10 m and 25 m
- Ethernet (CAT-6A) extension cables (angled connector) , available in 3 m
- Calibration Board (300 x 300 mm)
- Mount of choice (Stationary Mount or On-Arm Mount)

All accessories can be [ordered separately](#) .



3. System Requirements

OS	Windows 10/11, Linux Ubuntu 20.04/22.04/24.04 [1] or Jetson Linux 35/36
Dedicated GPU	It is also the best choice if the GPU will be used for more than Zivid's computations. A medium to high-end NVIDIA GPU with at least 3 GB of memory is required for optimal performance. This is the preferred solution for Zivid. Recommendations: • NVIDIA GeForce GTX 1060 or better • NVIDIA GeForce MX150 or better
CPU with integrated GPU	The benefit of an integrated GPU is that the data transfer from GPU to CPU is fast. It is also beneficial for applications that require low power consumption, e.g., battery-powered mobile platforms. A high-end integrated GPU with at least 3 GB of memory available is required for optimal performance. Recommendations: • Intel i7 with HD630 or better
Ethernet	Full performance: • 10GBASE-T (10G Copper Ethernet) adapter connected via PCI Express or Thunderbolt 3 Reduced performance: • 1000BASE-T and NBASE-T (1G, 2.5G, and 5G over copper) connections Recommendations: • ASUS XG-C100C 10G Network Adapter PCI-E x4 Card • QNAP QNA series Thunderbolt 3 to 10GbE Adapter

[1] Support for Ubuntu 18.04 is removed since SDK 2.10.

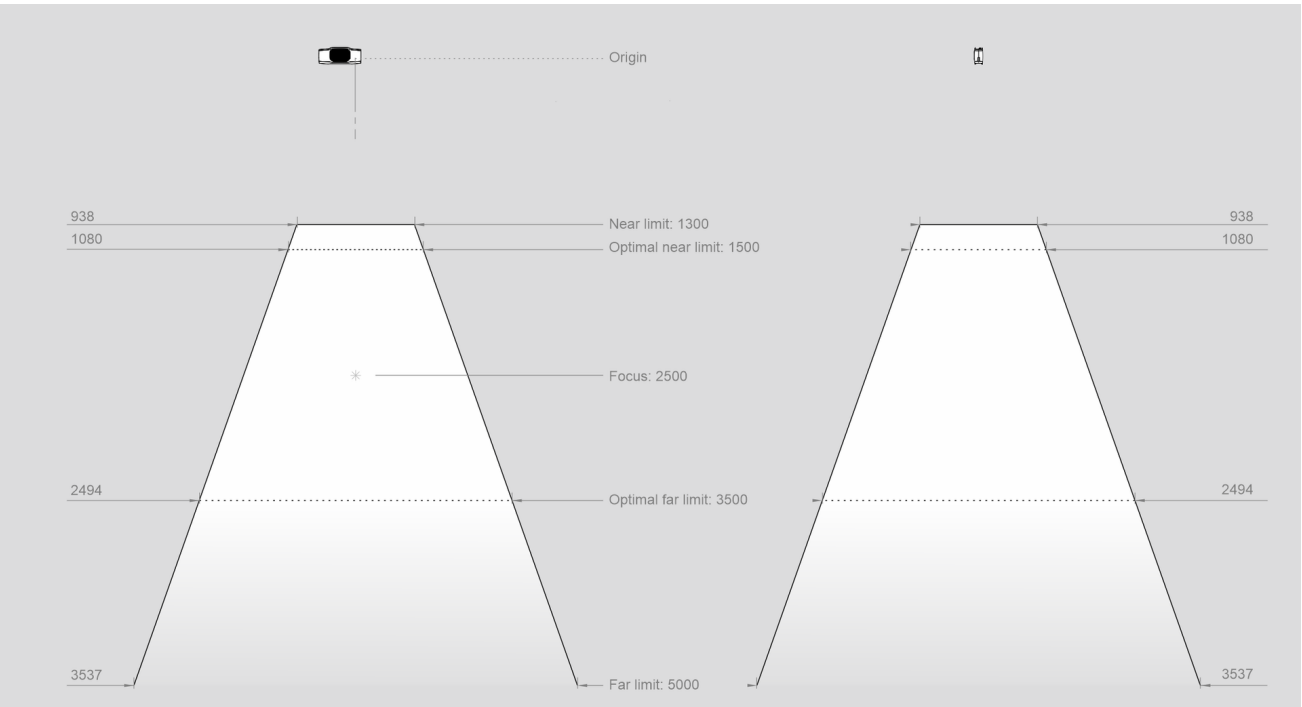
Check out the [Recommended Industrial PCs](#) if you need recommendations for compute devices.

4. Mechanical Installation

4.1. Working Distance and Field-of-View

Check out our [FOV and imaging distance calculator](#) to find the relation between distances and FOV for the Zivid cameras.

XL250



CAD model information

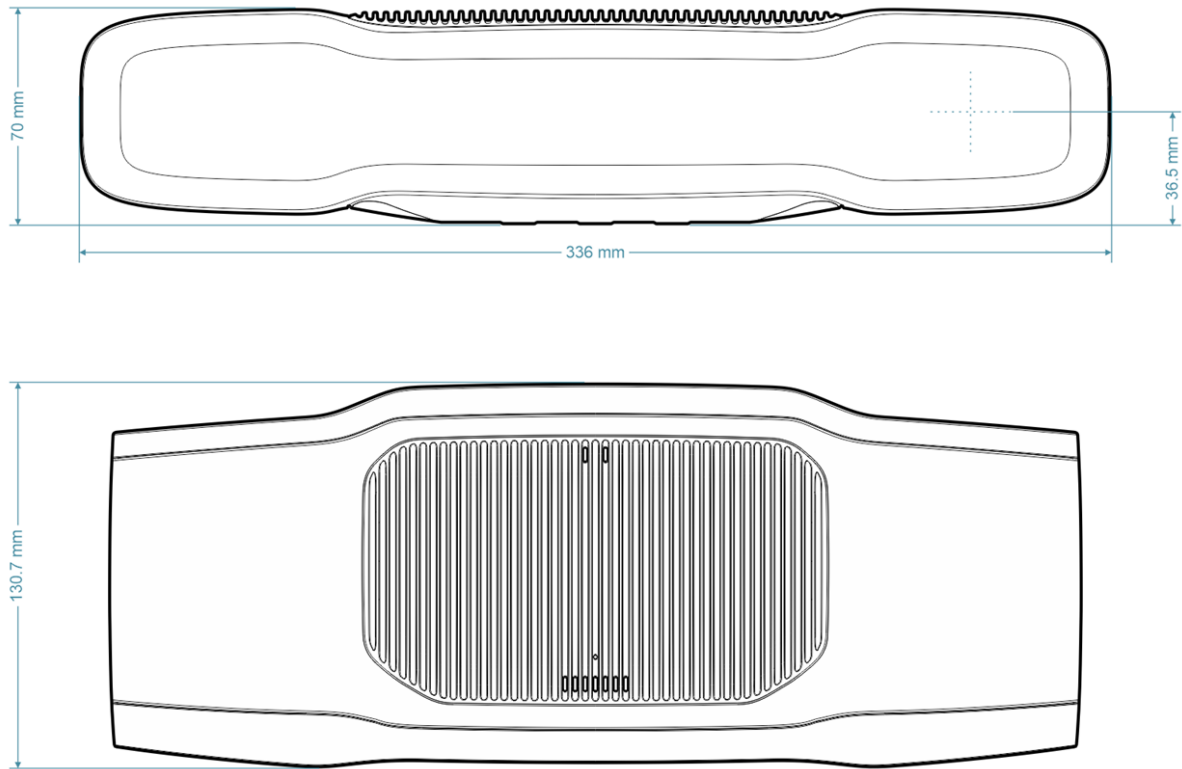
The datum reference of the Zivid 3 CAD models is at the center of the Ø5 positioning hole (B in the image below).



The [Optical Center Label](#) is found relative to the datum reference.

4.2. Mechanical Interface

Dimensions



Mounting Specifications

This Zivid camera has three M5 mounting holes, one $\varnothing 5$ positioning hole, and one $\varnothing 5 \times 1$ obround (a shape consisting of two semicircles connected by parallel lines tangent to their endpoints) alignment hole. We recommend using DIN 912 / ISO 4762 Hexagon or ISO 14579 Hexalobular socket head cap screws in stainless steel (A2 or A4). To ensure not damaging the threads, we recommend not exceeding the specified maximum torque value when fastening the screws.



Flatness of Mounting Surface

For optimal performance we recommend a mounting surface flatness of $\pm 0,05$ mm or better. Mounting the camera to an uneven surface can in some cases affect the calibration.

We recommend using one of the [Zivid Camera Mounts](#) to ensure problem free installation of the camera.



4.3. Mounting

Read our guidelines about mounting options for Zivid cameras.

Note

The camera must be completely still during the acquisition to deliver the specified 3D image quality. Otherwise, it is completely safe to move it, e.g. when mounted on a robot or any other moving platform.

Mounting Accessories

Mounting accessories can be ordered at shop.zivid.com.



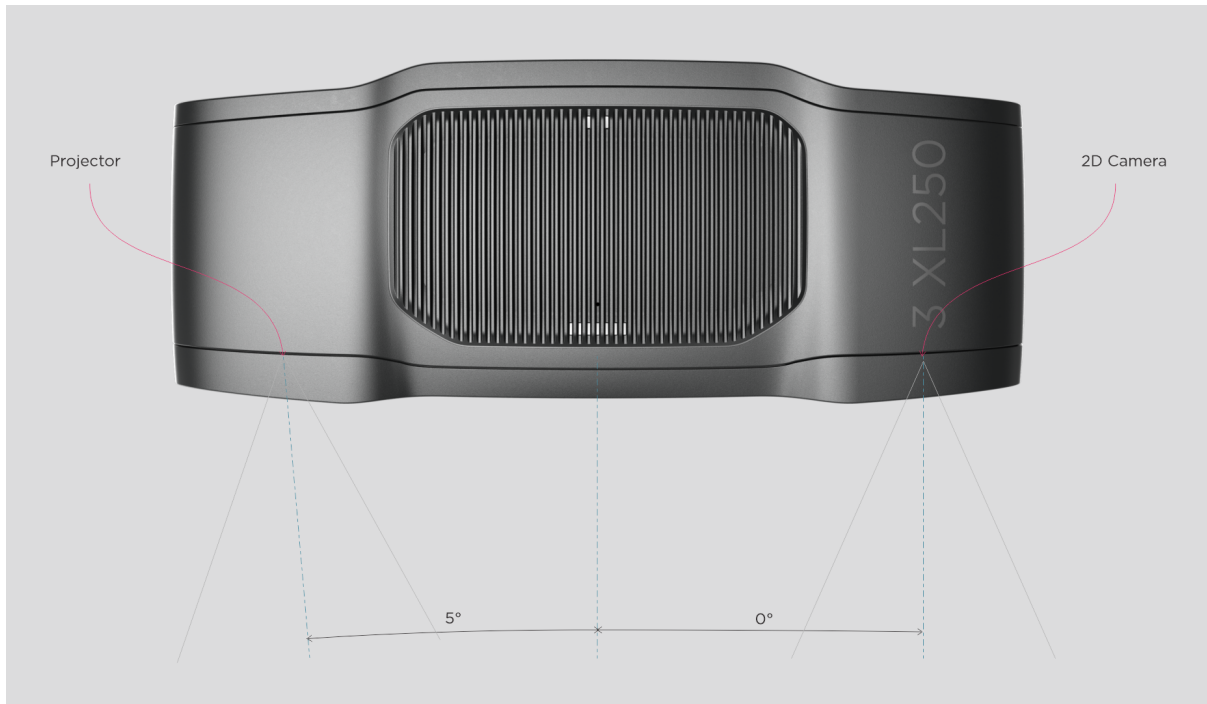
4.4. Positioning Correctly

Mounting the camera straight above the scene is most common and recommend.

It is especially beneficial for imaging transparent objects and large surfaces that are extremely specular, and in particular, also dark. Here you will benefit from mounting the camera perpendicular to the object to maximize the signal back to the camera.

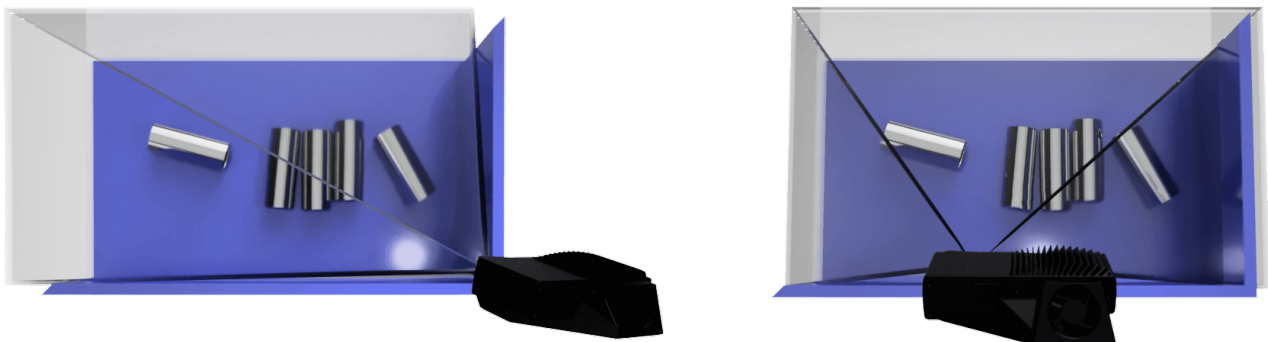
The 2D camera and the projector have an angle with respect to the center axis. This should be considered if it is desired to have the camera perpendicular to the scene.

XL250



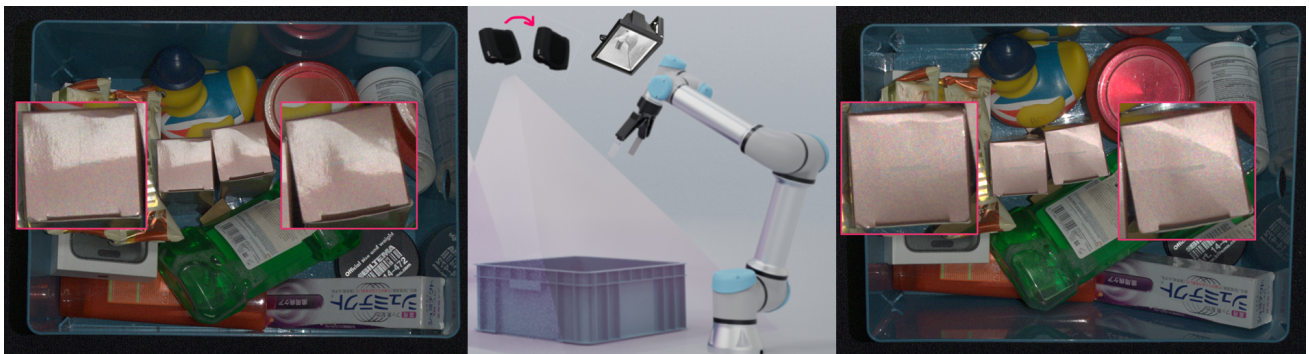
In bin-picking applications

In presence of strong interreflections from the bin walls, you can place the Zivid camera projector above the back edge or above the rear corner of the bin (see images below). Pan and tilt it so that the 2D camera is looking at the center of the bin. The projector rays should not fall on the inner surfaces of the two walls closest to the projector; they should almost be parallel to those two walls.



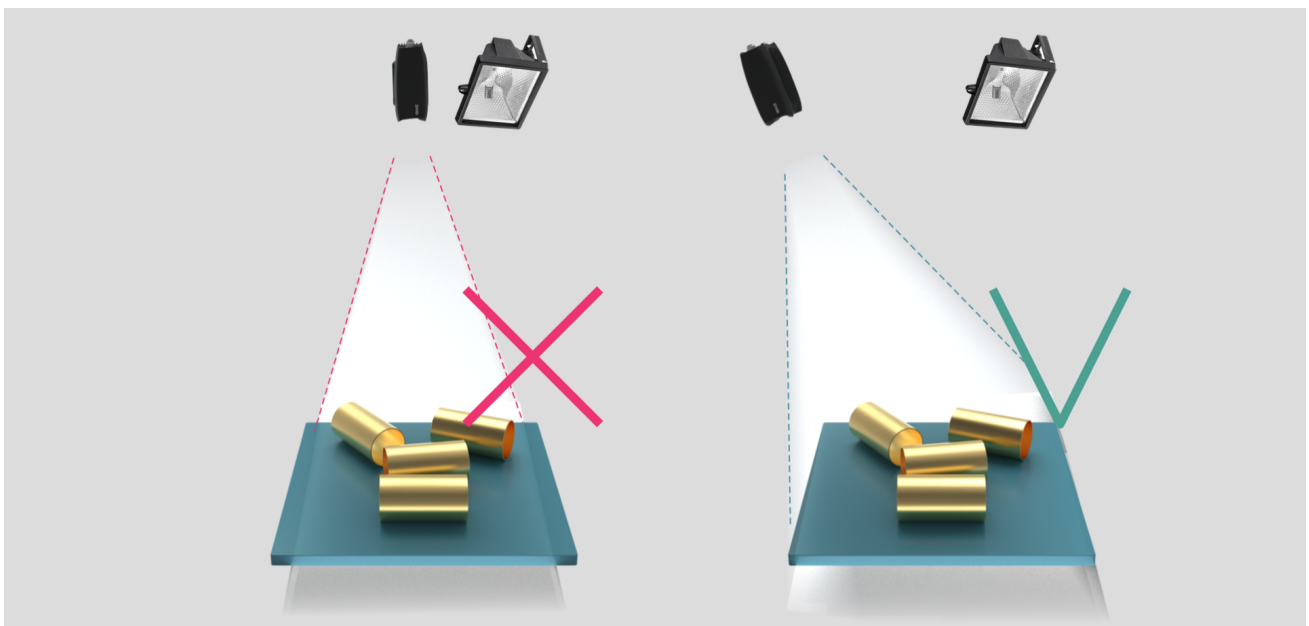
Mounting the camera this way minimizes interreflections from the bin walls, and also frees up space above the scene for easier access for tools and robots.

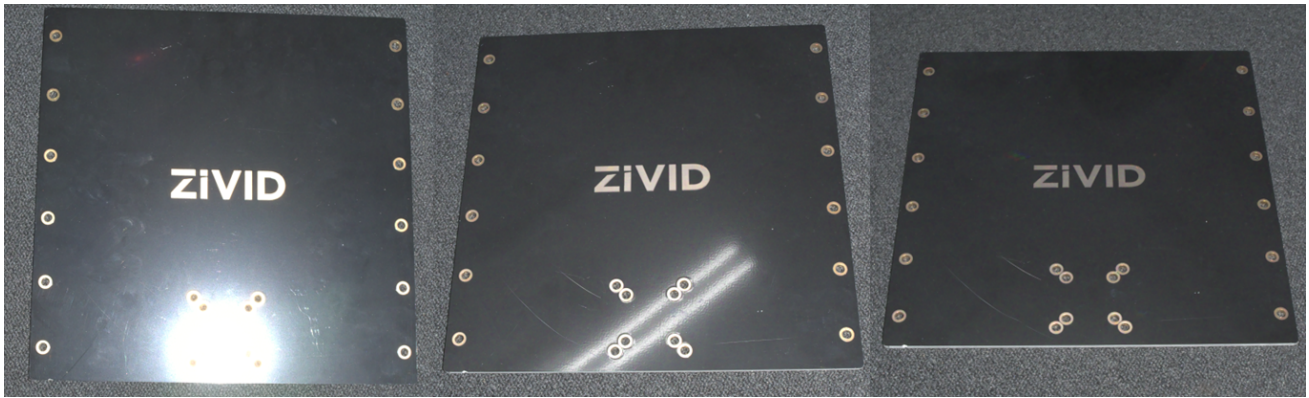
In strong ambient lighting conditions, direct reflections from the light source may create unwanted highlights in the 2D image. To minimize these highlights, try slightly moving or tilting the camera.



In surface imaging applications

For highly reflective surfaces, direct reflections from the light source, whether from the camera projector or an external light, can create unwanted highlights in the 2D image. To minimize these reflections, mount the camera at a slight tilt angle so that the reflected light is directed away from the camera's field of view. Adjusting the position of the light source or using diffused lighting can also reduce glare.





2D image with highlights from the projector (left), ambient light (center), and no highlights (right) depending on the camera position and angle.

Cooling clearance

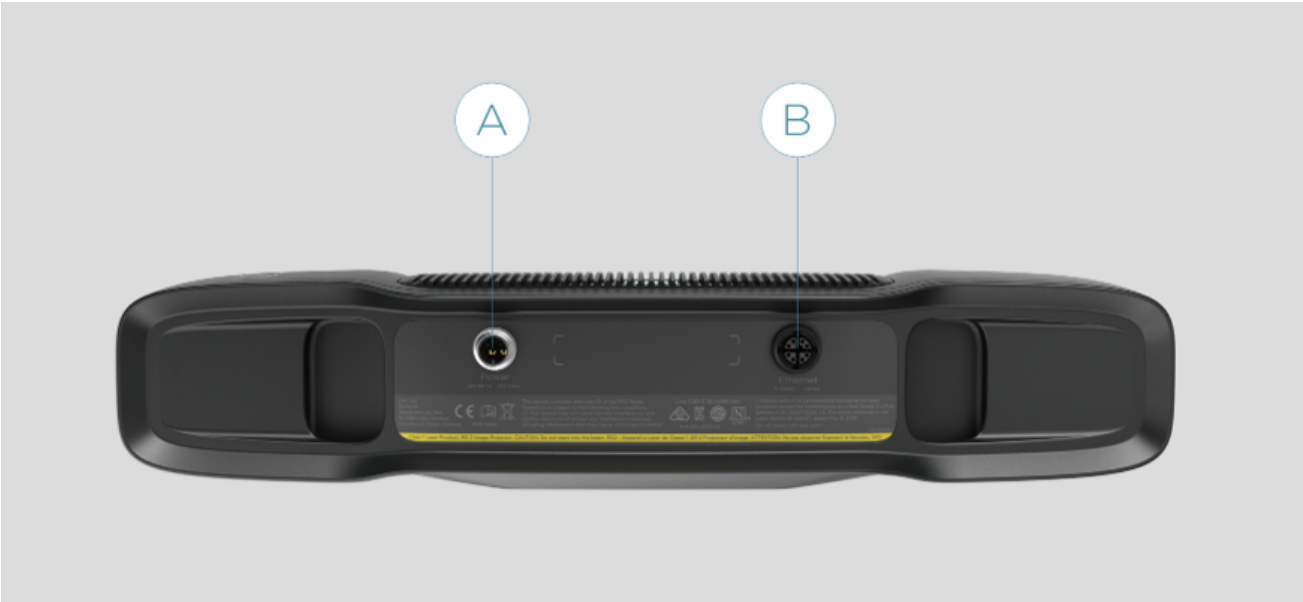
Zivid cameras use active and passive cooling, allow some space around the device for airflow, and do not block the air opening on its front and rear sides. See the [datasheets](#) for the operating temperature range for your camera.

Signal protection

Do not install Zivid cameras and cables next to high voltage devices that can generate high levels of electromagnetic disturbance. Do not route camera cabling through the same trunks/conduits with AC power cables and cables emitting high levels of disturbance.

5. Connectivity and Power Supply

5.1. Connectors



- A. M12-5: Power Connector 24V, 5A DC
- B. M12X: Ethernet Connector CAT 6A

Check Zivid [Approved Ethernet Cables](#) for more information.

Power supply interface



Optional mating connector: TE Connectivity AMP, 1838274-3 (Digikey: A97642-ND)

Tip

It is required to use both pins for 24V and for GND.

For more information about power supply and cables please see [Approved Power Supply And Power Cables](#).

Data cable

Zivid camera uses a dedicated ethernet cable for data transmission. See [Zivid Approved Ethernet Cables](#) for more information.

The table below provides the Zivid Ethernet cable pinout.



5.2. Connecting to the computer

- Plug the power supply first into the “24V”.
- Plug the Ethernet cable into the camera and connect it to your computer.
- Plug the power supply into a power outlet.

Note

On disconnect, follow the procedure in reverse, disconnect mains power first. Ensure that all connections are screwed in tightly. The coupling nut of the M12 screw connectors can in some cases be hard to screw in. However, when installed correctly they provide a robust and reliable connection. Check [System Requirements](#) for performance considerations and review performance by observing the [status Indication LEDs](#).

Use the AC/DC adapter supplied with the unit to ensure compliance with emission and immunity standards.

The Zivid camera is protected against reverse polarity and against overheating by a thermistor that physically removes the power.

The Zivid camera uses Ethernet communication and needs 10 Gbps for best performance. Your computer may not have a port for 10 Gigabit Ethernet. In that case, you can connect to it using an adaptor for 10GBASE-T (10 Gbps copper Ethernet) to Thunderbolt 3. At a reduced performance you can also use 1000BASE-T and NBASE-T (1 Gbps, 2.5 Gbps, and 5 Gbps over copper) to USB adapters.

Recommended network cards and adapters

We have successfully tested and recommend the following hardware:

- [ASUS XG-C100C 10G Network Adapter PCI-E x4 Card](#)
- [QNAP QNA series Thunderbolt 3 to 10GbE Adapter](#)

Caution

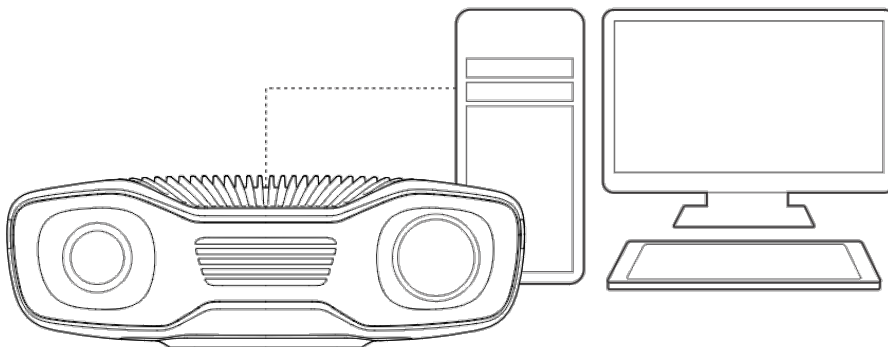
USB-based network adapters have reduced and more variable capture speed, and can occasionally give errors when using the camera. Our recommendation is to use 10Gb PCI Express cards for optimal performance.

Warning

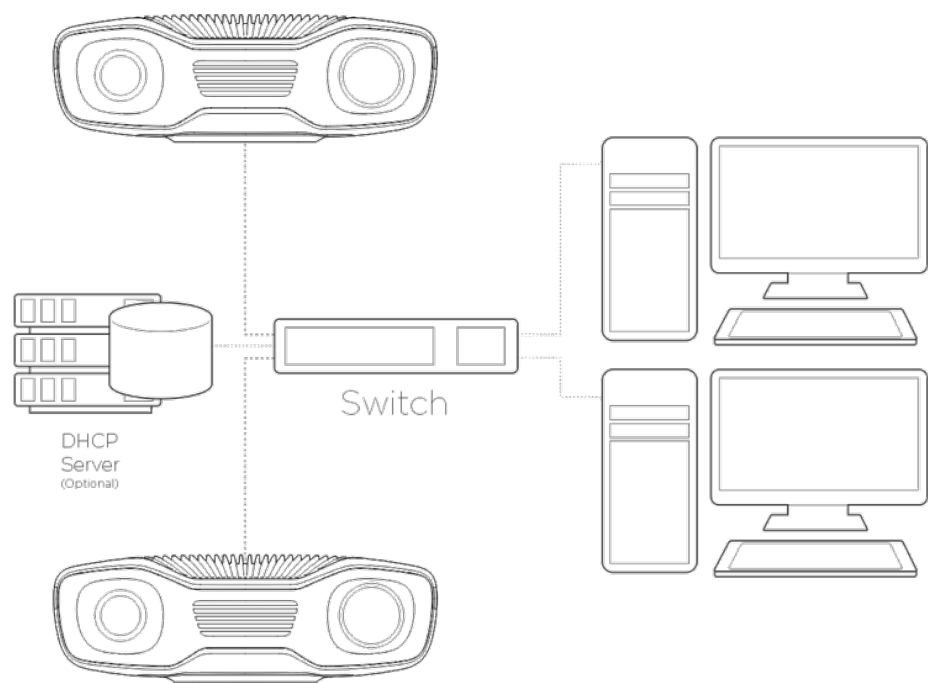
Use only [Zivid approved Ethernet cables](#).

Network Topology

Direct connection



Connection via switch



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. Service and Maintenance

The device contains no user-serviceable parts inside. The product warranty will be void if opened.

Caution

As with any bright light, do not stare into the beam.

Follow the below instructions to ensure that your Zivid camera is well maintained:

- Check screw connections and connectors at regular intervals.
- Do not block the air opening on the front and rear sides of the product.
- The unit uses active and passive cooling, allow some space around the device for airflow.
- Use a small vacuum cleaner or a small canister of compressed air to remove dust or other accumulated particles. This applies to both the glasses and in between the ribs of the heat sink.
- Regularly [clean optical glass parts of the device](#) .
- Check and update the calibration on a yearly basis by performing [Infield Correction](#) (and [Hand Eye](#)) when necessary.

8. 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:

www.zivid.com



E-mail

Technical support: customersuccess@zivid.com

Sales: sales@zivid.com

General: info@zivid.com

Phone

Zivid HQ-Oslo, NO | +47 21 02 24 72

Zivid Sales-Karlsruhe , DE | +49 151 55 646 385

Zivid Sales-Boston, MA, US | +1 (857) 523-0235

Zivid Sales-Xiamen, CN | +86 139 5012 9074

Zivid Sales-Seoul, KR | +82 10 8984 5350

Zivid AS
Gjerdrums vei 10A
0484
Oslo, Norway

See everything.

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