



# EoSens® Creation 2.0XGE

User Guide

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# 1 Before you start

## 1.1 About this manual

This manual contains helpful information to install and operate the described camera. It has been produced with care. Nevertheless, information might be erroneous or incomplete. Mikrotron GmbH cannot be held responsible for any problems resulting from incomplete or erroneous information.

In case you detect errors or need further information, please inform us via mail:

[service@mikrotron.de](mailto:service@mikrotron.de) or

Call +49- 89-7263-4200

We highly recommend to read this manual carefully.

**NOTICE** This manual is subject to change without notice.

It is intended for staff with technical qualifications who have been specially trained and have the appropriate knowledge in the field of automation technology, electrical and optical devices.

**INFO** *Keep this manual for future use.*

### 1.1.1 Tips, remarks, and notes

This manual contains tips and notes that help to avoid data loss or camera damage. They are emphasized as follows:

**INFO** *Provides information that may help to improve camera handling or avoid data loss.*

**NOTICE** *Provides information to avoid damage to the system.*

### 1.1.2 Registered trademarks

In this manual the following registered trademarks may be used:

- MotionBLITZ®
- ImageBLITZ®
- EoSens®
- GenlCam®
- Microsoft® and Windows®
- Intel®

Throughout the manual, these trademarks are not specifically marked as registered trademarks. This in no way implies that these trademarks can be used in another context without the trademark sign.

### 1.1.3 Conformity and use

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These requirements are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions given in this guide, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will have to correct the interference at its own expense.

**NOTICE**

You are herewith cautioned that any changes or modifications not expressly approved in this description could void your authority to operate this equipment.

### 製造説明：

此设备的生产与测试依照FCC条例第15条条例，符合A类电子设备标准。产品提供在商用使用环境中的合理保护，以防止使用过程中可能涉及到的损害。

此设备会产生、使用并可发射出无线电波，如果未按照本手册中所述安装和使用，可能会对无线通信设备产生干扰。如本设备在居民区操作出现干扰等情况，用户需要自费处理。

备注：请注意，如未按照此使用说明操作而自行更改设备，那么您将无权使用本设备。

### 規制適合宣言とご使用について(米国FCC)

この機器は、FCC規則のパート15に定められたクラスAデジタル装置に関する規制要件に基づいて所定の試験が実施され、その適合が認証されています。これらの規制要件は、商業環境において機器を使用する際、有害な干渉に対する妥当な保護を提供するために設けられています。この機器は、無線周波数エネルギーを生成かつ利用するとともに、放射することもあります。このリファレンスガイドの指示に従って設置および使用が行われない場合は、無線通信に有害な干渉を引き起こす恐れがあります。この機器を住宅地で利用すると有害な干渉を起こすこともあり、その場合、使用者は自己負担において適切な対策を講じる必要があります。

注意事項：このリファレンスガイドに明示的に承認していない変更や修正を行った場合には、本製品を使用する権利が無効となることがあります。

#### 1.1.4 Supplements

##### For customers in Canada

This apparatus complies with the Class A limits for radio noise emissions set out in Radio Interference Regulations.

##### Pour les utilisateurs au Canada

Cet appareil est conforme aux normes Classe A pour bruits radioélectriques, spécifiées dans le Règlement sur le brouillage radioélectrique.

## Life support applications

The products described in this manual are not designed for use in life support appliances or devices and systems where malfunction of these products can reasonably be expected to result in personal injury.

**NOTICE** Mikrotron customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Mikrotron for any damages resulting from such improper use or sale.

## 1.2 Warranty and non-warranty clause

Warranty is described in §8 of our General Terms and Conditions which can be downloaded on the Mikrotron web page ([www.mikrotron.de/en/terms.html](http://www.mikrotron.de/en/terms.html)).

In addition, take the following non-warranty clauses into account.

**NOTICE** The camera does not contain serviceable parts. Do not open the body of the camera. If the camera has been opened, the warranty will be void.

**NOTICE** The camera has to be used with a supply voltage according to the camera's specification. Connecting a lower or higher supply voltage, AC voltage, reversal polarity or using wrong pins of the power connector may damage the camera. Doing so will void warranty.

Our warranty does not protect against accidental damage, loss, or acts of nature.

**INFO** *Mikrotron cannot be held responsible for the loss of data. We recommend a backup plan.*

## 1.3 Support

1. In case of support or a warranty claim, make a note of the camera type and its serial number (S/N). You find all necessary information on the identification plate of the camera.
2. Contact us in one of the following ways:
  - Contact us via email: [support@mikrotron.de](mailto:support@mikrotron.de). Our support team will guide you through the process.
  - Or visit our support website [www.mikrotron.de/en/services/support.html](http://www.mikrotron.de/en/services/support.html) and fill out the form. You will receive an automatic reply from our ticket system.



SVS-VISTEK

## 2 Introduction

### 2.1 Intended use

The camera EoSens® Creation 2.0XGE belongs to the product class of so-called high-speed machine vision (MV) cameras that are integrated into test or measurement systems.

High-speed MV cameras are designed to capture images with high frame rate for various purposes in an industrial or scientific environment to deliver image data for further analysis. The images are transmitted to a frame grabber on a connected computer where they can be evaluated with the help of a software.

#### Other uses

Any other use is regarded as unintended use and leads to the loss of guarantee and liabilities. Contact the manufacturer for other uses.

These products are designed for industrial applications only. **The cameras are not designed for life support systems where malfunction of the products might result in any risk of personal harm or injury.**

### 2.2 Scope of delivery

The following components are part of delivery. Before installing the camera, check if the delivery is complete:

- Camera as ordered
- F-mount or C-mount lens adapter as ordered
- SFP+ module for FIBER or 10GBaseT SFP+ connector
- External power supply as ordered
- USB storage device with
  - Product documentation
  - MIKCam Kit

**NOTICE** Check if the delivery is complete before installing the camera.

**INFO** *The firmware can be updated remotely via a special updating software. For firmware updates, inform Mikrotron via email: [info@mikrotron.de](mailto:info@mikrotron.de).*

### 2.3 Optional accessories

#### Lenses

Only lenses for industrial purpose are suitable. To find lenses or other accessories, visit [www.mikrotron.de/en](http://www.mikrotron.de/en).

### Cables and transceiver modules

For connecting the camera, one of the following cables and transceiver module combinations must be used.

- Ethernet cable (CAT 6a or higher with RJ45 connector) and two SFP+ transceiver modules (10GBASE-T) for distances up to 30 m, available from Mikrotron GmbH
- Fiber cable (LC-LC, full duplex, min. OM3, 850 nm) and two short-range SFP+ transceiver modules (10GBASE-SR, LC duplex, media MMF, min. OM3) for distances up to 300 m, available from Mikrotron GmbH
- Fiber cable (LC-LC, full duplex, min. OS2, 1310 nm) and two long-range SFP+ transceiver modules (1000BASE-SX, 10GBASE-LR, LC duplex, media SMF, min. OS2) for distances up to 10 km, available from Mikrotron GmbH

### Power supply

An external power supply unit, e.g.:

- NTCAM132X (12 V/2.5 A) with 12 pin Hirose connector (HR10A-10P-12S(73) and 5 m cable
- NTCAM132XIO (12 V/2.5 A) with 12 pin Hirose connector (HR10A-10P-12S(73) and 5 m cable plus additional strobe out line

## 2.4 System requirements

The PC or image processing system that is connected with the camera must be equipped with:

- An image processing system, e.g.: PC and operating system according to the requirements of the frame grabber
- A fully installed frame grabber with device driver and software
- 10 Gbit Ethernet cable connection
- External power supply (NTCAM132X/NTCAM132XIO)





## 3 The camera

### 3.1 Camera description

The benefits of the CMOS technology are high speed, random access to pixels with free programmability and low power consumption.

The size and position of the region of interest and the speed of data output are free to define. The frame rate can be set to several thousand fps, depending on the resolution and video data width, with output via the Gigabit Ethernet Vision interface. The parameter sets are called profiles and can be stored in non volatile memory.

MIKROTRON GigE Vision cameras are designed for machine vision applications. The GigEVision connection is established by a sensor-to-image core.

#### INFO

*Refer to the PT1000 documentation for further information.*

The camera electronic is enclosed in a compact and solid full metal housing robust enough to comply with the requirements in heavy industrial surroundings. A standard Ethernet cable CAT 6 a or higher, or OM3-Fiber will support this.

XGE cameras can be equipped with standard C-mount or F-mount lenses made for industrial purpose.

The color and monochrome cameras EoSens® Creation 2.0XGE are supplied with the following features:

- Analog / digital gain
- Black level adjustment
- Firmware update in the field
- FPN correction
- Image information field
- Gamma correction
- Test images
- User profiles

#### Bayer filter

The sensor of the EoSens color cameras is supplied with a Bayer color filter. In order to get the color information, the imaging software has to decode the information of each pixel into red, green, and blue (RGB) by using the values of its neighboring pixels. Each red, green and blue filter element covers exactly one pixel on the sensor. A matrix of 2 x 2 filter elements builds a filter element matrix. A Bayer pattern image therefore must have an even number of pixels and an even number of lines. The ordering of the RGB pixels for each sensor is provided in the section on technical data.

### UV / IR cut filter

In addition, color cameras are equipped with an UV / IR cut filter. Light with wavelengths between 370 nm and 670 nm will be transmitted. As CMOS sensors are susceptible to UV and IR rays outside the visible spectrum, UV / IR filter avoid blurred images and therefore improve color images.

## 3.2 Operating temperature

If the camera is mounted on mechanical parts, the heat generated during operation will be dissipated by the optionally attached fan, the cooling fins at the rear of the camera, and the mechanical parts.

**NOTICE** The camera body temperature must not exceed the values specified in the technical data (see "Technical data" on page 16).

In case of overheating, the camera will automatically be switched off and the communication between camera and PC will be interrupted.

**INFO** *Durability of the camera will be reduced when being operated in an environment that is constantly exceeding the maximum permissible operating temperature. In this case, take additional cooling measures as described below.*

**NOTICE** The camera is not intended for use on an isolated mounting plate or in a closed housing because the temperature of the camera will rise continuously.

## 3.3 Additional cooling

**INFO** *If the camera is e.g. mounted on a sturdy aluminum structure, not only cooling is ensured but also a stable optical path. In addition, vibrations will be minimized within the entire system.*

If the ambient temperature is constantly exceeding 40 °C, additional cooling is recommended. This can be achieved by

- Air- or water-cooling system
- Air-conditioned housings

### 3.4 Interfaces of the camera

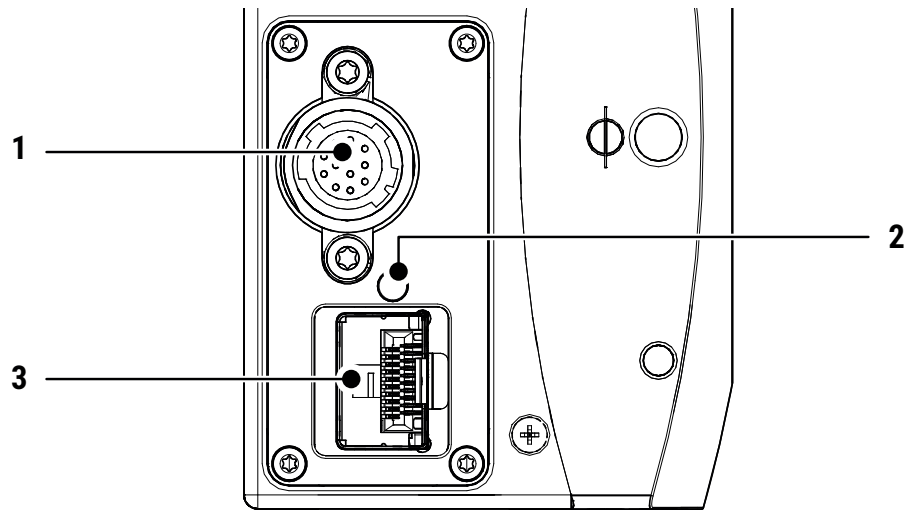


Fig.: 3-1: Interfaces of the camera EoSens® Creation 2.0XGE

1	12 pin Hirose power connector used when an external power supply (12 - 24 V) has to be connected, an external trigger is connected and / or an output signal is used.
2	Status LED to verify the operating status of the camera
3	Module slot to connect the camera with a compatible SFP+ transceiver module

### 3.5 Status LED

The multi-color status LED indicates camera and connection states.

LED State	Indication
OFF	No power
Solid orange	System is booting
Solid green	System has booted
Fast flash green	Camera in acquisition mode

## 4 First steps

### 4.1 Connecting camera and image processing system

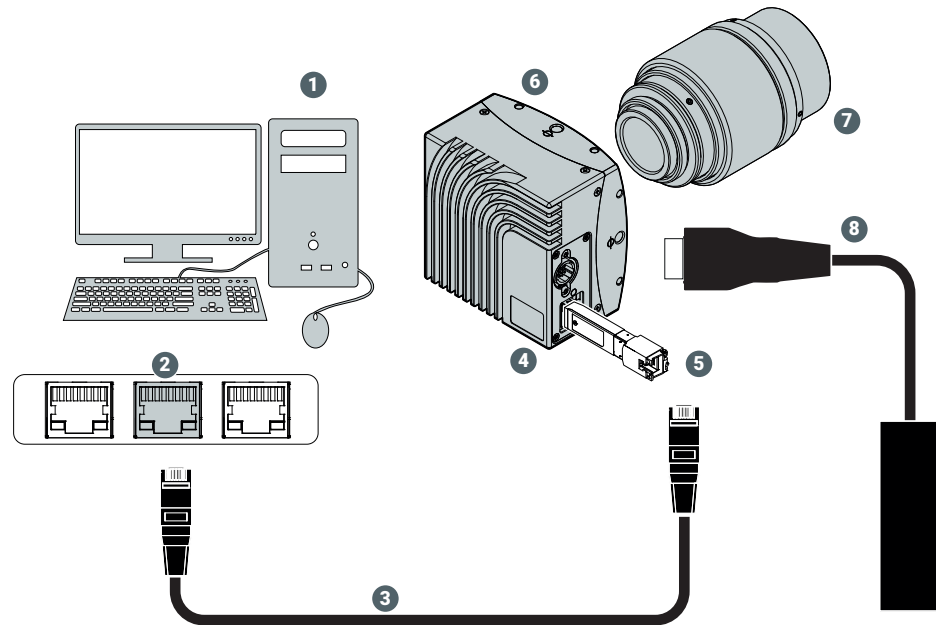


Fig.: 4-1: Connecting the camera and image processing system

1. Install the frame grabber software on the image processing system (see documentation of frame grabber board).
2. Switch off the image processing system (1).
3. Unscrew the dust protection cover of the camera (6).
4. Mount the lens (7).
5. Insert the SFP+ module (5) into the camera slot (4).
6. Connect the 10 Gbit Ethernet cable (3) or OM3 fiber cable with the module (5).
7. Connect the other end of the cable with the Ethernet socket of the network card (NIC) (2).
8. Connect the power supply NTCAM132x or NTCAM132XIO (8) via the 12-pin connector with the camera (6).

#### INFO

*If connecting an external trigger, take the pinning into account.*

9. Connect the power supply with the main supply.
10. Switch on the image processing system (1).
11. Check the status LED of the camera to verify that the camera is ready for use.

## 4.2 Connecting an external power supply or I/O signals

The external 12 - 24 V DC power supply (min. 18 W) must be connected with the 12-pin connector at the rear of the camera (refer to "Connecting camera and image processing system" on the previous page).

**NOTICE** The power connector of the camera has to be connected with a DC power supply providing 12 to 24 V DC. Connecting a lower or higher supply voltage, an AC voltage, reversal polarity or using wrong pins of the power connector may damage the camera and will void warranty!

Mikrotron offers the power supply unit NTCAM132xx / NTCAM132XIO with cables of 5 or 10 meters.

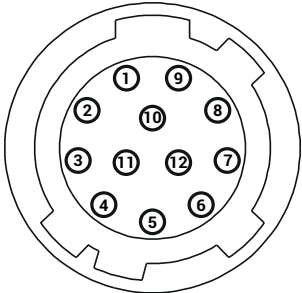
**INFO** If you assemble your own cable, pay attention to the pinning described below.

### 12-pin connector and I/O signals

1. Connect the external power supply with the 12-pin connector of the camera.

**NOTICE** The DC power supply must deliver 12-24 V DC (18.4 W). It must be equipped with a HR-10A-10P-12S plug.

The 12-pin connector provides two inputs for an external trigger and two output signals. The output signal can be controlled.

	Pin	Signal	Pin	Signal
	1 + 12	GND	6	IN0
	2 + 11	VCC (12 - 24 V)	7	IO <sub>GND</sub>
	3	IO <sub>GND</sub>	8	OUT1
	4	OUT0	9	IO <sub>GND</sub>
	5	IO <sub>GND</sub>	10	IN1

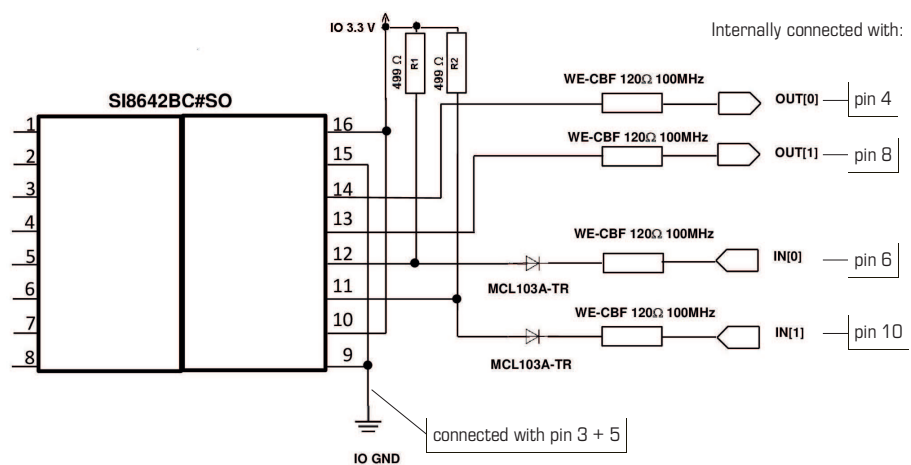


Fig.: 4-2: Connecting input and output signals with the internal circuit

All inputs accept 3.3 V LVTTTL signals. They are also 5 V TTL compatible.

All inputs can also accept signals with 12 V and 24 V.

**NOTICE** An open (not connected) input will be interpreted as high level from the camera. For low level an input voltage of 0 - 0.3V must be connected.

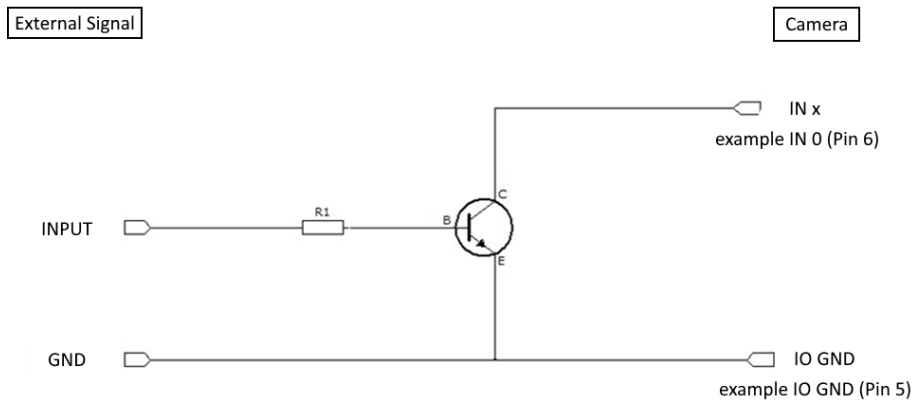


Fig.: 4-3: IO signals

If the available external signal cannot deliver a low level voltage  $< 0.3\text{ V}$  or the input signal is  $> 24\text{ V}$ , the following transistor circuit can be used. A suitable transistor is for example BC547, or 2N2222.

**NOTICE** This circuit will invert the signal. (A high level at the input will be seen as low level at the camera.)

Examples for R1

Input voltage	Resistor
3.3 V	2.7 kOhm
5 V	4.7 kOhm
12 V	12 kOhm
24 V	22 kOhm

### 4.3 The power-up profile

If the camera is powered-up, the power-up profile permanently stored in the non-volatile memory of the camera will be loaded. This profile consists of a number of camera settings such as sensor resolution and frame rate. It is used to set the camera into a defined operation mode.

**INFO** *The camera has NOT to be configured by the host to start operation. The power-up profile will deliver all necessary values.*

Serial number and firmware version are provided in the non-volatile memory of the camera. Use the GenICam feature "DeviceSerialNumber" to read the serial number and the firmware revision.

**INFO** *Read the chapter on Bootstrap Registers in the Reference Guide for more information. For the serial number, see the identification plate at the side of the camera.*

## 4.4 Cleaning sensor and lens

Unplug the camera before you clean any parts!

Never open the housing when cleaning the window of the sensor. If the camera has been opened, the warranty will be void.

1. If there are coarse particles on the lens or the window of the sensor, use a vacuum cleaner to remove them before cleaning to prevent scratches.
2. Clean the window of the sensor and the lens with a dry and soft lens-cleaning tissue.

**NOTICE** Do not use tools that may harm the sensor or lens.

## 4.5 Updating the camera firmware

This section describes how to carry out a firmware update for a camera from Mikrotron GmbH.

### Prerequisites

**INFO** *The updater software requires the Microsoft Redistributables for Visual Studio 2015-2019 (vcredist\_x64.exe) that can be downloaded from Microsoft for free.*

### Procedure

The updater process requires frame grabber specific components. The program assumes that there is a "Data" folder containing the following files:

1. Close and exit all camera-related applications.
2. Connect the camera with the power supply and the network.
3. Open the tool "MC206x\_Updater\_V\*\*\*" in the folder "Firmware".
4. Start "RunUpdater.bat".

**NOTICE** Do not switch off the camera during the update process.

5. When the update is finished, restart the camera.

## 5 Technical data

### 5.1 Camera specifications

Frame rate (8 bit)	536 fps
Pixel depth	8 / 10 bit
Shutter speed	2 $\mu$ s – 999999 $\mu$ s
Shutter time (steps)	1 $\mu$ s
Max. Jitter	$\pm$ 4 ns
Triggermodi	Timer / pulse width
Max. Trigger frequency	300 kHz
Quantum efficiency	>45% @ 550 nm
Interfaces	10 Gbit Ethernet
Adapter	C- / F-mount
Dimensions (W x H x L)	80 x 80 x 57.1 mm (fanless, C-mount) / 80 x 80 x 67.1 mm (with fan, C-mount) / 80 x 80 x 84.6 mm (fanless, F-mount) / 80 x 80 x 94.6 mm (with fan, F-mount) / 80 x 80 x 81.8 mm (fanless, G-mount) / 80 x 80 x 94.6 mm (with fan, G-mount)
Weight	0.45 kg
Cooling	<ul style="list-style-type: none"> <li>• Fanless</li> <li>• Optional fan at the back of the housing</li> </ul>
Noise of optional fan	<b>max. 23 dB(A)</b>
Power supply	12 - 24 V DC @ 11 W (Power adapter supplied)
Operating temperature (camera body)	+5 °C ... +60 °C
Shock resistance	70 g
Vibration resistance	7 grms
Compliance	GigE Vision



## 5.2 Sensor specifications

Sensor type	LUX19HS, CMOS global shutter
Image sensor size	19.2 x 10.8 mm
Resolution	2.0 Megapixel
Active pixels	1920 x 1080 px
ROI min.	128 x 8 px
Pixel depth	8 bit / 10 bit
Pixel size	10 x 10 $\mu\text{m}$
Light sensitivity	20 V/lux*s @ 550 nm (6,400 / 5,000 ASA)
Dynamic range up to	56 dB
Full well charge	15000 e-
Bayer filter pattern	BayerGB8 / BayerGB10 Because the pattern must always start at the same field with a color camera only even height and even offset-y is possible. The camera will automatically round down if odd values are entered. Also bear in mind when using the invert readout function the pattern must be inverted too.

## 5.3 Resolution and frame rates

Resolution	Capture & process	Output
1920 x 1080 px	2247 fps	536 fps
1280 x 1024 px	2369 fps	852 fps
1024 x 768 px	3152 fps	1421 fps
768 x 600 px	4026 fps	1421 fps
640 x 480 px	5020 fps	1421 fps
512 x 512 px	4710 fps	1421 fps
384 x 240 px	9911 fps	1421 fps
128 x 128 px	18177 fps	1421 fps
128 x 8 px	170578 fps	1421 fps

### INFO

Use our camera compare tool to calculate the frame rate for a certain ROI size.  
[www.mikrotron.de/cameracompare/](http://www.mikrotron.de/cameracompare/)

## 5.4 Camera dimensions

All dimensions in Millimeters.

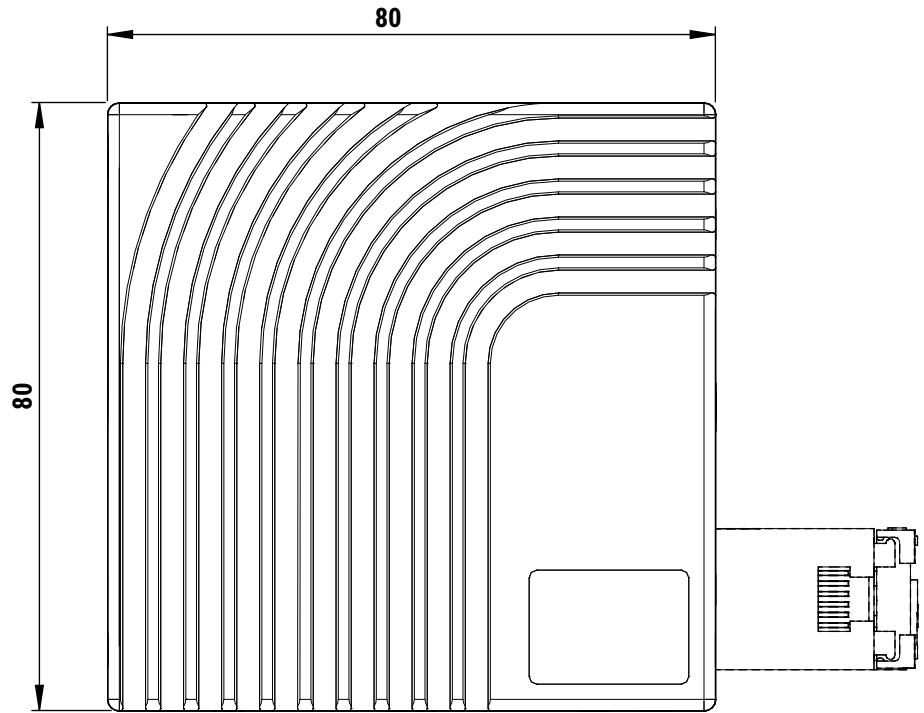


Fig.: 5-1: Rear view (fanless)

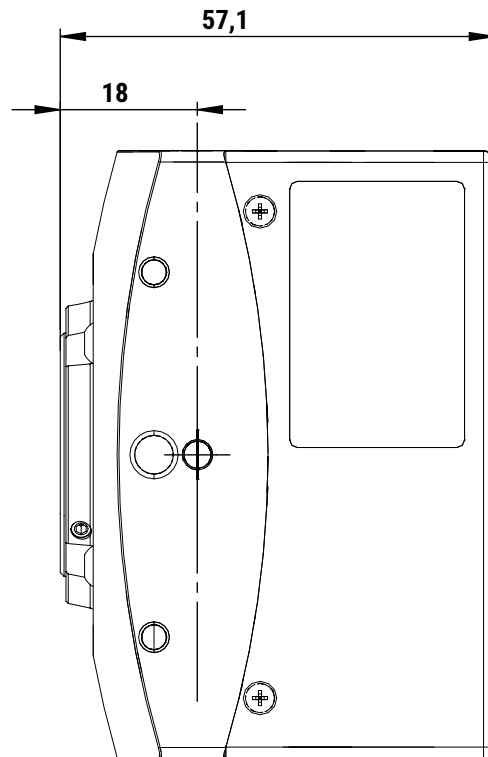


Fig.: 5-2: Side view (fanless) with C-mount adapter

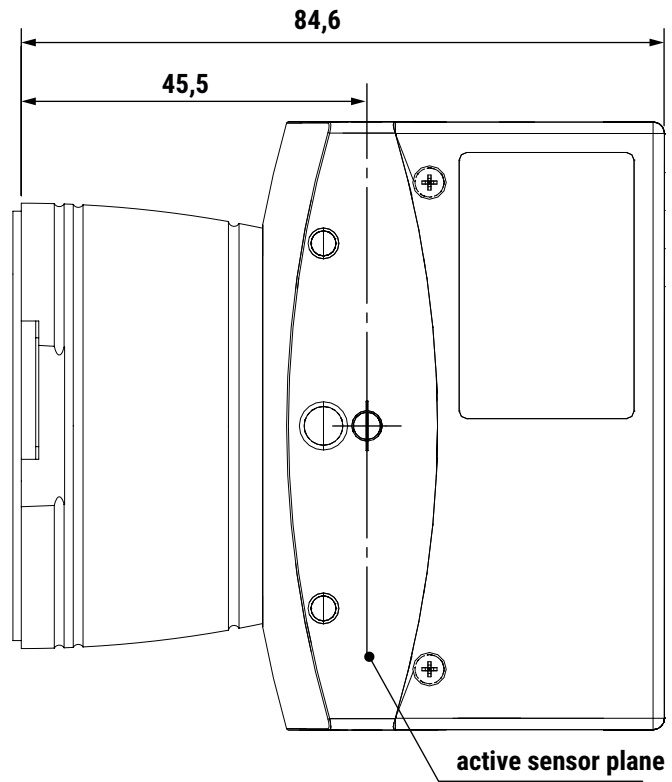


Fig.: 5-3: Side view (fanless) with F-mount adapter

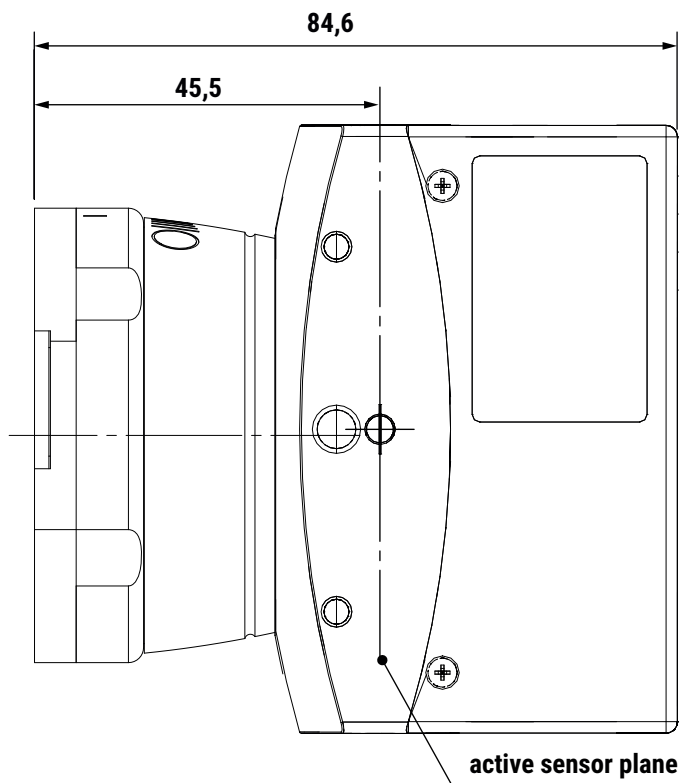


Fig.: 5-4: Side view (fanless) with G-mount adapter

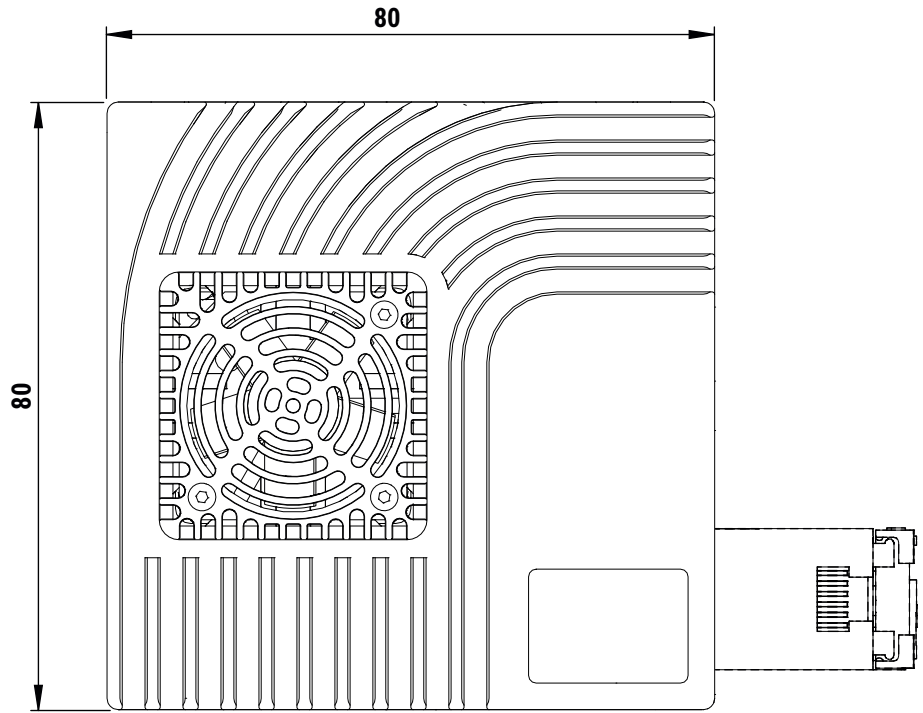


Fig.: 5-5: Rear view (with fan)

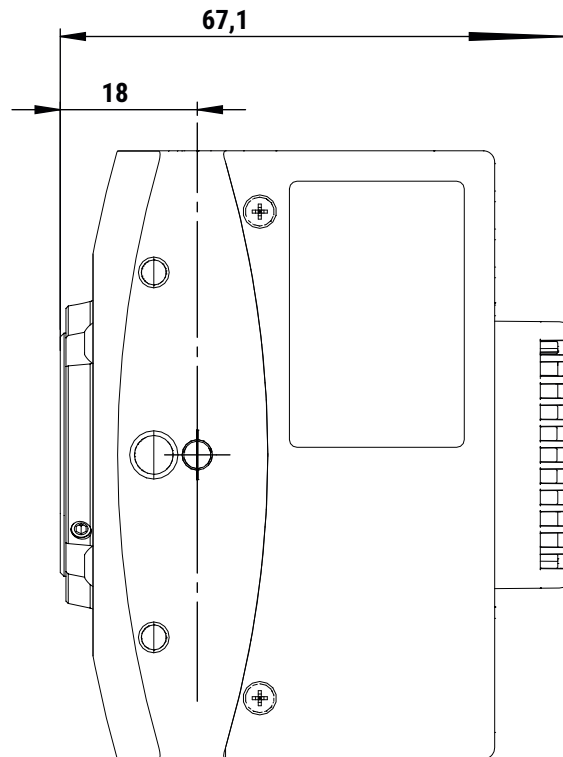


Fig.: 5-6: Side view (with fan) with C-mount adapter

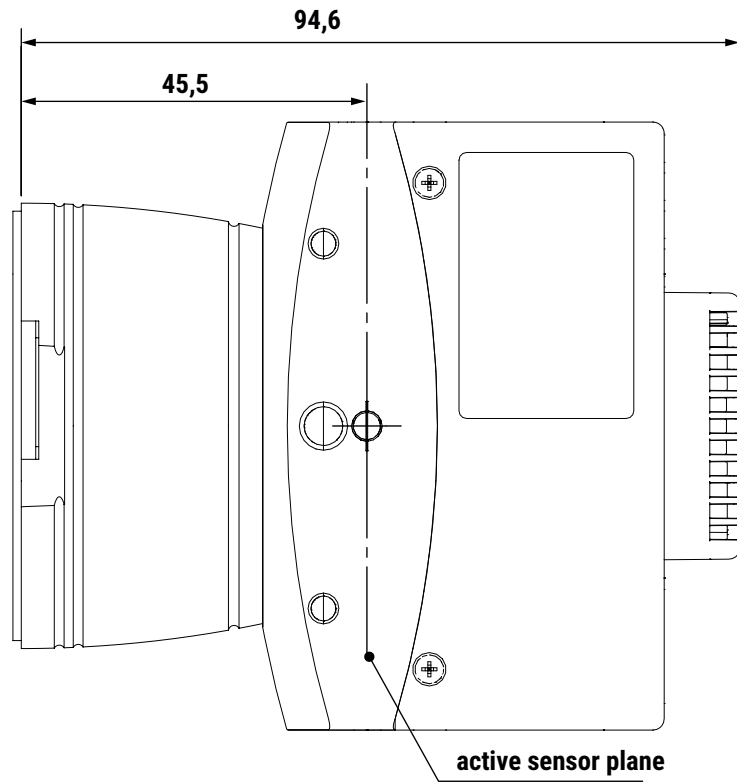


Fig.: 5-7: Side view (with fan) with F-mount adapter

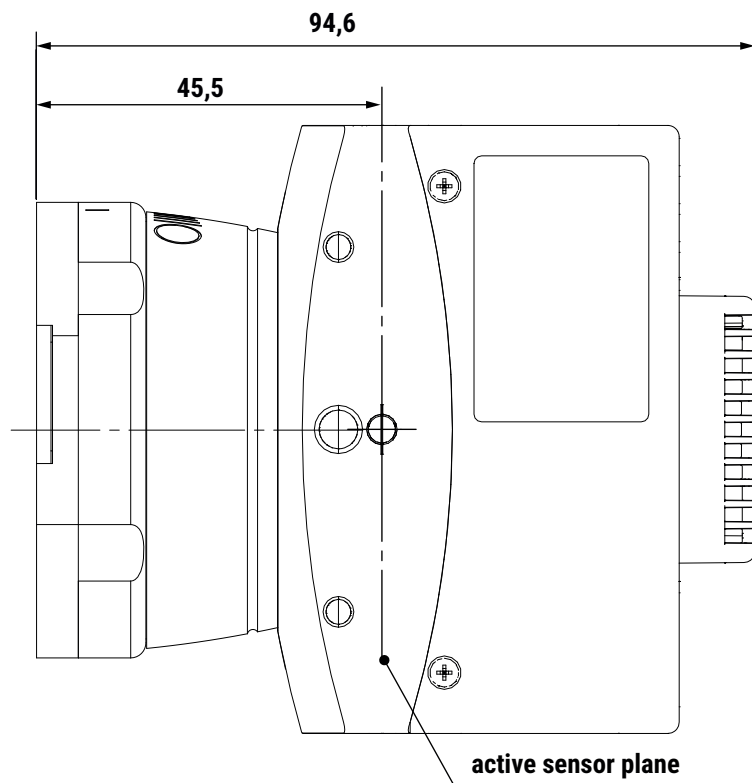


Fig.: 5-8: Side view (fanless) with G-mount adapter

## 5.5 Spectral response

### 5.5.1 Monochrome

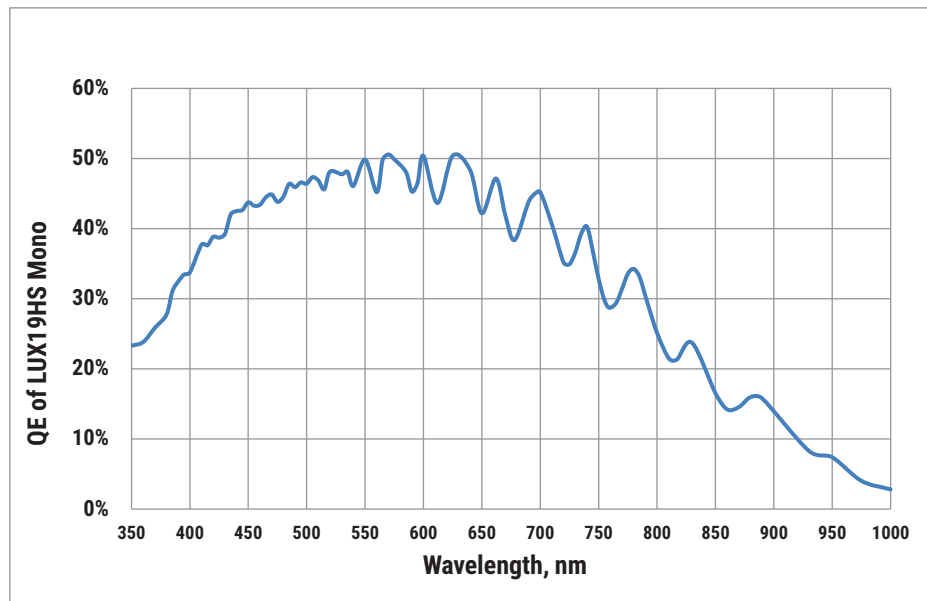


Fig.: 5-9: Spectral response - monochrome

## **6 Appendix**

The following page contains the Declaration(s) of Conformity.



# EU DECLARATION OF CONFORMITY

Address: **Mikrotron GmbH**  
Landshuter Str. 20-22 ,  
85716 Unterschleißheim

Series: EoSens Creation  
2.0XGE

Model: CAMMC2064-352-2, CAMMC2065-352-2,  
CAMMC2064-352-8, CAMMC2065-352-8

**The product complies with the requirements of the following European directives:**

2014/30/EU	Electromagnetic Compatibility (EMC)
2011/65/EU + (EU) 2017/2102	Restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)

**The compliance with the requirements of the European Directives was proved by the application of the following harmonised standards:**

EMC:	EN 55032:2016-02
	EN 55035:2018-04

Unterschleißheim, January 11, 2021

Walter Denk, General Manager

i.A. Andreas Ertl, Head of R&D



A BRAND OF SVS-VISTEK

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This document and the product(s) described are subject to change without further notice.