

# EMMI

## Quick Start Guide



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The EMMI camera and adapter must be used according to this EMMI quick start guide. Any operation related to maintenance, repair or calibration must be carried out by qualified personnel. Consequently, in case of failure, contact Riscure to find out about the procedure to follow.

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## What is in the box

The box contains the EMMI camera, adapter for mounting on a Laser Station and a 1200 nm ring light.



### Box content checklist

Qty [1]	Description		Identifier [2]
1 (optional)	<p>Goldeye G-008 SWIR TEC1 camera with C-mount.</p> <p>Note: Export regulations apply to Goldeye G-008. Goldeye camera may be optional or replaced by other C-mount SWIR camera.</p>		Camera
1	EMMI adapter for C-mount SWIR camera and Laser Station 2.		Adapter
1	<p>Goldeye G-008 power supply unit, 12 V DC / 1.25 A with 12-pin Hirose plug.</p> <p>Note: photo shows a generic power supply.</p>		PSU
-	Country specific power cable (included with PSU)		

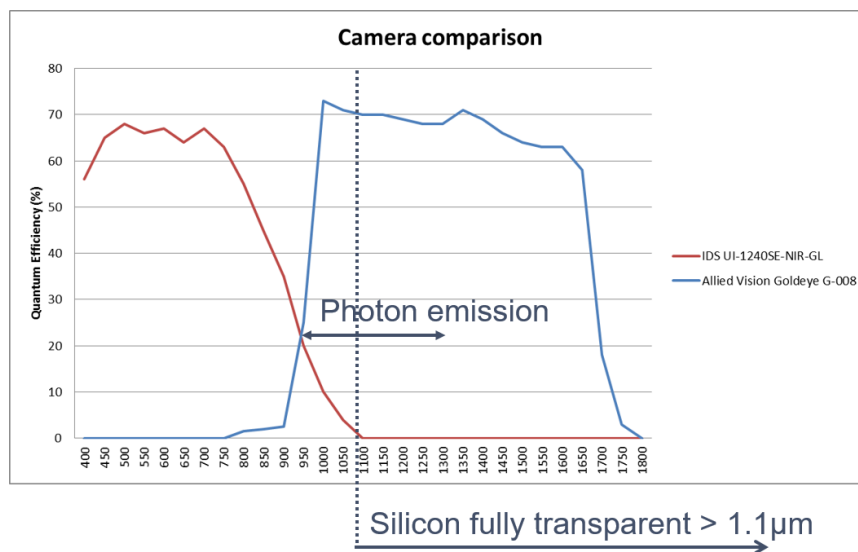
Qty [1]	Description		Identifier [2]
1	1200 nm IR ring light with magnetic mounting ring		Ring light
1	12 V DC 5A  IR right light PSU		Ring light PSU
1	Ethernet cable		Ethernet
-	This "EMMI - Quick Start Guide"		

[1] The amount or number of registered items (quantity, Qty)

[2] Identifier used in this document to refer to the item.

## What does it do

The sensitive Goldeye G-008 SWIR camera together with the high optical transmission adapter enables photon EMISSION Microscopy. 'EMMI' creates an image of weak photon radiation, created by switching transistors in active chips. Camera selection and adapter design aim at optimal sensitivity for the photon emission wavelength range, see Figure 1.



*Figure 1 High sensitivity of Goldeye G-008 with InGaAs sensor for photon emission.*

Due to camera's high sensitivity, this set-up is also ideal for backside imaging using illumination at 1200 nm wavelength. At this wavelength, the silicon backside of a chip is fully transparent. For this purpose, a 1200 nm ring light is part of the package.

## Building the EMMI set-up

### Mounting camera

Please follow next steps to connect Goldeye G-008 SWIR camera and adapter:

- Remove circular protection caps from adapter and camera.
- Camera has c-mount at bottom and adapter has c-mount at top. Align c-mounts and rotate camera to connect camera to adapter. When end of c-mount thread is reached, align camera with adapter to make a  $0^\circ$ ,  $90^\circ$ ,  $180^\circ$  or  $270^\circ$  angle.
- Camera and adapter are connected, see Figure 2 for end result.



*Figure 2 Connected camera and adapter.*

### Remove beam splitter

The camera and adapter use the optical port on Laser Station, which is usually used for the beam splitter, see red circle in Figure 3. Please follow next steps to remove beam splitter.



*Figure 3 Beam splitter needs to be removed.*

- Loosen screws, see blue circles in Figure 3.
- Carefully slide beam splitter out of Laser Station. Pay attention not to touch or damage beam splitter glass.
- Store beam splitter in its storage container. Note: you may use the protective housing of the adapter for this purpose.
- You completed removal of the beam splitter.

## **Mounting adapter with camera on Laser Station**

After removing the beam splitter, please follow next steps to mount adapter on to Laser Station.

- A protective housing covers the adapter. Loosen housing screws and carefully slide protective housing away.
- Position camera with adapter in front of open optical port. Camera should be pointing upwards.

- Carefully slide adapter into Laser Station and use same screws to fix adapter to Laser Station.
- Your camera and adapter are now mounted on to Laser Station.

## **Connect camera cables**

You will find two connectors on top of the camera

- Plug camera power supply into 12-pin Hirose connector to power the camera.
- Plug an Ethernet cable into Ethernet connector for network connection between your camera and computer. This connection handles camera control and transfer of image data.
- Your camera is ready for imaging.

## **Mounting 1200 nm ring light**

The 1200 nm ring light must be mounted to one of the objectives via a magnetic ring. Please perform following steps.

- The magnetic ring has several screws. You can reach these screws from ring outside using a hex key. Loosen these screws so that magnetic ring fits over objective from the bottom.
- Slide magnetic ring up to objective thickening, see Figure 4.
- Fix magnetic ring by fixing screws.
- Bring 1200 nm ring light to magnetic ring so that both can connect.
- Connect power supply to ring light.
- You have mounted and connected the ring light.



*Figure 4 Mounting 1200 nm ring light to objective.*

# Protection

Human eye and camera sensor need protection

## Human eye

The human eye needs protection against laser light and against intense IR radiation from 1200 nm ring light



### **Do not stare into 1200 nm ring light.**

The light from 1200 nm ring light is invisible for the human eye and does not cause any eye reflex. Pay attention not to stare into the IR ring light.



### **Do not bring ring light close to your eye.**

The IR LEDs are directed towards ring center at 17 mm below ring bottom side. Do not bring your eye close to this center of light.



### **Never use Laser Station without beam splitter, camera adapter or safety box**

The Laser Station with safety box has two safety mechanisms to protect against laser light reaching the human eye:

1. The interlock system switches laser off when safety box is opened.
2. The laser light is contained inside Laser Station.

The second safety mechanism is by-passed when beam splitter and adapter are both removed from Laser Station. The laser beam would point outside through the open optical port if activated.

## Camera sensor

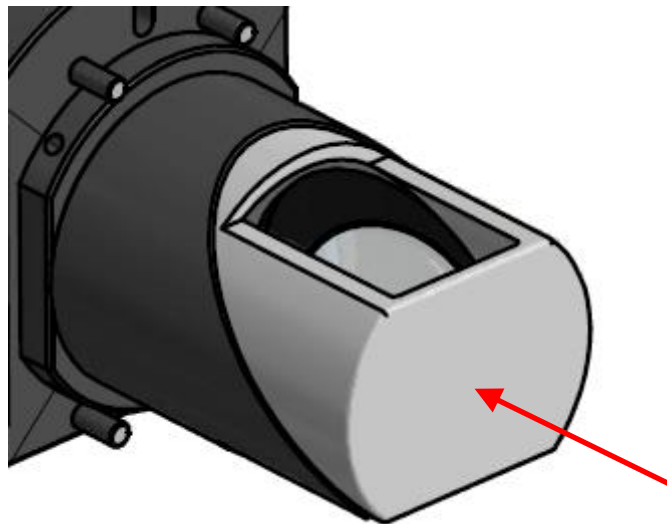
The sensitive camera sensor needs protection against laser light. For this purpose, the camera adapter is equipped with a shield to block any laser light coming from any laser mounted on top of Laser Station, see Figure 5. For standard operation, this shield provides sufficient protection.



### **Do not use camera with lasers without Laser Station**

When using camera together with a laser, make sure never to point the laser at camera sensor.

When creating a laser spot, make sure never to project an image of this bright laser spot on to camera sensor.



*Figure 5 Shield to protect sensor against laser light.*

# Help and troubleshooting

## Common problems

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1200 nm ring light does not lit **CAUSE:** 1200 nm wavelength is not visible by the human eye. Be careful! Do not stare into IR LEDS.

**SOLUTION:** Show camera image on computer monitor. Switch 1200 nm ring light ON/OFF by plugging/unplugging the power supply. Check impact of switching on brightness of camera image.

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Cannot get camera image. **CAUSE:** Camera is not powered.

**SOLUTION:** Connect Camera power supply to camera and mains.

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**CAUSE 2:** Allied Vision driver software missing.

**SOLUTION 2:** Download Vimba software package at <https://www.alliedvision.com/en/products/software.html>.

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**CAUSE 3:** No network connection.

**SOLUTION 3:** Configure Ethernet network for connection to camera.

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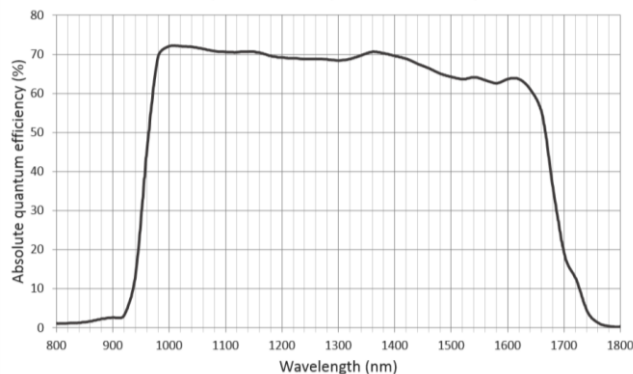
## Still have questions?

Visit the Riscure Support Portal: <http://support.riscure.com>.

# Technical specifications

## Camera

- Sensor: InGaAs FPA
- Spectral range: 900 – 1700 nm



*Figure 6 Goldeye G-008 spectral sensitivity.*

- Sensor size: 320 × 256 pixels
- Maximum frame rate at full resolution: 344 frames per second
- FPA cooling: TEC1. Min.  $\Delta T = 20K$
- Power supply: 12V DC, nominal load 1.25 A, 12-pin Hirose plug
- Control and image data transfer: Ethernet connector
- Driver software: Vimba from <https://www.alliedvision.com/en/products/software.html>
- Body dimensions: 78 × 55 × 55 mm

## Operating conditions

- Room temperature 20 – 30 °C, (68 – 86 °F), preferred
- Relative humidity less than 85% (no condensation)
- Place protection caps on camera and adapter when not in use to protect against dust. Cover adapter with protective housing.

## Ring light

- IR LEDs at 1200 nm wavelength
- 12 V power supply
- 17 mm working distance between object and bottom of ring light