

## Options

### Custom Light Sources

The AEON camera calibrator can optionally be equipped with custom light sources:

- Up to 14 channels of wavelengths between 365 nm and 1550 nm (ACC2)
- Special high irradiation monochrome light source
- Monochrom high dynamic range light source (> 128 db, ACC2)

### Custom Adaptors

According to your specifications

### Custom Versions

To be used with climate chambers, e.g.

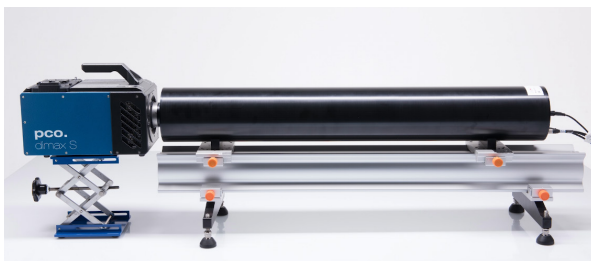
### Measuring Services

AEON offers a wide range of measurement services that go beyond the capabilities of the AEON camera calibrators and the EMVA 1288 standard:

**High-resolution spectral measurements.** A dedicated monochromator is available for measurements of the absolute quantum efficiency with resolutions down to 3 nm FWHM from 250 nm to 1050 nm thus covering the whole range from the ultra violet to the near infrared wavelengths.

**MTF measurements.** The light sensitive area of the pixel is measured with a resolution of about 1  $\mu\text{m}$ . From these high resolution measurements accurate MTF curves are computed by Fourier transform.

**Additional measurements.** Regarding your special demands, tailored solutions can be developed.



## The EMVA 1288 Standard

EMVA has launched an initiative to define a unified method to measure, compute and present specification parameters for cameras and image sensors used for machine vision applications. Application of this standard will be of great benefit for the customer, distributor, and manufacturer: Finally, camera parameters are specified in an objective and comparable way.

The standard is elaborated by a consortium of the industry leading sensor and camera manufacturers, distributors and research institutes. The first version of the standard was officially released by the working group member companies in August 2005. The current release 4.0 (June 2021) is available for download at the EMVA website ([www.emva.org](http://www.emva.org)).



### AEON offers EMVA 1288

- Consulting
- Measuring Services
- Customizable Test Equipment
- Training (online & on location)

For detailed information, please turn to our experts.  
E-Mail: [info@heurisko.de](mailto:info@heurisko.de)

## AEON® | Imaging

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## AEON® | Imaging

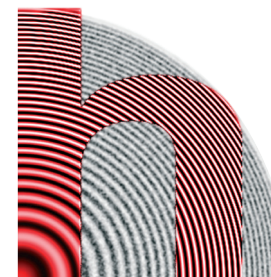
### Camera Calibrator

## Test equipment for accurate EMVA 1288 Measurements

SNR  
Linearity  
DSNU, PRNU  
Dark current  
Spectral sensitivity  
Bad pixel specification  
... and more

## Various Systems\* Customizable Software & Light Sources

*\*for various types of cameras*



## Key Features

Model	ACC2	ACC4
Largest sensor diameter	80 mm	18 mm
Standard camera adaptors	S-mount, CS-mount, C-mount, Nikon F, M72	S-mount, CS-mount, C-mount
Standard light source	Pulsed, current-controlled, RGB or RGB & IR LED light source Ø 84 mm	Pulsed, current-controlled, RGB LED light source Ø 21 mm
Calibration	Split optical path with built-in calibrated photo diode	
Usable cameras	Linear/non-linear, monochrome/color/multispectral, area/line cameras	
Overall dimensions (L x W x H)	935 x 130 x 140 mm	298 x 79 x 65 mm
Control interface	USB 2.0	
External power supply	≤ 24 VDC	None (via USB)



Modular and complete turn-key system with all required evaluation software based on AEON's powerful **heurisko**® image processing software. A **heurisko**® Developer license is included.

The whole set of measurements is conducted automatically after interactive setting of the measurement and the camera parameters. Batch processing is possible.

## Measurements

The AEON EMVA 1288 camera calibrator conducts all EMVA 1288 measurements (**newest release 4.0**):

**A** Linearity, Noise, and Sensitivity. According to the standard, these measurements are performed with monochromatic green light for monochrome cameras and with blue, red, and green light for color cameras.

**B** Spatial Inhomogeneities. With only a few illumination steps, the mean and the variance of each individual pixel are computed by averaging up to 1000 images. With these data it is possible to analyze the spatial inhomogeneities of the dark image and of the sensitivity of the sensor.

**C** Dark Current. The dark current is determined by taking many images at different exposure times without any illumination.



From these measurements, the following quantities are derived:

- Absolute gain factor  $K$  in electrons per digits ( $e^-/DN$ )
- Absolute sensitivity threshold and saturation capacity
- Maximal signal-to-noise ratio ( $SNR_{sat}$ )
- Dynamic range (DR)
- Linearity
- Spatial inhomogeneity of the dark image (dark signal nonuniformity, DSNU) and of the sensitivity (photoresponse nonuniformity, PRNU)
- Quantum efficiency ( $\eta$ ) at the main wavelengths used (blue, green, and red) or optionally at selectable wavelengths between 365 nm and 1550 nm.

The measurement results are provided as plots (PDF) and Excel files (csv). All essential intermediate results including images with the dark signal nonuniformity (DSNU) and the photoresponse nonuniformity (PRNU) are stored.

## Hardware

The AEON EMVA 1288 camera calibrator is a modular optical system, which is described in the following in more detail.

The optical system consists of a tube or box system with exchangeable optical components including a homogeneous light source and a standard camera mount such as Nikon F-mount, C-mount or M72. The maximum recommended sensor diameter is 80 and 18 mm, respectively. The whole system is light-tight so that no dark room is required to perform the measurements.

All light sources are current-controlled LEDs. The current can be controlled digitally with 12-bit resolution. Exposure can be changed either by changing the LED current or by changing the exposure time of the camera with constant LED current. Therefore, the measurements are made simple, because triggering of neither the camera nor the light source is required. The camera just needs to be connected to the computer for grabbing images.

The whole system can be controlled by a computer via a single USB connection.

Out-of-the box camera drivers include

- Camera Link and GigE-Vision, Camera Link HS and CoaXPress via Silicon Software framegrabbers
- Camera Link and Camera Link HS via Dalsa framegrabbers
- GigE-Vision and USB 3 Vision via Pleora's eBUS
- Various other proprietary camera interfaces (e.g. Euresys)
- Open interface for other camera drivers

