



Figure 1: OEOS - 04 - 368

### Specific features

The strengths of the sensors are the high resolution in measurement field direction and the fast parallel sampling rate of the sensor data.

Sampling rate:	up to 4000 Hz
Resolution:	0.064 mm
Distance receiver - transmitter:	up to 1500 mm
Detector length:	98 ... 2078 mm
Power supply:	12 ... 36 V DC
Wavelength:	635 nm
Interface:	Ethernet

### OEOS - short description

The OEOS (Opto Electronical Object Scanner) sensor is a **measuring system** that is able to take **shadow images** of opaque (impervious to light) objects.

The sensor made up of a transmitter and a receiver unit which are available in different detector lengths. The transmitter produces **parallel laser beams** of laser class 2.

The receiver is able to generate scans with a **resolution** of **64 µm** (0.064 mm) in detector length. When an opaque object passes through the parallel laser beam a shadow image is generated. The data is **sampled with a rate** of up to **4000 Hz** and pushed out via Ethernet to an evaluation unit (like a personal computer). The data can be saved and visualized via software on the evaluation unit.

The software is designed to display infinity recordings without saving them. When an opaque object passes, the software is able to save the data and convert them to a **binary picture** (see Figure 2). Furthermore the software is needed to adjust the units to each other and to configure the sensor parameters like light intensity, sample rate, triggering and data logging.

Optionally, it is possible to add a rotary encoder to get improved information about the movement between sensor and object. This option improves the data evaluation. With this information it is possible to add a metric scale to the shadow image for improved analysis.



Figure 2: Example of a shadow image

### Product designation & order no.

Table 1: Standard product sizes\*

Product ID	Designation	Detector length
7G7-4B1	OEOS - 01 - 98	98 mm
1W5-10M	OEOS - 04 - 368	368 mm
8JW-DGD	OEOS - 06 - 548	548 mm
JJY-PAS	OEOS - 09 - 818	818 mm
6Z5-4GJ	OEOS - 12 - 1088	1088 mm

Example:  
**OEOS - 12 - 1088**

— measurement height  
 — number of cascading modules  
 — product name

\*Der OEOS Sensor is available in other lengths on request.

## Technical data

Table 2: Technical data

Type	OEOS - 01 ... OEOS - 06	OEOS - 07 ... OEOS - 12	Unit
Sampling rate	240 ... 4000		Hz (FPS)
Resolution	0.064 / 64		mm / $\mu$ m
Working distance	100 ... 1500		mm
Power supply	12 ... 36	24 ... 36	VDC
Current	100 ... 760	450 ... 1000	mA
Measuring technique	Parallel data sampling over the detector length		
Sensor principle	Transmitter / Receiver		
<b>Optical properties</b>			
Optical filter	Band-pass filter $635 \pm 10$		nm
Wavelength	635		nm
Laser class	2		DIN EN 60825-1
<b>Environmental conditions</b>			
Operating temperature range	0 ... +50		$^{\circ}$ C
Storage temperature range	0 ... +85		$^{\circ}$ C
IP code	IP-66		
<b>Housing and mechanical data</b>			
Housing material	Aluminum, matt-black anodized		
Window material	Plexiglas, scratchproof surface and chemical-resistant		
Housing metrics	See Technical drawings		
Weight	-	-	
<b>Data logging and output</b>			
Data logging	Triggered / manually		
Sensor data output	Ethernet (UDP-Frame)		
	100	100 / 1000	Mbps
Data format	LLD-Log files, convertible to bitmap, CSV [Excel, MatLab, RStudio]		
<b>Connection and mounting</b>			
Connection cables	5 m cable with open wire (Power supply)* 2 m cable with plug und jack (Synchronization)* - m cable for Ethernet connection (Data Interface)* Optional 3 m cable with plug und open wire (Rotary encoder)*		
Mounting connectors Receiver side	4-pole, plug (Power supply) 5-pole, jack (Synchronization to the transmitter) Ethernet, jack (Sensor data) 4-pole, jack (Rotary encoder)		
Mounting connectors Transmitter side	4-pole, plug (Synchronization to the receiver)		

\*These cables are available in different lengths upon request.

## Housing metrics

Table 3: Housing metrics

	Height H in mm	Width B in mm	Depth T in mm		
			Transmitter	Receiver	
OEOS - 01 - 98	286	333	63	53	
OEOS - 04 - 368	556				
OEOS - 06 - 548	736				
OEOS - 09 - 818	818				
OEOS - 12 - 1088	1276				

## Technical drawings

The following drawings show the sensor in different views. The metrics are demonstrated for an OEOS - 04 -368 housing. In the following description the n stands for the count of modules (here e.g. 04).

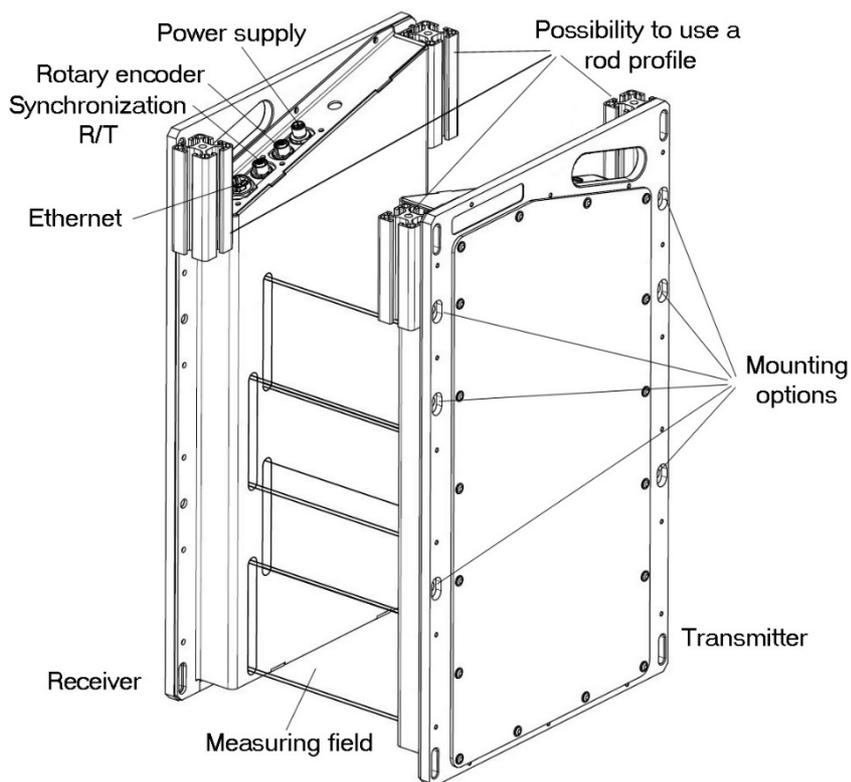


Figure 3: Angled view of the OEOS sensor

The detector length can be calculated from the product description.

Example:

Formula to calculate the detector length:

Fixed specifications are the single detector length (98 mm) and the overlap (8 mm), n depicts variation (number of modules).

$$\begin{aligned} \text{detector length} &= (n - 1) * (\text{single detector length} - \text{overlap}) && + \text{single detector length} \\ \text{detector length} &= (n - 1) * (98 \text{ mm} - 8 \text{ mm}) && + 98 \text{ mm} \\ \text{detector length} &= (n - 1) * 90 \text{ mm} && + 98 \text{ mm} \end{aligned}$$

$$\boxed{\text{detector length} = (n-1) * 90 \text{ mm} + 98 \text{ mm}}$$

The resulting detector length is stated in mm.

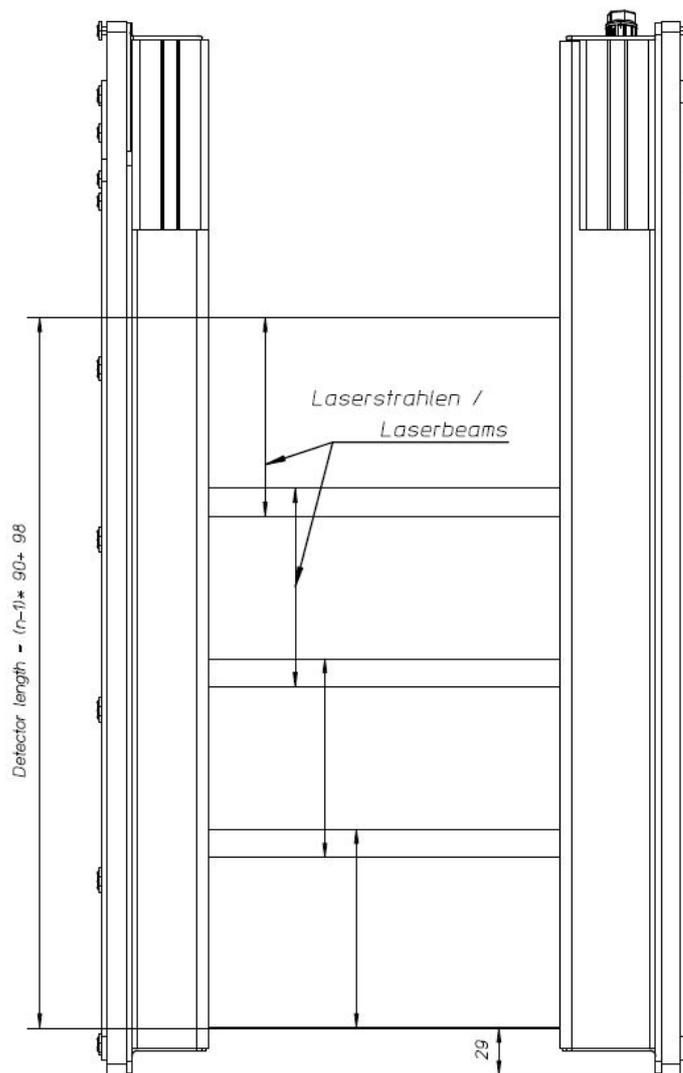


Figure 4: Frontal view of the OEOS sensor

The mounting points and the total sensor height H of the sensor is shown below.  
The base plates of transmitter and receiver are similar, therefore the metrics are only presented once.

In the cases of OEOS-01 to OESO-03 there are special calculations:

OEOS-01	→	height = 192 mm + 94 mm	= 286 mm
OEOS-02	→	height = 192 mm + 90 mm + 94 mm	= 376 mm
OEOS-03	→	height = 192 mm + 180 mm + 94 mm	= 466 mm

Starting from OEOS-04 there is a common equation:

OEOS-04 to OEOS-..	→	height = 192 mm + A * 180 mm + 90 mm + 94 mm
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$$A = n - 3$$

$$\text{height} = 376 \text{ mm} + (n-3) * 180 \text{ mm}$$

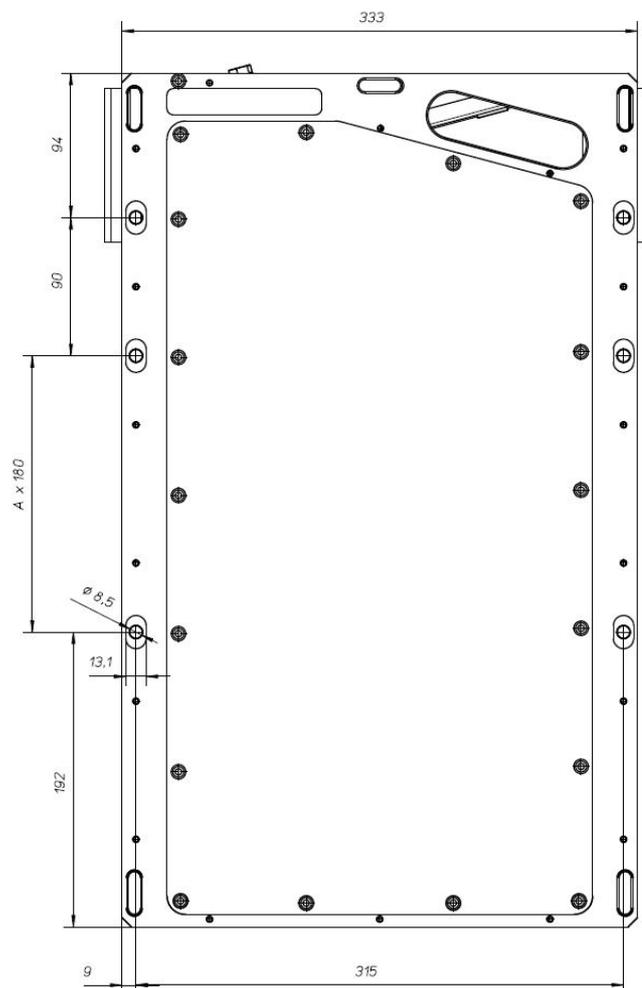


Figure 5: Side view of the OEOS sensor



## Sensor resolution

### Detector line

The resolution of the detector line of the sensor is static. It is defined by the system's light sensible components and is 64  $\mu\text{m}$  (0,064 mm).

### Movement direction of the measuring object through the detector line

This resolution is not static. It is defined by the adjusted exposure time of the light sensible components of the receiver and the velocity difference between the passing object and the sensor, where it does not matter which one of the two is moving.

For more detailed information see [OEOS-Handbook Chapter 1.3 Generating of shadow images](#).

## Behavior with external light

The sensor is not sensitive to external or ambient light sources. The light sensible components of the receiver are covered with a band-pass filter, that ensures that only those wavelengths which emitted by the transmitter are passed through. This ensures an outdoor usage of the sensor even under daylight.

However, it is still recommended to avoid direct sun light hitting to avoid faulty exposure and corrupt measurements.

## Adjusting the intensity

For safety reasons, the sensor is initiated with a reduced laser intensity. It is recommended to set the laser intensity to maximum before starting a measurement in order to get the best possible signal on the light sensible components of the receiver unit. To facilitate usage, sensor configurations can be saved and loaded after a restart of the sensor.

## Pin assignment

