

# ShapeDrive G4 MLAS/MLBS

3D Sensors



## Operating Instructions

Original operating instructions  
Subject to change without notice  
Available as PDF file only  
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Version: 1.3.1  
[www.wenglor.com](http://www.wenglor.com)

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# 1. Change Index of Operating Instructions

| Version | Date       | Description/Change                                                                                                                                                                                                                                                                                                                              | Firmware version |
|---------|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| 1.0.0   | 14.04.2023 | Initial version of the operating instructions                                                                                                                                                                                                                                                                                                   | 1.0.0            |
| 1.1.0   | 27.09.2023 | <ul style="list-style-type: none"><li>• Added description of trigger behaviour (section “<a href="#">8.6 Trigger Behaviour</a>”)</li><li>• Added default settings SyncOut (section “<a href="#">8.11 Default Settings</a>”)</li><li>• Added complementary software (section “<a href="#">9. Software</a>”)</li><li>• Some supplements</li></ul> | 1.1.0            |
| 1.1.1   | 30.11.2023 | Small bugfixes                                                                                                                                                                                                                                                                                                                                  | 1.1.0            |
| 1.2.0   | 20.12.2023 | <ul style="list-style-type: none"><li>• Greyscale HDR mode</li><li>• Intrinsic and extrinsic camera parameters via XML (see Interface Protocol at product area <a href="#">3D Sensors</a>)</li></ul>                                                                                                                                            | 1.2.0            |
| 1.3.0   | 03.07.2024 | Updated description for version 1.3.0 of ShapeDrive firmware                                                                                                                                                                                                                                                                                    | 1.3.0            |
| 1.3.1   | 11.11.2025 | Small corrections                                                                                                                                                                                                                                                                                                                               | 1.3.0            |

## 2. General

### 2.1 Information Concerning these Instructions

- These instructions enable safe and efficient use of
  - » MLASx1x
  - » MLBSx1x
- These instructions are an integral part of the product and must be kept on hand for the entire duration of its service life.
- Local accident prevention regulations and national work safety regulations must be complied with as well.
- The product is subject to further technical development, and thus the information contained in these operating instructions may also be subject to change. The current version can be found at [www.wenglor.com](http://www.wenglor.com) in the product's separate download area.



**NOTE!**

The operating instructions must be read carefully before using the product and must be kept on hand for later reference.

### 2.2 Explanations of Symbols

- Safety precautions and warnings are emphasized by means of symbols and attention-getting words.
- Safe use of the product is only possible if these safety precautions and warnings are adhered to.

The safety precautions and warnings are laid out in accordance with the following principle:



**ATTENTION-GETTING WORD**

**Type and Source of Danger!**

Possible consequences in the event that the hazard is disregarded.

- Measures for averting the hazard.

The meanings of the attention-getting words, as well as the scope of the associated hazards, are listed below:



**DANGER!**

This word indicates a hazard with a high degree of risk which, if not avoided, results in death or severe injury.



**WARNING!**

This word indicates a hazard with a medium degree of risk which, if not avoided, may result in death or severe injury.



**CAUTION!**

This word indicates a hazard with a low degree of risk which, if not avoided, may result in minor or moderate injury.



**ATTENTION!**

This word draws attention to a potentially hazardous situation which, if not avoided, may result in property damage.



**NOTE!**

A note draws attention to useful tips and suggestions, as well as information regarding efficient, error-free use.

## 2.3 Limitation of Liability

- The product has been developed taking into account the state of the art as well as the applicable standards and guidelines.
- We reserve the right to make technical changes.
- A valid declaration of conformity can be found at [www.wenglor.com](http://www.wenglor.com) in the download area of the product.
- wenglor sensoric elektronische Geräte GmbH (hereinafter „wenglor“) accepts no liability for:
  - » Failure to observe the operating manual,
  - » Unsuitable or improper use of the product,
  - » Excessive use, incorrect or negligent treatment of the product,
  - » Incorrect installation or commissioning,
  - » Use of untrained personnel,
  - » Use of unauthorized spare parts or
  - » Improper or unauthorized changes, modifications or repair work to the products.
- This operating manual does not contain any guarantees/warranties from wenglor with regard to the processes described or certain product properties.
- wenglor assumes no liability with regard to printing errors or other inaccuracies contained in this operating manual, unless it can be proven that wenglor was aware of the errors at the time the operating manual was created.

## 2.4 Copyrights

- The contents of these instructions are protected by copyright law.
- All rights are reserved by wenglor.
- Commercial reproduction or any other commercial use of the provided content and information, in particular graphics and images, is not permitted without previous written consent from wenglor.

## 3. For Your Safety

### 3.1 Use for Intended Purpose

ShapeDrive 3D sensors project multiple stripe patterns onto the stationary measurement object. The 3D point cloud is generated on the device from this series of images and sent to the PC.

### 3.2 Use for Other than the Intended Purpose

- The product is not a safety component in accordance with the EC Machinery Directive.
- The product is not suitable for use in potentially explosive atmospheres.



**DANGER!**

**Risk of personal injury or property damage in case of use for other than the intended purpose!**

Use for other than the intended purpose may lead to hazardous situations.

- Instructions regarding use for intended purpose must be observed.
- 

### 3.3 Personnel Qualifications

- Suitable technical training is a prerequisite.
- In-house electronics training is required.
- Trained personnel who use the product must have uninterrupted access to the operating instructions.



**DANGER!**

**Risk of personal injury or property damage in case of incorrect initial start-up and maintenance!**

Personal injury and damage to equipment may occur.

- Adequate training and qualification of personnel.
- 

### 3.4 Modification of Products



**DANGER!**

**Risk of personal injury or property damage if the product is modified!**

Personal injury and damage to equipment may occur. Non-observance may result in loss of the CE mark and the guarantee may be rendered null and void.

- Modification of the product is impermissible.
  - Unauthorized opening of the device is not permitted.
-

### 3.5 General Safety Precautions

**NOTE!**



- These instructions are an integral part of the product and must be kept on hand for the entire duration of its service life.
- In the event of possible changes, the respectively current version of the operating instructions can be accessed at [www.wenglor.com](http://www.wenglor.com) in the product's separate download area.
- Read the operating instructions carefully before using the product.
- The sensor must be protected against contamination and mechanical influences.

### 3.6 LED Warnings



**LED risk group 2**  
DIN EN 62471:2009-03

Applicable standards and safety regulations must be observed.



**NOTE!**

Due to the normal human reactions of turning away from bright sources of light and withdrawing from thermal discomfort, lamps/luminaires do not represent any danger.

### 3.7 Approvals





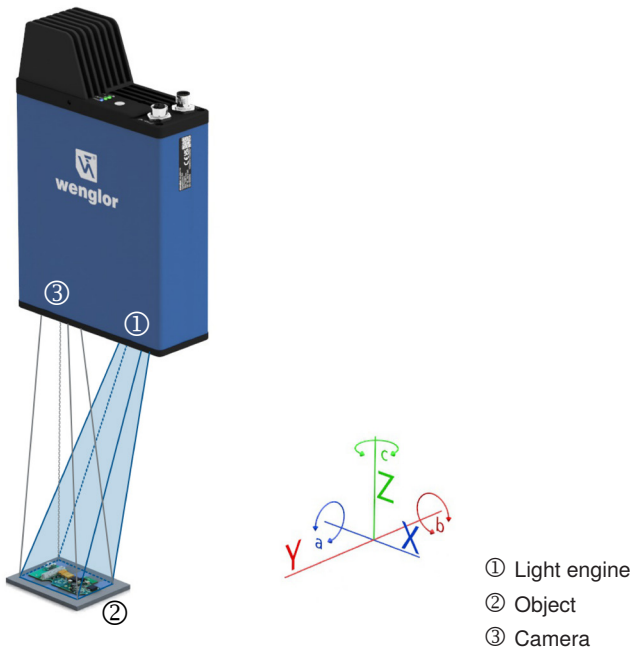
## 4. Function Principle

ShapeDrive G4 sensors are designed to detect the geometry of an object in three dimensions. Therefore, they are also called 3D sensors.

The underlying functional principle is based on triangulation. A special light module (1) projects a sequence of patterns onto the object (2) and a camera (3) captures the reflected light. This arrangement forms a triangle with a fixed base between the camera, light module and object.

To generate 3D data (called a point cloud), different patterns are successively projected onto the stationary object. These are captured by the integrated camera. The point cloud is calculated with high precision from this captured image stack.

The resulting point cloud consists of a large number of 3D points and corresponds to the recorded surface. This point cloud can subsequently be used for inspection or measurement tasks, for example.



## 5. Sensor Types

ShapeDrive offers several different types of sensors:

- » MLAS11x: 3D sensor with a camera resolution of 5 MP and a measuring volume up to  $240 \times 200 \times 200$  mm
- » MLAS21x: 3D sensor with a camera resolution of 12,3 MP and a measuring volume up to  $240 \times 160 \times 200$  mm
- » MLBS11x: 3D sensor with a camera resolution of 5 MP and a measuring volume up to  $1300 \times 1000 \times 1000$  mm

## 6. Technical Data

|                                        | MLASxxx                     | MLBSxxx       |
|----------------------------------------|-----------------------------|---------------|
| Optical Data                           |                             |               |
| Light source                           | LED (blue)                  |               |
| Wavelength                             | 457 nm                      |               |
| Service life (ambient temp. = +25° C)* | 20 000 hours                |               |
| Risk group (EN 62471)                  | 2                           |               |
| Environmental conditions               |                             |               |
| Storage temperature                    | -5 ... 70 °C                |               |
| Ambient temperature                    | 0 ... 40 °C                 |               |
| Max. ambient light                     | 5000 lux                    |               |
| EMV                                    | DIN EN 61000-6-2; 61000-6-4 |               |
| Athmospheric humidity                  | 5...95 %, non-condensing    |               |
| Electrical Data                        |                             |               |
| Supply voltage                         | 18 ... 30 V DC              |               |
| Max. current consumption (Ub = 24 V)   | 2,5 A                       | 3,5 A         |
| Short-circuit protection               | Yes                         |               |
| Reverse polarity protected             | Yes                         |               |
| Interface                              | Ethernet TCP/IP             |               |
| Transmission speed                     | 1...10 Gbit/s               |               |
| Protection class                       | III                         |               |
| Inputs/Outputs                         | 4                           |               |
| Integrated web server                  | Yes                         |               |
| Mechanical Data                        |                             |               |
| Housing material                       | Aluminum/plastic            |               |
| Degree of protection                   | IP67 **                     |               |
| Power I/O connection                   | M12×1, 12-pin               | ---           |
| Power connection                       | ---                         | M12×1, 5-pin  |
| I/O / I/O power connection             | ---                         | M12×1, 12-pin |
| Ethernet connection                    | M12×1, 8-pin, X coded       |               |
| Optic cover                            | Plastic                     |               |
| Safety-relevant data                   |                             |               |
| MTTd (EN ISO 13849-1)                  | 71,35 a                     |               |

\* Service life is related to the LED. Since the LED is not permanently switched on, the service life increases accordingly

\*\* Only valid if all plugs are connected/closed by cables or caps with corresponding protection class.

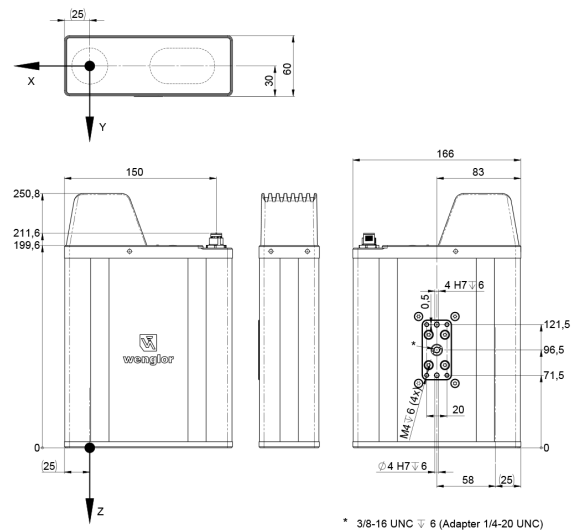
| Order Number       | MLAS112               | MLAS113               | MLAS114                 | MLAS212               | MLAS213               | MLAS214               |
|--------------------|-----------------------|-----------------------|-------------------------|-----------------------|-----------------------|-----------------------|
| Technical Data     |                       |                       |                         |                       |                       |                       |
| Optical Data       |                       |                       |                         |                       |                       |                       |
| Working range Z    | 300...340 mm          | 220...320 mm          | 400...600 mm            | 255...295 mm          | 220...320 mm          | 270...470 mm          |
| Measuring range Z  | 40 mm                 | 100 mm                | 200 mm                  | 40 mm                 | 100 mm                | 200 mm                |
| Measuring range X  | 60 mm                 | 120 mm                | 240 mm                  | 60 mm                 | 120 mm                | 240 mm                |
| Measuring range Y  | 48 mm                 | 90 mm                 | 200 mm                  | 40 mm                 | 80 mm                 | 160 mm                |
| Resolution Z       | 3...4 $\mu\text{m}$   | 4...8 $\mu\text{m}$   | 13...30 $\mu\text{m}$   | 1...2 $\mu\text{m}$   | 2...5 $\mu\text{m}$   | 3...9 $\mu\text{m}$   |
| Resolution X/Y     | 30...34 $\mu\text{m}$ | 47...69 $\mu\text{m}$ | 115...172 $\mu\text{m}$ | 18...20 $\mu\text{m}$ | 30...44 $\mu\text{m}$ | 37...65 $\mu\text{m}$ |
| Camera resolution  | 5 MP                  |                       |                         | 12,3 MP               |                       |                       |
| Electrical Data    |                       |                       |                         |                       |                       |                       |
| Acquisition time * | 0,22...0,5 s          |                       |                         | 0,4...0,9 s           |                       |                       |

| Order Number       | MLBS111                 | MLBS112                 | MLBS115                 |
|--------------------|-------------------------|-------------------------|-------------------------|
| Technical Data     |                         |                         |                         |
| Optical Data       |                         |                         |                         |
| Working range Z    | 1050...1450 mm          | 1550...2050 mm          | 1750...2750 mm          |
| Measuring range Z  | 400 mm                  | 500 mm                  | 1000 mm                 |
| Measuring range X  | 500 mm                  | 750 mm                  | 1300 mm                 |
| Measuring range Y  | 380 mm                  | 560 mm                  | 1000 mm                 |
| Resolution Z       | 25...48 $\mu\text{m}$   | 34...60 $\mu\text{m}$   | 61...151 $\mu\text{m}$  |
| Resolution X/Y     | 226...312 $\mu\text{m}$ | 335...442 $\mu\text{m}$ | 605...950 $\mu\text{m}$ |
| Camera resolution  | 5 MP                    |                         |                         |
| Electrical Data    |                         |                         |                         |
| Acquisition time * | 0,22...0,5 s            |                         |                         |

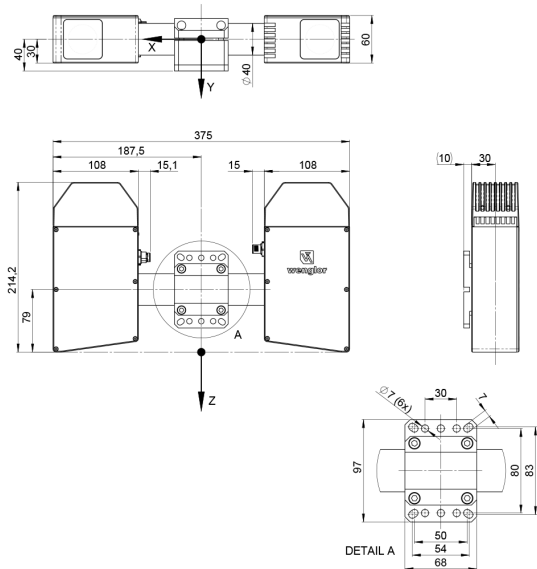
\* At a transmission speed of 10 Gbit/s and an exposure time of 10 000  $\mu\text{s}$

# 6.1 Dimensional Drawings

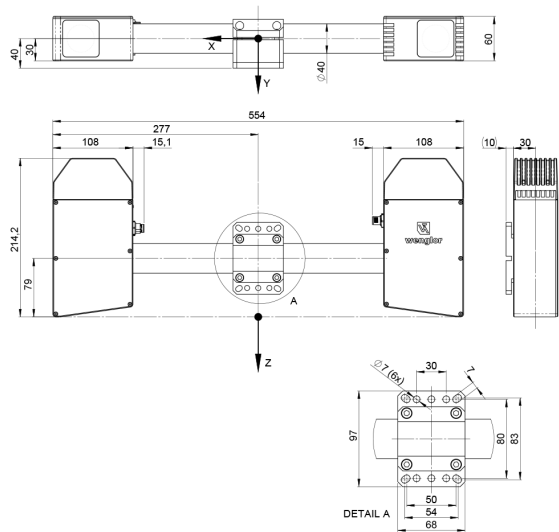
## MLASx1x:



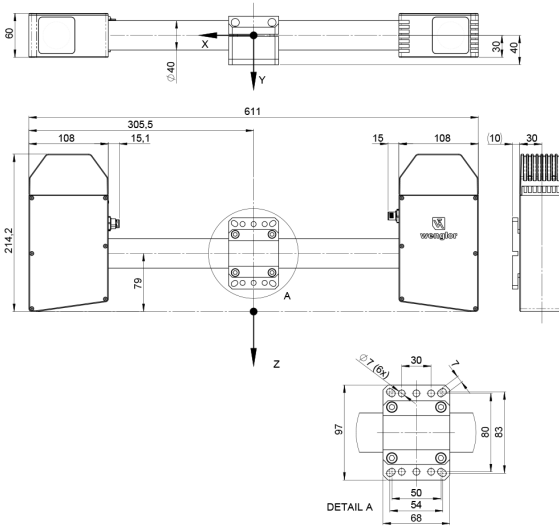
## MLBS111:



MLBS112:

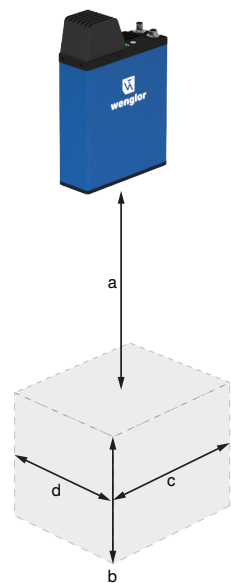


MLBS115:



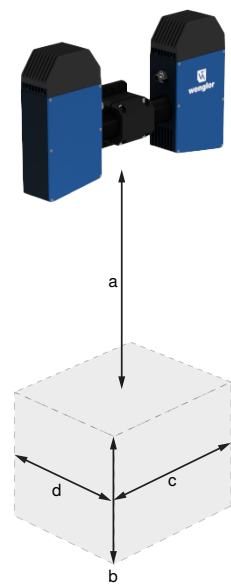
## 6.2 Field of View

### MLASx1x:



| Sensor  | Field of view (b×c×d) | Working distance (a) |
|---------|-----------------------|----------------------|
| MLAS112 | 40×60×48 mm           | 300 mm               |
| MLAS113 | 100×120×90 mm         | 220 mm               |
| MLAS114 | 200×240×200 mm        | 400 mm               |
| MLAS212 | 40×60×40 mm           | 255 mm               |
| MLAS213 | 100×120×80 mm         | 220 mm               |
| MLAS214 | 200×240×160 mm        | 270 mm               |

### MLBSx1x:

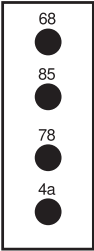


| Sensor  | Field of view (b×c×d) | Working distance (a) |
|---------|-----------------------|----------------------|
| MLBS111 | 400×500×380 mm        | 1050 mm              |
| MLBS112 | 500×750×560 mm        | 1550 mm              |
| MLBS115 | 1000×1300×1000 mm     | 1750 mm              |

### 6.3 LED Display

LEDs:

A22



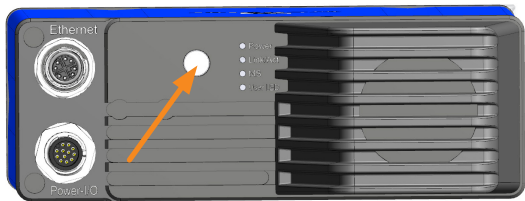
68 = Supply voltage indicator  
85 = Link/Act  
78 = Module status  
4a = User LED

| LED | Designation        | Status | Function                           |
|-----|--------------------|--------|------------------------------------|
| 68  | Power              | Blue   | Operating voltage on               |
|     |                    | Off    | Operating voltage off              |
| 85  | Link/Act           | Green  | Link established (10 Gbit)         |
|     |                    | Orange | Link established (2,5...5 Gbit)    |
|     |                    | Red    | Link established (100...1000 Mbit) |
|     |                    | Off    | No Ethernet device connected       |
| 78  | Module status (MS) | Green  | Device operative                   |
|     |                    | Red    | Device error                       |
|     |                    | Off    | Device doesn't start up            |
| 4a  | User LED           | Off    | controlled via SDK command         |
|     |                    | Green  |                                    |
|     |                    | Red    |                                    |
|     |                    | Orange |                                    |

### 6.4 Button on Device

3D Sensors have one button next to the connectors.

#### MLASx1x:



#### MLBSx1x:



Pressing and releasing the button within the following time period enables the following functionality.

| State         | Press duration | Function                                                                                                                                                                                           |
|---------------|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Localize      | 3...6 s        | Starts or stops localizing                                                                                                                                                                         |
| Network Reset | 10...15 s      | Resets network settings of Ethernet connector to defaults <ul style="list-style-type: none"><li>• IP address 192.168.100.1</li><li>• Subnet mask 255.255.255.0</li><li>• Gateway 0.0.0.0</li></ul> |



**NOTE!**

To avoid unwanted changes from the button on the device, deactivate the functionality on the device website (see section [“10.5 Settings”](#)).



## 7. Transport and Storage

### 7.1 Transport

Upon receipt of shipment, the goods must be inspected for damage in transit. The manufacturer must be informed without delay concerning damage to the package. When returning the package, clear indication of transport damage must be attached.

### 7.2 Scope of Delivery

- ShapeDrive 3D sensor
- Instruction leaflet
- Safety information sheet
- Mounting set
- Thread adapter (MLAS only)

### 7.3 Storage

**The following points must be taken into consideration with regard to storage:**

- Do not store the product outdoors.
- Store the product in a dry, dust-free place.
- Protect the product against mechanical impacts.
- Protect the product against exposure to direct sunlight.
- Observe storage temperature.



#### **ATTENTION!**

#### **Risk of property damage in case of improper storage!**

The product may be damaged.

- Comply with storage instructions.
-

## 8. Installation and Initial Start-Up

---



### **ATTENTION!**

#### **Risk of property damage in case of improper installation!**

The product may be damaged.

- Comply with installation instructions
- 

### 8.1 General Installation Instructions

- Observe electrical and mechanical regulations, standards, and safety rules.
  - Make sure that the sensor is mounted firmly and securely.
  - The power supply should be connected directly and it should be as short as possible
    - » max. cable length Ethernet (10 Gbit): 10 m
    - » max. cable length Ethernet (1 Gbit): 30 m
  - The sensor must be protected against mechanical influences.
  - The sensor should not be subjected any vibration because this could influence measurement.
  - To ensure sufficient air circulation, leave some space around the device and do not cover the fan and its air outlets.
  - Adequate heat dissipation must be assured for the device. This can be accomplished, for example, by means of a metallic connection between the sensor housing and the mounting base.
  - Stable operation is achieved after a warm-up phase of 5-10 min, depending on the ambient temperature and kind of mounting.
  - The sensor needs approx. 30-40 sec. to boot.
- 



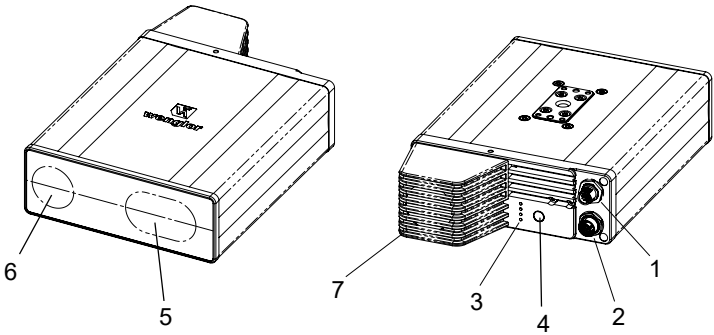
### **ATTENTION!**

It is essential to ensure that the maximum device temperature of 85 °C is not exceeded.

---

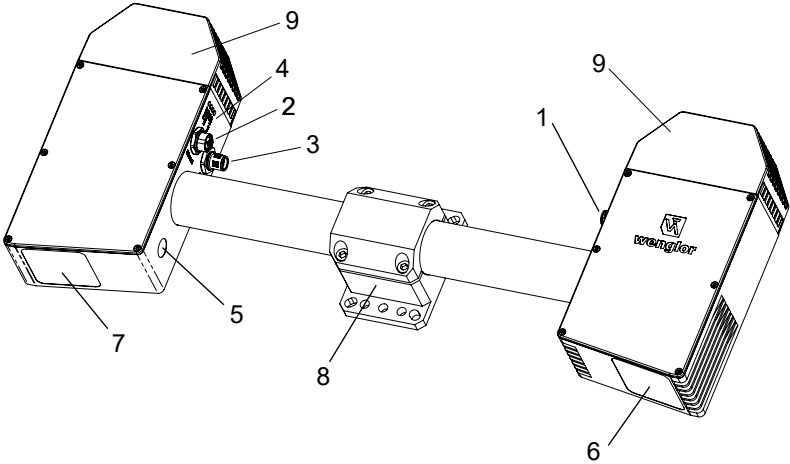
## 8.2 Sensor Construction

### MLASx1x:



- ① = Power / Digital I/O
- ② = Ethernet connector
- ③ = Status LEDs
- ④ = Button
- ⑤ = Light emission
- ⑥ = Receiver
- ⑦ = Fan

### MLBSx1x:



- ① = Power connector
- ② = Ethernet connector
- ③ = I/O connector
- ④ = Status LEDs
- ⑤ = Button
- ⑥ = Light emission
- ⑦ = Receiver
- ⑧ = Mounting clamp
- ⑨ = Fan

### 8.2.1 Tightening Torques

Tightening torques must be complied with in order to assure error-free operation. The respective values are listed in the following table.

| Connection Type                              | Tightening torque (Nm)                    |
|----------------------------------------------|-------------------------------------------|
| M12 connection cable power/I/O (connector 1) | see corresponding cable datasheet         |
| M12 connection cable I/O (connector 3)       | see corresponding cable datasheet         |
| M12 connection cable Ethernet (connector 2)  | see corresponding cable datasheet         |
| MLAS: Mounting M4 (thread)                   | 2,5 (min. thread engagement length: 4 mm) |
| MLBS: Mounting M6 (thread)                   | 8                                         |

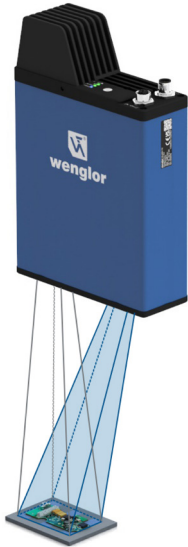


**NOTE!**  
The values may differ when using other cables (please see cable data sheet).

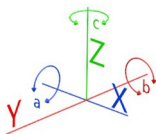
### 8.3 The Sensor's Coordinate System

The coordinate system is a right-handed trihedron and is defined as follows:

- The Z-axis runs along the optical axis at the receiver side.
- The XY-plane coincides with the front face of the receiver.



The X-axis corresponds to measuring range X.  
The a-axis corresponds to rotation around the X-axis.  
The Z-axis corresponds to measuring range Z.  
The c-axis corresponds to rotation around the Z-axis.  
The Y-axis corresponds to measuring range Y.  
The b-axis corresponds to rotation around the Y-axis.



## 8.4 Shadowing and Obstruction



**NOTE!**  
Under certain arrangements, shadowing may occur. Please take this into account.

|                                     |                                                                                             |
|-------------------------------------|---------------------------------------------------------------------------------------------|
|                                     |                                                                                             |
| Measurement without any obstruction | The visible range is obstructed by the edge. The measuring object cannot be fully captured. |

## 8.5 Installation

### 8.5.1 Electrical Connection

Depending on the sensor and usage only two or three connections are needed.

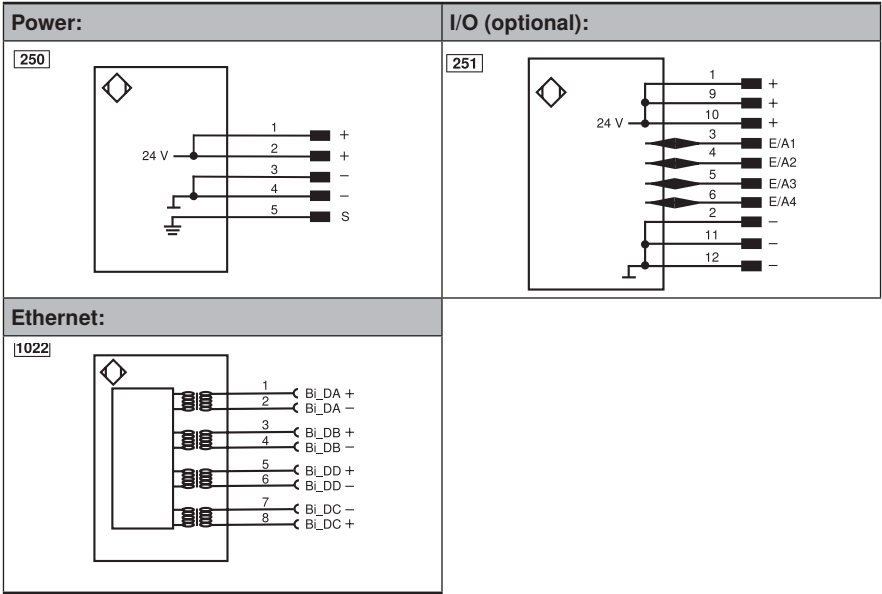
**MLASx1x:**

- Power/I/O: M12; 12 pin for power and digital I/O
- Ethernet: M12; 8-pin x-coded for 1/10 Gbit Ethernet

| Power/I/O:     | Ethernet:      |
|----------------|----------------|
| <div>251</div> | <div>022</div> |

MLBSx1x:

- Power: M12; 5 pin for power
- I/O: M12; 12 pin connector for digital I/O and digital I/O power supply. Only needed if digital I/O is used.
- Ethernet: M12; 8-pin x-coded for 1/10 Gbit Ethernet



Legend:

| Legend                 |                                            |                      |                                |                                        |                     |
|------------------------|--------------------------------------------|----------------------|--------------------------------|----------------------------------------|---------------------|
| +                      | Supply Voltage +                           | nc                   | Not connected                  | EN <sub>RS422</sub>                    | Encoder B/B̄ (TTL)  |
| -                      | Supply Voltage 0 V                         | U                    | Test Input                     | EN <sub>A</sub>                        | Encoder A           |
| ~                      | Supply Voltage (AC Voltage)                | Ū                    | Test Input inverted            | EN <sub>B</sub>                        | Encoder B           |
| A                      | Switching Output (NO)                      | W                    | Trigger Input                  | AMIN                                   | Digital output MIN  |
| Ā                      | Switching Output (NC)                      | W-                   | Ground for the Trigger Input   | AMAX                                   | Digital output MAX  |
| V                      | Contamination/Error Output (NO)            | O                    | Analog Output                  | AO <sub>K</sub>                        | Digital output OK   |
| Ū                      | Contamination/Error Output (NC)            | O-                   | Ground for the Analog Output   | SY In                                  | Synchronization In  |
| E                      | Input (analog or digital)                  | BZ                   | Block Discharge                | SY OUT                                 | Synchronization OUT |
| T                      | Teach Input                                | AMV                  | Valve Output                   | OL <sub>T</sub>                        | Brightness output   |
| Z                      | Time Delay (activation)                    | a                    | Valve Control Output +         | M                                      | Maintenance         |
| S                      | Shielding                                  | b                    | Valve Control Output 0 V       | rsv                                    | Reserved            |
| RxD                    | Interface Receive Path                     | SY                   | Synchronization                | Wire Colors according to DIN IEC 60757 |                     |
| TxD                    | Interface Send Path                        | SY-                  | Ground for the Synchronization |                                        |                     |
| RDY                    | Ready                                      | E+                   | Receiver-Line                  | BK                                     | Black               |
| GND                    | Ground                                     | S+                   | Emitter-Line                   | BN                                     | Brown               |
| CL                     | Clock                                      | ≡                    | Grounding                      | RD                                     | Red                 |
| E/A                    | Output/Input programmable                  | SnR                  | Switching Distance Reduction   | OG                                     | Orange              |
|                        | IO-Link                                    | Rx+/-                | Ethernet Receive Path          | YE                                     | Yellow              |
| PoE                    | Power over Ethernet                        | Tx+/-                | Ethernet Send Path             | GN                                     | Green               |
| IN                     | Safety Input                               | Bus                  | Interfaces-Bus A(+)/B(-)       | BU                                     | Blue                |
| OSSD                   | Safety Output                              | La                   | Emitted Light disengageable    | VT                                     | Violet              |
| Signal                 | Signal Output                              | Mag                  | Magnet activation              | GY                                     | Grey                |
| BI_D+/-                | Ethernet Gigabit bidirect. data line (A-D) | RES                  | Input confirmation             | WH                                     | White               |
| EN <sub>No RS422</sub> | Encoder 0-pulse 0/0̄ (TTL)                 | EDM                  | Contactor Monitoring           | PK                                     | Pink                |
| PT                     | Platinum measuring resistor                | EN <sub>ARs422</sub> | Encoder A/Ā (TTL)              | GN <sub>YE</sub>                       | Green/Yellow        |

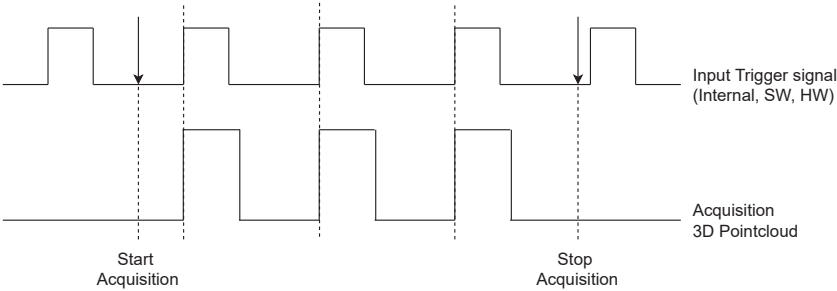
## 8.6 Trigger Behaviour



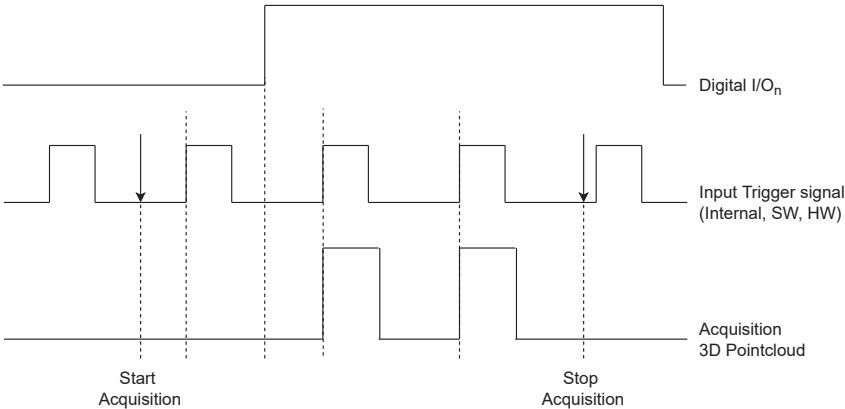
**NOTE!**  
For details about trigger source and activating digital I/O data acquisition check interface protocol at [ShapeDrive 3D Sensors](#).

### 8.6.1 Trigger Input

**SetTriggerSource=0 (or any trigger source); SetSensorEnable=0**



**SetTriggerSource=0 (or any trigger source); SetSensorEnable=1 (or 2...4)**



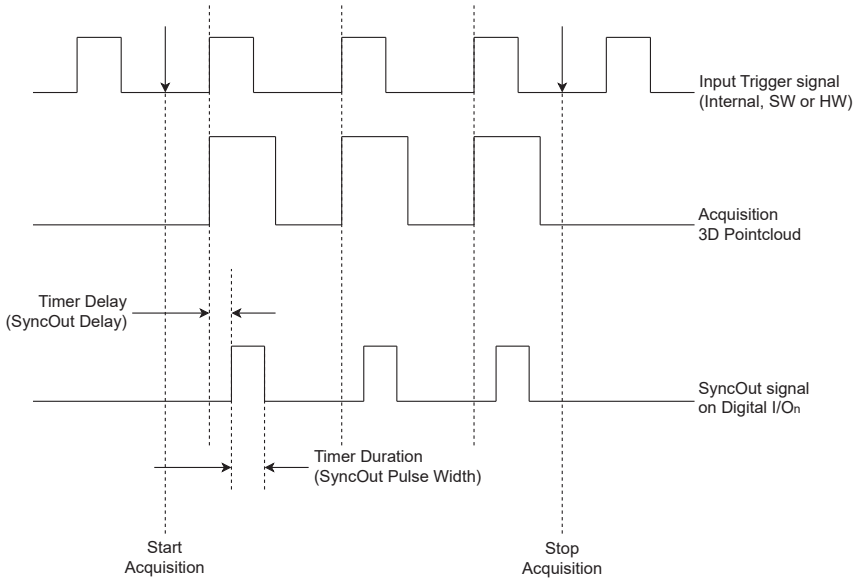
## 8.6.2 SyncOut Function



### NOTE!

Due to the time required to configure the projector of the sensor after Start Acquisition, the first SyncOut pulse has a delay of a few milliseconds (typically 100ms), which gets reduced to minimum possible (typically 20-40 ms) for subsequent SyncOut pulses.

### SyncOut with Frame Start Behaviour

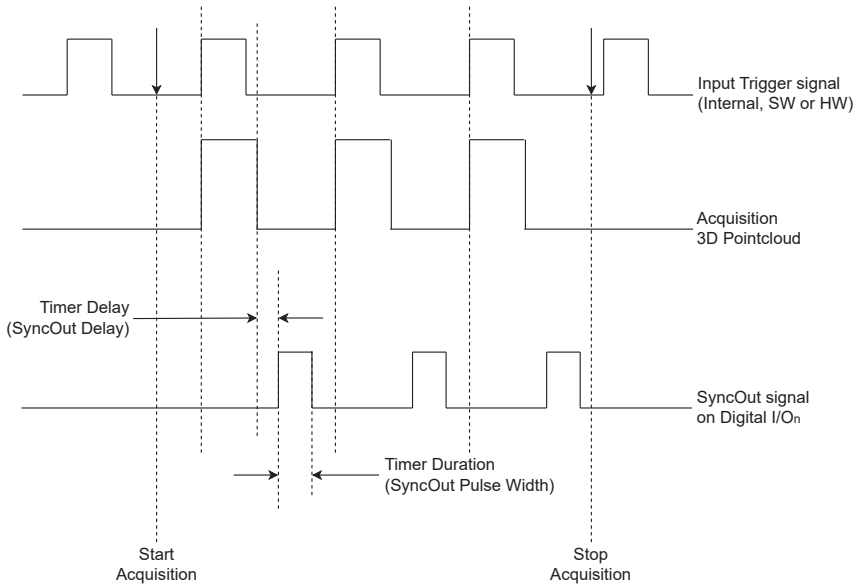


### Example Command sequence:

1. SetEA3LineMode=1 → Set IO3 pin function as user output
2. SetEA3LineSource=2 → Set IO3 pin function as Timer0 (SyncOut)
3. SetTimer0Source=0 → Set trigger point of Timer to be start of the frame (at the start of the capturing stacks)
4. SetTimer0Duration=20000 → Set the pulse width of the SyncOut signal in  $\mu\text{s}$
5. SetTimer0Delay=10000 → Set the delay of the Timer in  $\mu\text{s}$



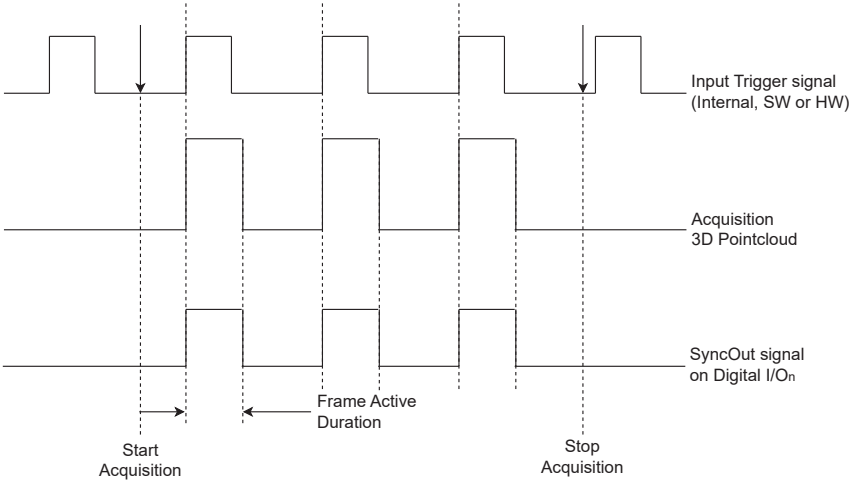
## SyncOut with Frame End Behaviour



### Example Command sequence:

1. SetEA3LineMode=1 → Set IO3 pin function as user output
2. SetEA3LineSource=2 → Set IO3 pin function as Timer0 (SyncOut)
3. SetTimer0Source=1 → Set trigger point of Timer to be end of the frame (at the end of the capturing stacks)
4. SetTimer0Duration=20000 → Set the pulse width of the SyncOut signal in  $\mu\text{s}$
5. SetTimer0Delay=10000 → Set the delay of the Timer in  $\mu\text{s}$

### SyncOut while Frame Active Behaviour



### Example Command sequence:

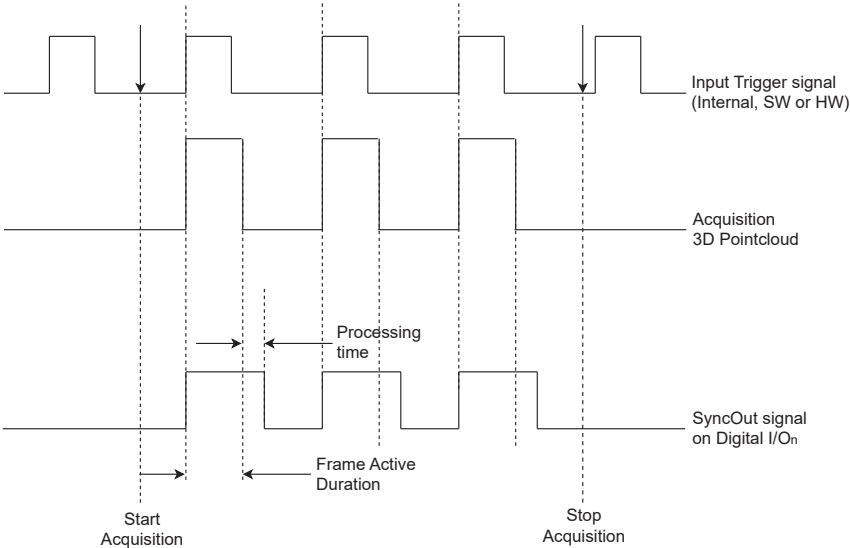
1. SetEA3LineMode=1 → Set IO3 pin function as user output
2. SetEA3LineSource=0 → Set IO3 pin function as Sync Out while Frame Active (SyncOut signal remains HIGH as long as the sensor is capturing stacks, i.e. ExposureTimeLimit × LED Pattern (16 or 28))



### NOTE!

In this mode the commands SetTimer0Duration and SetTimer0Delay have no effect.

### SyncOut while Sensor Busy Behaviour



#### Example Command sequence:

1. SetEA3LineMode=1 → Set IO3 pin function as user output
2. SetEA3LineSource=1 → Set IO3 pin function as Sync Out while Sensor Busy (SyncOut signal remains HIGH as long as the sensor is capturing stacks and processing them, i.e. (ExposureTimeLimit × LED Pattern + Processing Time))



**NOTE!**

In this mode the commands SetTimer0Duration and SetTimer0Delay have no effect.

## 8.7 Initial Startup

Connect the power cables to the sensor and connect them to the power supply and IPC.



### CAUTION!

Make sure that the cables have been correctly and securely connected in order to assure error-free operation.

---



### NOTE!

Maximum permissible length of the power supply cable is 30 m.  
The power supply cable must be equipped with an additional, suitable shield.



### NOTE!

The voltage drop across the cable must be taken into account during installation.

### 8.7.1 System Requirements IPC

Following system requirements are recommended

- Prozessor Core i7 (min. 6. Generation)
- RAM 16GB
- SSD 250GB
- 1...10 Gbit Ethernet
- Windows 10/11
- Linux Ubuntu 20.04

## 8.8 Transmission Speed Selection

In speed sensitive applications it is recommended to use a separate 10 Gbit network card. A function is already guaranteed with 1 Gbit, even if not at full speed. In addition, it is recommended not to operate any other devices on the same network adapter. The device selects the maximum transmission speed itself. If this does not correspond to the network adapter, check the cabling or exclude disturbances of the transmission.

## 8.9 Adjusting Network Settings

In TCP/IP networks the devices must be in the same network to communicate. It can be that either the sensor or the customer IPC must be configured to ensure this.



### NOTE!

For details check operating instructions of the Software wenglor Discovery Tool ([DNNF022](#))

8.9.1 Test Connection between Sensor and IPC

To test the connection between sensor and IPC following should be done:

- Ensure that power and Ethernet connection is available and wait approx. 30-40 s after power on.
- Check LEDs
  - » Supply voltage indicator – blue
  - » Link/Act LED – on (red, orange, green)
  - » Module state – green
- Open browser and type the sensor IP address (factory settings 192.168.100.1) into the browser address field. The web page should be available. If the web page is not reachable check all settings and retry. If still no success please follow the next steps.

8.9.2 Manual Network Settings

Upon shipment from the factory, the default Ethernet network settings of the sensor are:

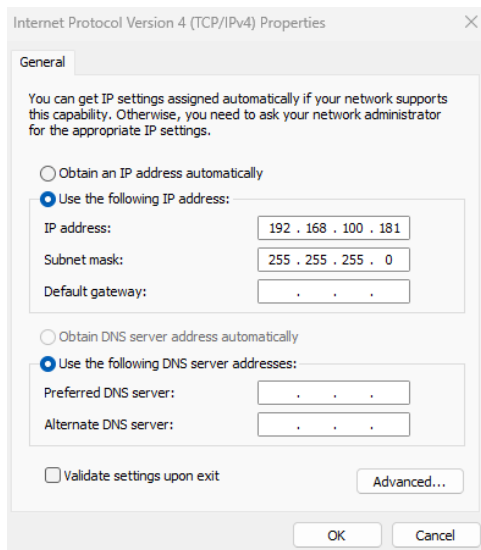
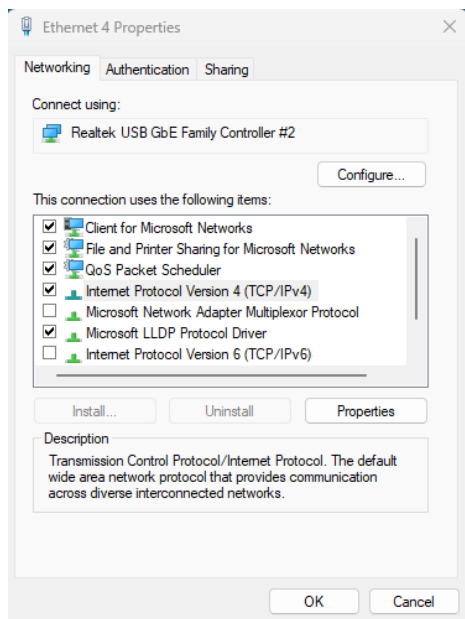
- IP address            192.168.100.1
- Subnet mask        255.255.255.0.

In order to be able to connect the sensor to your PC, you have to make sure that the sensor and your PC are both within the same IP address range.

Address format for IP Addresses (IPv4)

|             | Network Part | Device Part (host part) |
|-------------|--------------|-------------------------|
| IP address  | 192.168.100. | 001                     |
| Subnet mask | 255.255.255. | 000                     |

The network part of the sensor’s IP address must coincide with the network part of PC’s IP address, but the device part of the address must be different for the sensor and the IPC. By default, the IP address of the network adapter card in the IPC is set to dynamic (automatic allocation). Change the setting to “static”. The IP address must differ from the sensor IP and must be unique in the network, e.g. 192.168.100.181.



The integrated web server can then be accessed containing all global device settings (see section “[10. Integrated Web Server](#)”).

## 8.10 Complementary Accessories

The product pages of the 3D sensors can be reached via the link below or the QR code. From there navigate to the desired product and the corresponding system components

- Complementary products
- Mounting technology
- Connection equipment
- Software

<https://www.wenglor.com/en/3D-Sensors/c/cxmCID214181>



## 8.11 Default Settings

|               |                                      | MLAS11x                                     | MLAS21x                                     | MLBS11x                                     |
|---------------|--------------------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|
| Pin function  | I/O1                                 | ---                                         | ---                                         | ---                                         |
|               | I/O2                                 | ---                                         | ---                                         | ---                                         |
|               | I/O3                                 | Sync Out                                    | Sync Out                                    | Sync Out                                    |
|               | I/O4                                 | Sync In                                     | Sync In                                     | Sync In                                     |
| I/O Settings  | I/O1                                 | Operating voltage active, extra load enable | Operating voltage active, extra load enable | Operating voltage active, extra load enable |
|               | I/O2                                 | Operating voltage active, extra load enable | Operating voltage active, extra load enable | Operating voltage active, extra load enable |
|               | I/O3                                 | Operating voltage active, extra load enable | Operating voltage active, extra load enable | Operating voltage active, extra load enable |
|               | I/O4                                 | Operating voltage active, extra load enable | Operating voltage active, extra load enable | Operating voltage active, extra load enable |
| 3D            | Measuring rate (exposure time limit) | 12 000 $\mu$ s                              | 22 000 $\mu$ s                              | 30 000 $\mu$ s                              |
|               | Exposure time                        | 12 000 $\mu$ s                              | 22 000 $\mu$ s                              | 30 000 $\mu$ s                              |
|               | Patternmode                          | 28                                          | 28                                          | 28                                          |
|               | LED power                            | 10 %                                        | 10 %                                        | 10 %                                        |
| Interface     | IP address                           | 192.168.100.1                               | 192.168.100.1                               | 192.168.100.1                               |
|               | Subnet mask                          | 255.255.255.0                               | 255.255.255.0                               | 255.255.255.0                               |
|               | Control port                         | 32000                                       | 32000                                       | 32000                                       |
|               | TCP port                             | 32001                                       | 32001                                       | 32001                                       |
|               | MAC address                          | See website                                 | See website                                 | See website                                 |
| Web interface | User name                            | admin                                       | admin                                       | admin                                       |
|               | Password                             | admin                                       | admin                                       | admin                                       |
| Language      |                                      | English                                     | English                                     | English                                     |



## 9. Software

### 9.1 wenglor Discovery Tool

The wenglor Discovery Tool software [DNNF022](#) makes it easy to search for and find camera-based products in the network. The network configuration of the products is also adapted so that a connection can be established.

### 9.2 VisionApp Demo 3D

VisionApp Demo 3D software [DNNF013](#), available free of charge, displays measurement data from 2D/3D profile sensors and 3D sensors on your monitor. These point-cloud presentations of data can be saved, loaded and transferred so as to support users regardless of their location. Furthermore, the sensor parameters can be configured on the convenient user interface.

### 9.3 Interfaces

Shape Drive 3D Sensors can be integrated via SDK or GigE Vision. For details check the interface protocols at [ShapeDrive 3D Sensors](#).

# 10. Integrated Web Server

Access the device website via entering directly the IP address of the device in any supported browser (default IP address: 192.168.100.1).

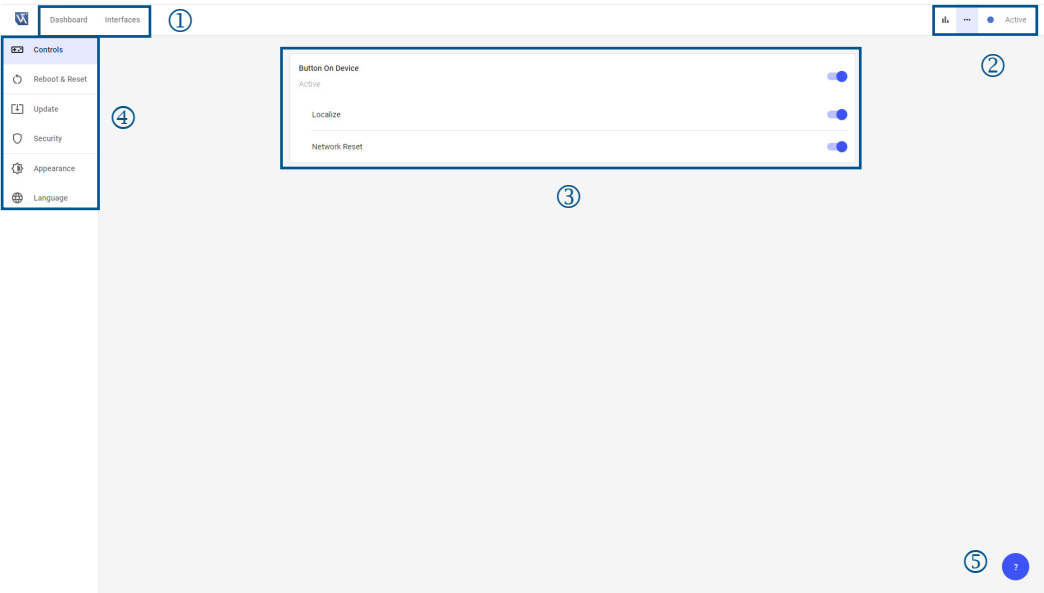


**NOTE!**  
Make sure that the network settings of the device and the communication partner fit together (see section “8.9.2 Manual Network Settings”).

Supported browsers (tested on Windows 10 (22H2) and Windows 11 (22H2) PCs):

- Chrome 108
- Firefox 108
- Microsoft Edge 108
- Chromium 111

## 10.1 Structure of Device Website

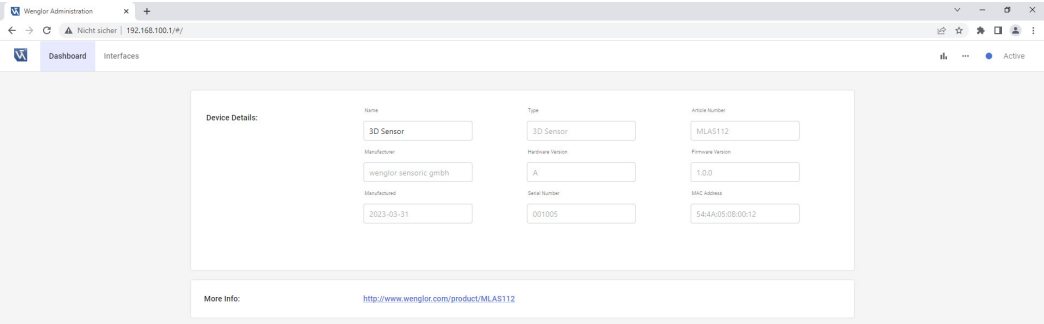


The website is divided in several areas:

- (1) Tabs
- (2) Icon menu bar
- (3) Workspace
- (4) Side navigation
- (5) Help button (see section “10.8 Help Button”)

## 10.2 Dashboard

By default, the dashboard shows the details of the 3D sensor.



Adjust the name, if needed (limited to 63 characters).

“More info” opens a new tab in the browser with the product detail page on the wenglor website (only available with internet access).

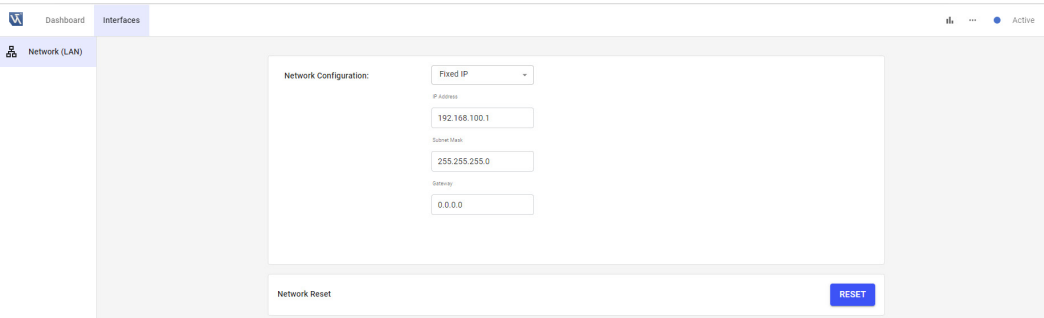
## 10.3 Interfaces

Open the tab “Interfaces” to see and edit all interface settings.  
It is possible to adjust the fixed network settings of the 3D sensor:

- IP address
- Subnet mask
- Gateway

By default the 3D sensor has the following network settings:

- IP address: 192.168.100.1
- Subnet mask: 255.255.255.0
- Gateway: 0.0.0.0





#### NOTE!

- Confirm the reboot info to start the network change. During the network change, a software reboot is done automatically.
- After network changes, enter the new IP address in the browser in order to access the device website again.

“Network reset” resets the network configuration of the device to its defaults

- IP address: 192.168.100.1
- Subnet mask: 255.255.255.0
- Gateway: 0.0.0.0

## 10.4 Diagnosis

Click in the icon menu bar on the “Diagnosis” icon in order to get further diagnosis info.

### 10.4.1 CPU

The side navigation “CPU” shows the CPU load of the Machine Vision Device for a maximum of the last 60 seconds

Dashboard Interfaces

CPU

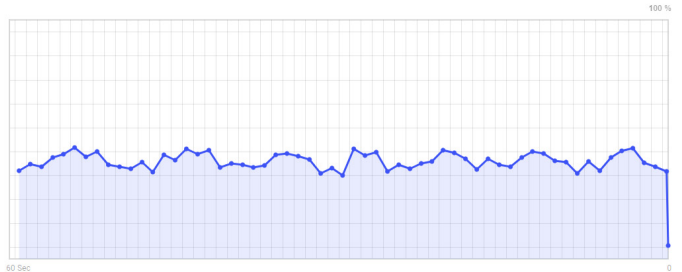
RAM

LAN Ethernet

Browser Data

Logging

CPU



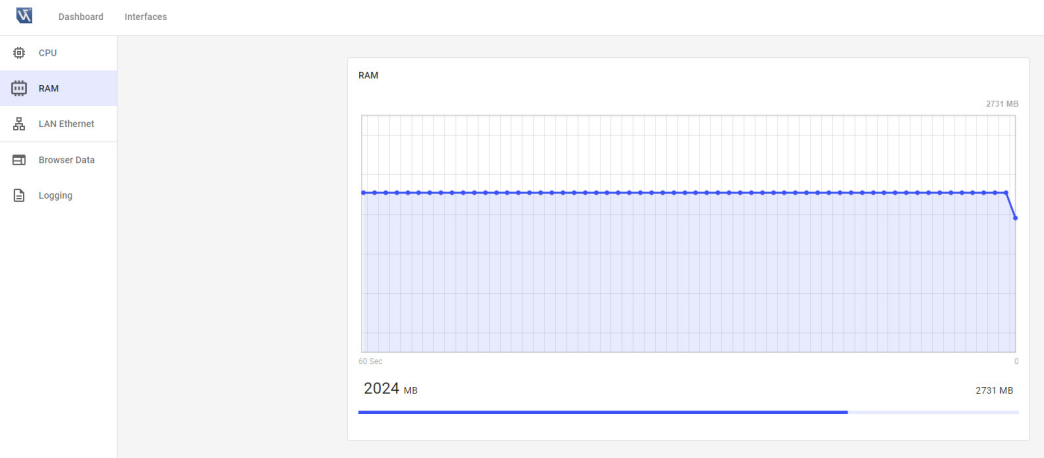
60 Sec

40.7 %

100 %

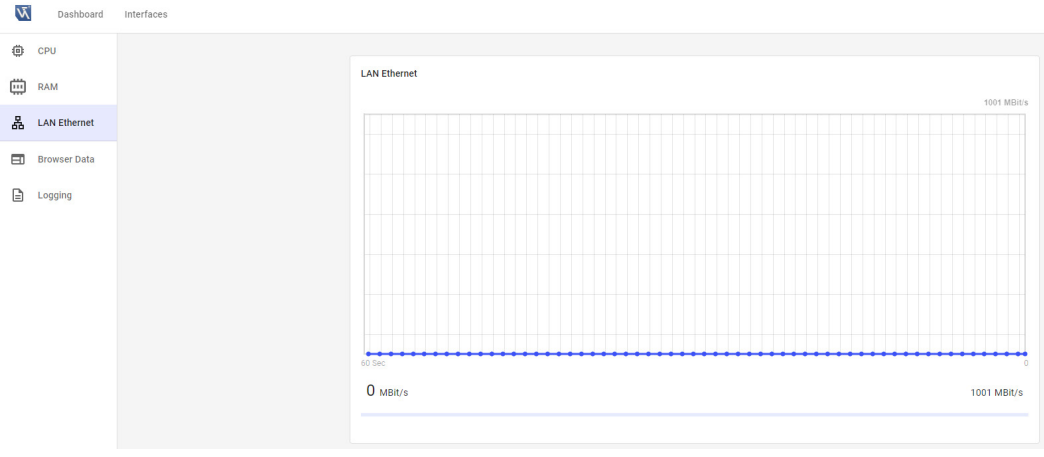
10.4.2 RAM

The side navigation “RAM” shows the RAM usage of the Machine Vision Device for a maximum of the last 60 seconds.



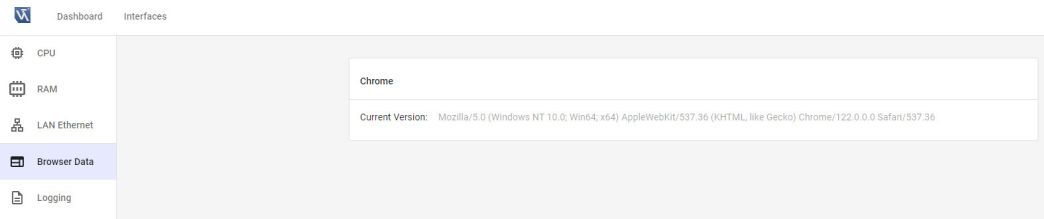
10.4.3 LAN Ethernet

The side navigation “LAN Ethernet” shows the network load at the LAN connector of the Machine Vision Device for a maximum of the last 60 seconds.



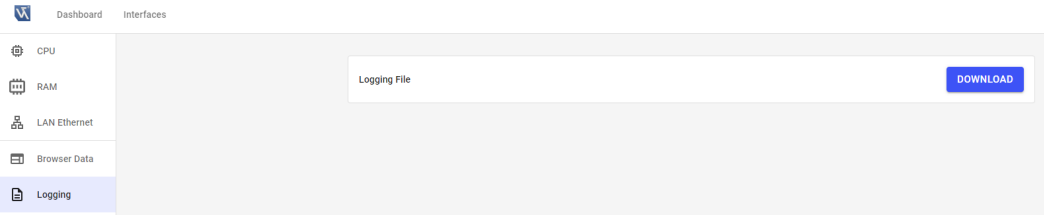
### 10.4.4 Browser Data

The side navigation “Browser Data” shows the version of the currently used browser.



### 10.4.5 Logging

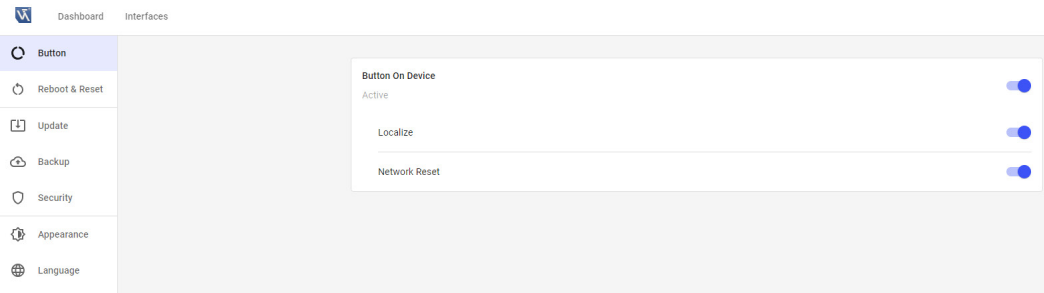
The side navigation “Logging” allows to download logging info for all services of the device in one zip file for the wenglor support and development team.



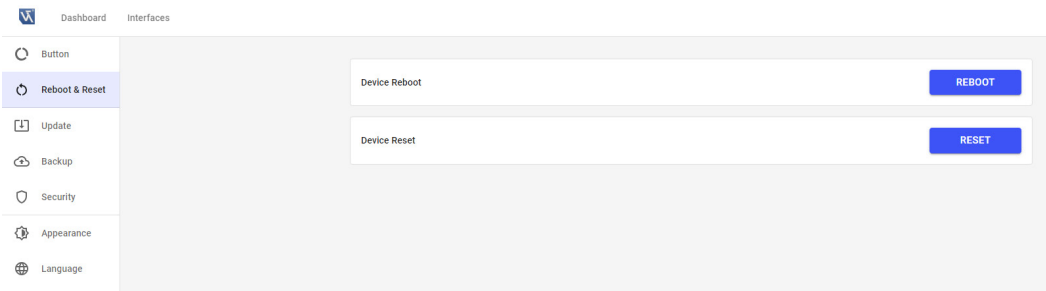
## 10.5 Settings

The icon menu bar “Settings” contains the following side navigation:

- **Button:** Option to activate/deactivate the button functionality on the device for localize and network reset in order to protect it from unwanted changes (see section “6.4 Button on Device”).



- **Reboot & Reset:** The side navigation “Reboot & Reset” allows to perform a software reboot of the device. Furthermore it is possible to reset the settings of the device website to the defaults (no reset of camera settings like e.g. exposure time).



- **Update:** Update the firmware via click on CHOOSE. Select a \*.swu firmware update file. Confirm the reboot info to start the firmware update. During the firmware update, a software reboot is automatically done.



### Firmware Compatibility

The firmware version number consists of three digits (e.g. Firmware MLxS 1.0.0).

- Major release: The first digit is changed (no compatibility).
- Feature release: The second digit is changed.
- Bugfix release: The third digit is changed.

The following applies with regard to the compatibility of the device website:

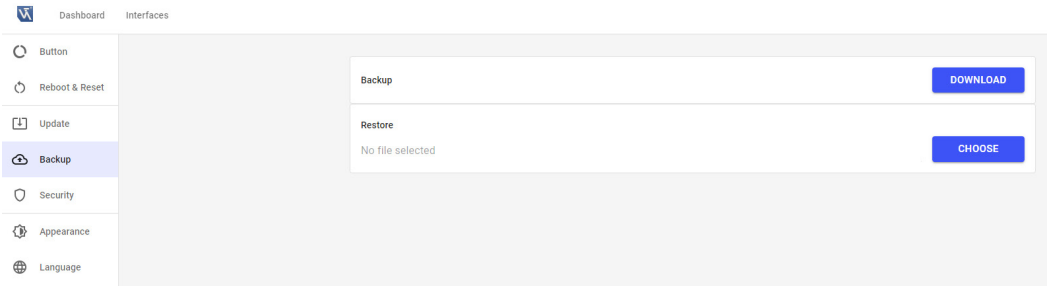
- At a bugfix release, the settings of the device website are unchanged.
- At a feature release upgrade (second digit increases), the settings of the device website remain.
- At a feature release downgrade (second digit decreases), it is possible that the settings of the device website are set back to default.

### NOTE!



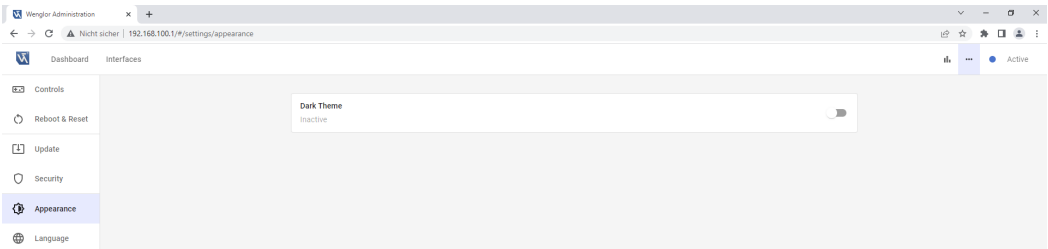
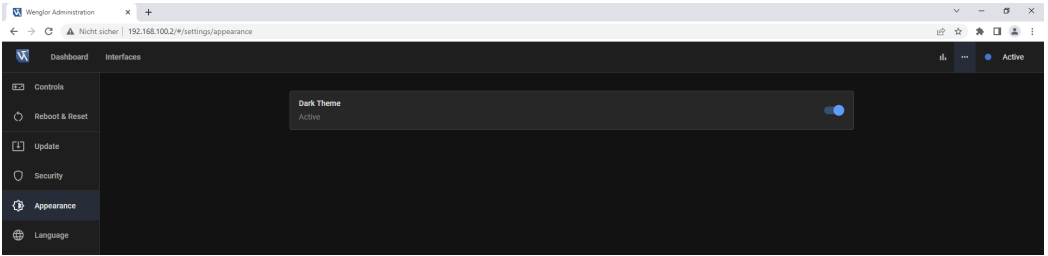
- A backup of the device settings for the device website is done when the device settings change at a firmware update or downgrade (contains maximum one backup file).
- Contact the wenglor support team (email to [support@wenglor.com](mailto:support@wenglor.com)) in case of activating again the settings of the device website on a compatible firmware version.

- **Backup:** The side navigation “Backup” allows to create and to restore a backup of the settings for the device website.
  - » Backup: Creates a backup file for the settings of the device website.
  - » Restore: Allows to restore a backup on the device. Restoring a backup file is only possible in case of the same device type (article number) and the same firmware version of the device. If loading the backup file on another device with the same article number, make sure that the same firmware version is installed on it before restoring the backup.



- **Security:** Option to activate/deactivate authentication to protect the device from unwanted changes (see section “10.7 Login and Logoff”). By default, authentication is deactivated.

- **Appearance:** Switch between dark and bright theme



- **Language:** The side navigation “Language” defines the user language of the device website (DE, EN, FR, IT, ES, PT, NL, HU, TR, ZH, RU).

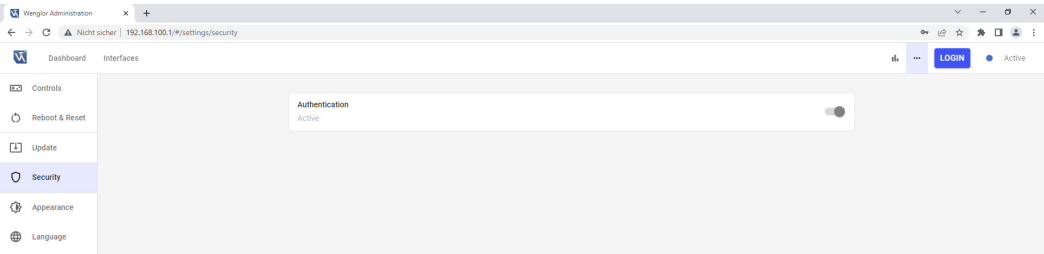


# 10.6 Device Status

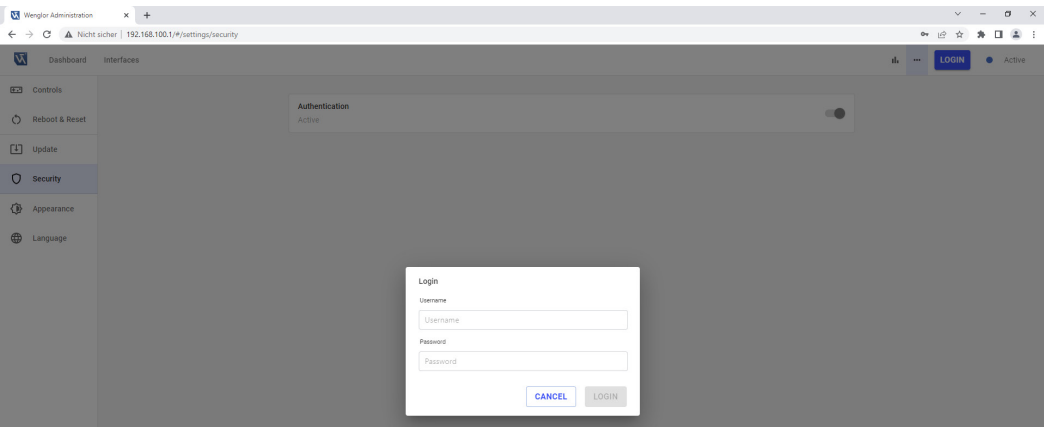
The device status signals the following states:

- Blue: Active (Running)
- Blue blinking: Localizing (activate/deactivate localizing via button on device, see section “6.4 Button on Device”)
- Yellow: Warning (e.g. in case of high CPU, high RAM or high LAN Ethernet. Typically warning is sent, if one of the values is bigger than 80% for more than 3 seconds)
- Red: Error (e.g. in case of crashed software service)

# 10.7 Login and Logoff



If authentication is active, the device is protected from unwanted changes. Before changing properties, it is necessary to login.



Use admin (default) to login for the first time.

- Username: admin
- Password: admin



### NOTE!

It is possible to edit username and password of admin (default), but it is not possible to delete the account or to change the user group.

Wenglor Administration x +

Nicht sicher | 192.168.100.1/#/administration/manage-account

Dashboard Interfaces

AD admin

Username admin

Password [CHANGE PASSWORD](#)

User group Admin (default)



### NOTE!

Admins and admin (default) can create new accounts, edit and delete other accounts. Setter and Worker can only change the own username or password.

Wenglor Administration x +

Nicht sicher | 192.168.100.1/#/administration/accounts-overview

Dashboard Interfaces

| Name   | User group      | Actions                                     |
|--------|-----------------|---------------------------------------------|
| Worker | Worker          | <a href="#">Edit</a> <a href="#">Delete</a> |
| admin  | Admin (default) | <a href="#">Edit</a>                        |

[ADD ACCOUNT](#)

The following table shows the rights for the different user groups:

| Functionality                   | Admin or admin (default) | Setter | Worker | Logged off |
|---------------------------------|--------------------------|--------|--------|------------|
| Device website: See properties  | Yes                      | Yes    | Yes    | Yes        |
| Device website: Edit properties | Yes                      | No     | No     | No         |



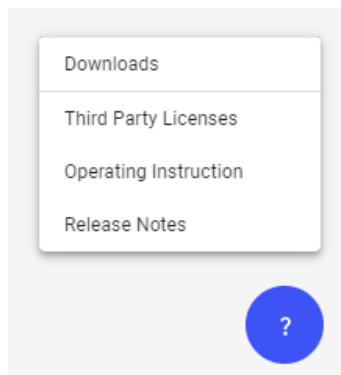
### NOTE!

- Please remember usernames and passwords!
- In case of lost passwords, please contact [support@wenglor.com](mailto:support@wenglor.com)

## 10.8 Help Button

After clicking on the help button (bottom right question mark) a menu opens with access to

- Downloads
- Third Party Licenses
- Operating Instruction
- Release Notes



## 11. Maintenance Instructions



### NOTE!

- This sensor does not require any cyclical recalibration.
- Cleaning of both lens covers at regular intervals is recommended in order to assure uniform good quality of the measured values. A commercially available cloth for cleaning eyeglasses can be used for this purpose.
- Do not clean the sensor with solvents or cleansers which could damage the product.

## 12. Proper Disposal

wenglor sensoric GmbH does not accept the return of unusable or irreparable products. Respectively valid national waste disposal regulations apply to product disposal.

## 13. EU Declaration of Conformity

The EU declaration of conformity can be found on our website at [www.wenglor.com](http://www.wenglor.com) in the product's separate download area.

### **wenglor sensoric GmbH**

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[info@wenglor.com](mailto:info@wenglor.com)

For further wenglor contacts please see [www.wenglor.com](http://www.wenglor.com)