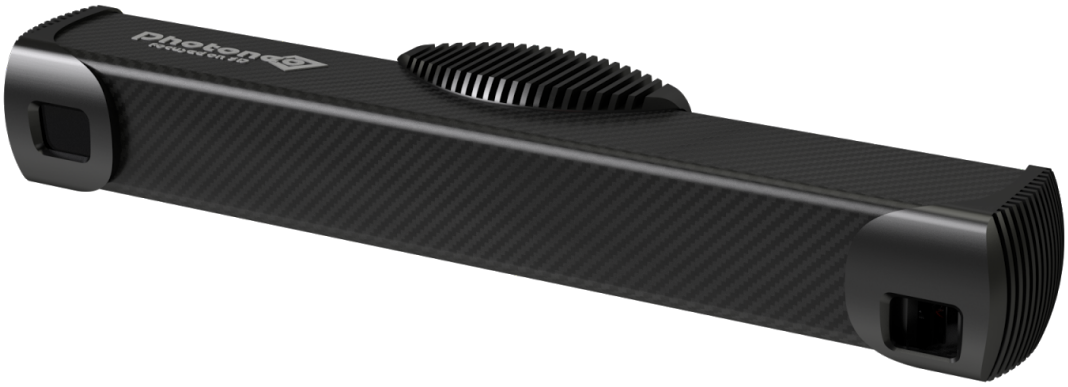
Photoneo
focused on 3D

PhoXi® 3D Scanner

User manual and Installation instructions



01/2018

You have chosen a Photoneo® PhoXi® 3D Scanner. Please take a few minutes to read this manual and become familiar with the advantages of Photoneo® PhoXi® 3D Scanner.

For more information on our products, accessories, replacement parts, software and services, see our website photoneo.com/product-showcase/phoxi_3d_scanners/ or contact our team at support@photoneo.com.

Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

⚠ DANGER

indicates that death or severe personal injury **will** result if proper precautions are not taken.

⚠ WARNING

indicates that death or severe personal injury **may** result if proper precautions are not taken.

⚠ CAUTION

with a safety alert symbol, indicates that minor personal injury can result if proper precautions are not taken.

CAUTION

without a safety alert symbol, indicates that property damage can result if proper precautions are not taken.

NOTICE

indicates that an unintended result or situation can occur if the relevant information is not taken into account.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions.

Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Photoneo products

Note the following:

⚠ WARNING

Photoneo products may only be used for the applications described in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Photoneo. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

Preface

Purpose of the manual

This manual provides information about installing and setup the PhoXi® 3D Scanner and is designed for engineers, installers, and electricians who have a general knowledge of automation.

Required basic knowledge

To understand this manual, it is necessary to have a general knowledge of automation.

Scope of the manual

This manual describes the following products:

- Photoneo® PhoXi® 3D Scanner

Trademarks

Certification, CE label, C-Tick, and other standards

Refer to the CE Approval(page 15).

Table of contents

1) Product overview

Photoneo® PhoXi® 3D Scanner is a device that uses structured light projection to reconstruct a 3D surface geometry of an imaged object. In the structured light projection, one or more patterns are projected onto a scene. This greatly simplifies computations to calculate the 3D surface geometry from images of the scene. The 3D surface geometry and texture is provided as an output via Ethernet connection in multiple formats of cloud of points.

At the beginning Photoneo® PhoXi® 3D Scanner project special patterns onto scene. Duration of each pattern can be set in PhoXi® Control, total projection time is then number of patterns (most usually 17) × single pattern exposure (in miliseconds) × 2. Then after data acquisition the PhoXi® 3D Scanner calculates all points in space and sends data over ethernet connection to subscriber. Projection to total cycle time ratio is then lower than one and not only depends on scanner settings but also on ethernet connection speed.

⚠ WARNING

This device is Laser class 3R product. Do not look into direct laser light! Use of protective eye glasses is recommended.

The laser projector aperture is located at the right side of the front panel of the device, as shown on the picture. The aperture is clearly marked by a warning label (image 1: PhoXi® 3D Scanner's laser projector location). Do not look into laser projector unit while the device is in use.

As a rule of thumb, to keep your machine safe always face the scanner away from areas with possible occurrence of people and secure the area with safety mechanism to avoid tresspassing of unqualified personnel. Despite diffuse reflections are not harmful, secure space around scanner for specular reflections from mirrors, polished objects and similar.

All components the product is made of, that are bought from 3rd parties, conforms with applicable european directives and laws.

image 1: PhoXi® 3D Scanner's laser projector location

Laser radiation

according to IEC / EN 60825-1 (2014): refer to Parameters, page 16.

2) Scope of delivery

With purchased PhoXi® 3D Scanner you will receive:

Hardware components

- PhoXi® 3D Scanner
  - 3D scanner
  - Power adaptor (230VAC/12VDC, 60,100,160W)[1]
  - Ethernet cable adaptor (with RJ45 socket)
  - Power cable
  - This manual

Software components

- PhoXi® Control (configuration tool downloadable from: photoneo.com/product-detail/phoxi-control-application/)

1- May vary with firmware version

3) Installation of PhoXi® 3D Scanner

Guidelines for installing

PhoXi® 3D Scanner is designed to be easy to install. You can install a scanner either on a 4xM4 22x45mm raster,M8 or 3/8-16 UNC screw, and you can orient the scanner in every way[2].

1. Mount the scanner using preferred method, refer to Dimensions and drawings, page 20. Example of mounting via 4xM4 screws is shown at image 2: Mounting of Scanner. Take into account a correct scanning distance of object and obstacles in between scanner and object.

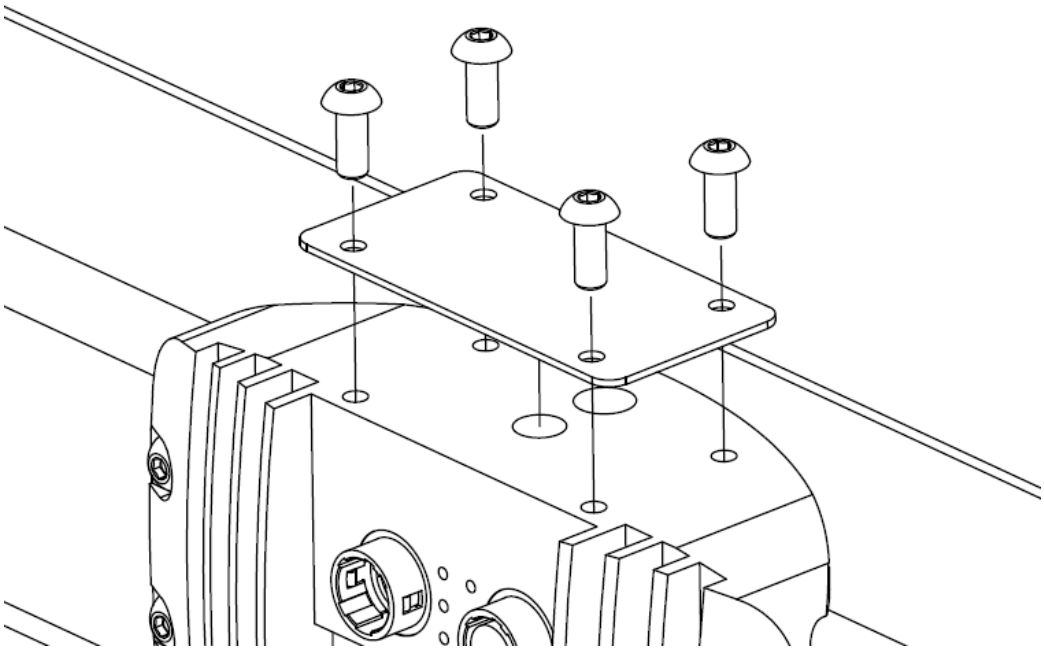


image 2: Mounting of Scanner

2. Connect the scanner to the computer or local network via ethernet cable or via ethernet adapter provided[3].

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2 - CAD model of scanner is downloadable from Photoneo Wiki:
http://wiki.photoneo.com/index.php/PhoXi_3D_scanners_family#CAD_data

3 - May vary with firmware version

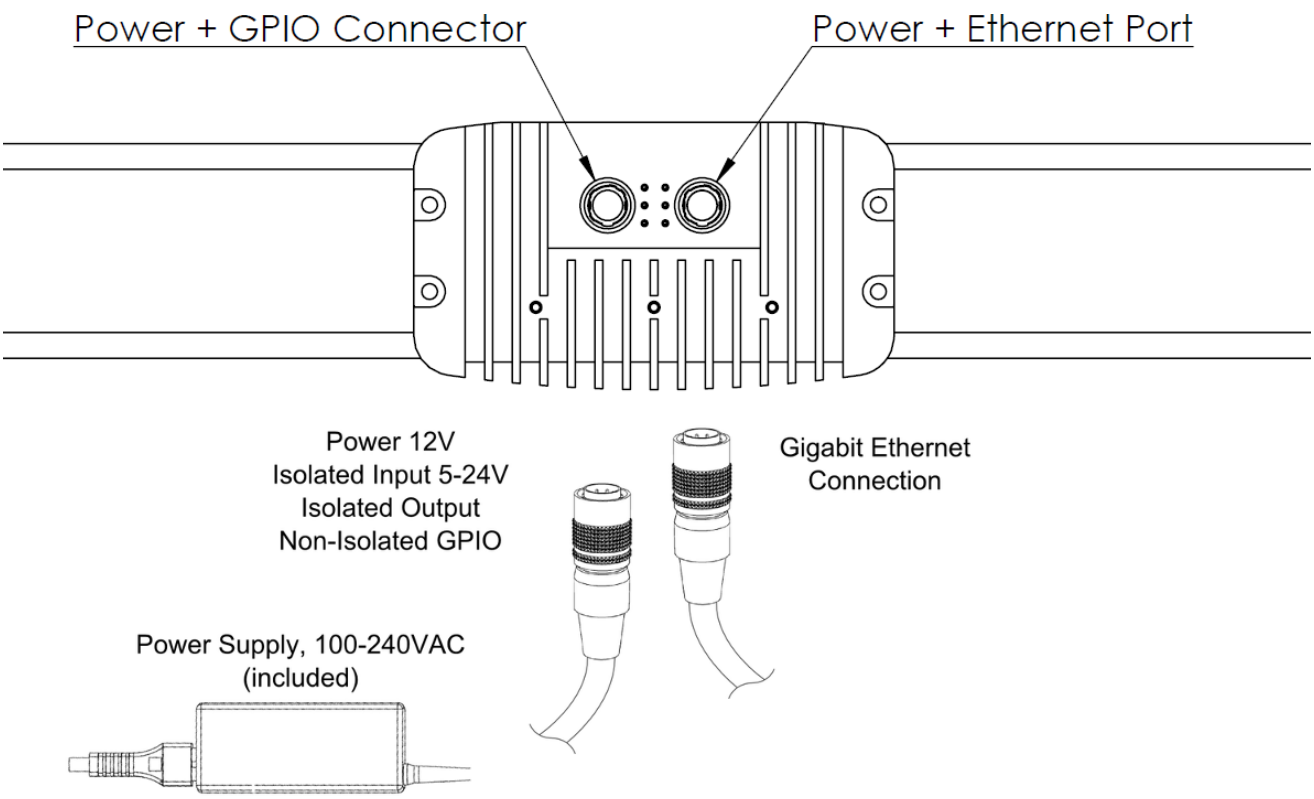


image 3: Connection of scanner

3. Plug the scanner into the power outlet (AC adapter is included in the shipment)
4. Download PhoXi® Control application from the Photoneo webpage: http://www.photoneo.com/product-detail/phoxi-control-application/ and install it
5. Run the PhoXi® Control application and try to make your first scan. Please refer to Configuration, page 13.

Separate the PhoXi® 3D Scanners from heat, high voltage, and electrical noise

As a general rule for laying out the devices of your system, always separate the devices that generate high voltage and high electrical noise from the low-voltage, logic-type devices such as the PhoXi® 3D Scanner. When configuring the layout of the PhoXi® 3D Scanner, consider the heat-generating devices and locate the electronic-type devices in the cooler areas. Reducing the exposure to a high-temperature environment will extend the operating life of any electronic device. Consider also the routing of the wiring for the devices in the panel. Avoid placing low-

voltage signal wires and communications cables in the same tray with AC power wiring and highenergy, rapidly-switched DC wiring.

Provide adequate clearance for cooling and wiring

PhoXi® 3D Scanners are designed for natural convection cooling. For proper cooling, you must provide a clearance of at least 25 mm above and below the devices.

⚠ CAUTION

For any other than horizontal monting, the maximum allowable ambient temperature is reduced by 10 degrees C.

4) Configuration

PhoXi® Control

PhoXi® Control application provide interface for PhoXi® 3D Scanner. An user may examine all scanners available on network as shown on image 4: PhoXi® Control – network discovery.

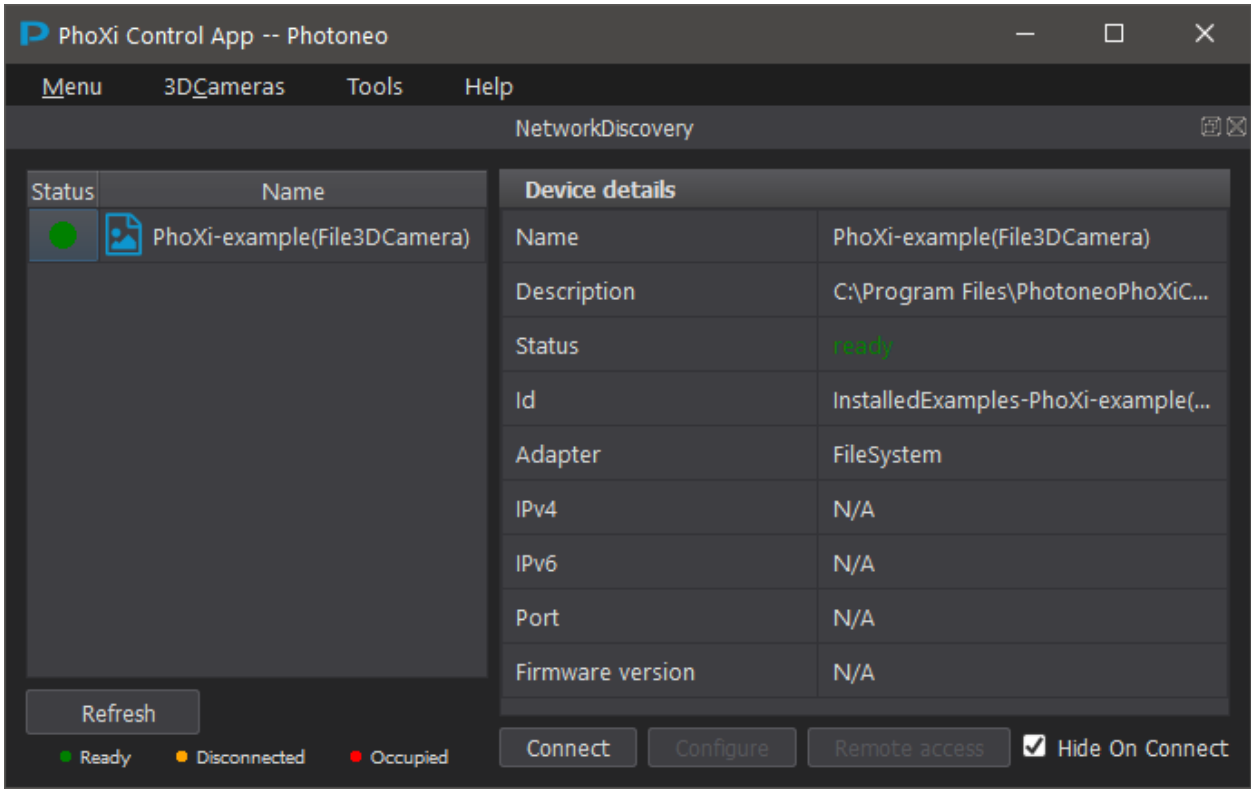


image 4: PhoXi® Control – network discovery

After succesfull connection (image 5: PhoXi® Control – main window) the user can tweak scanner parameters to achieve optimal point-cloud readout. For further support please consult support@photoneo.com or read PhoXi® Control manual.

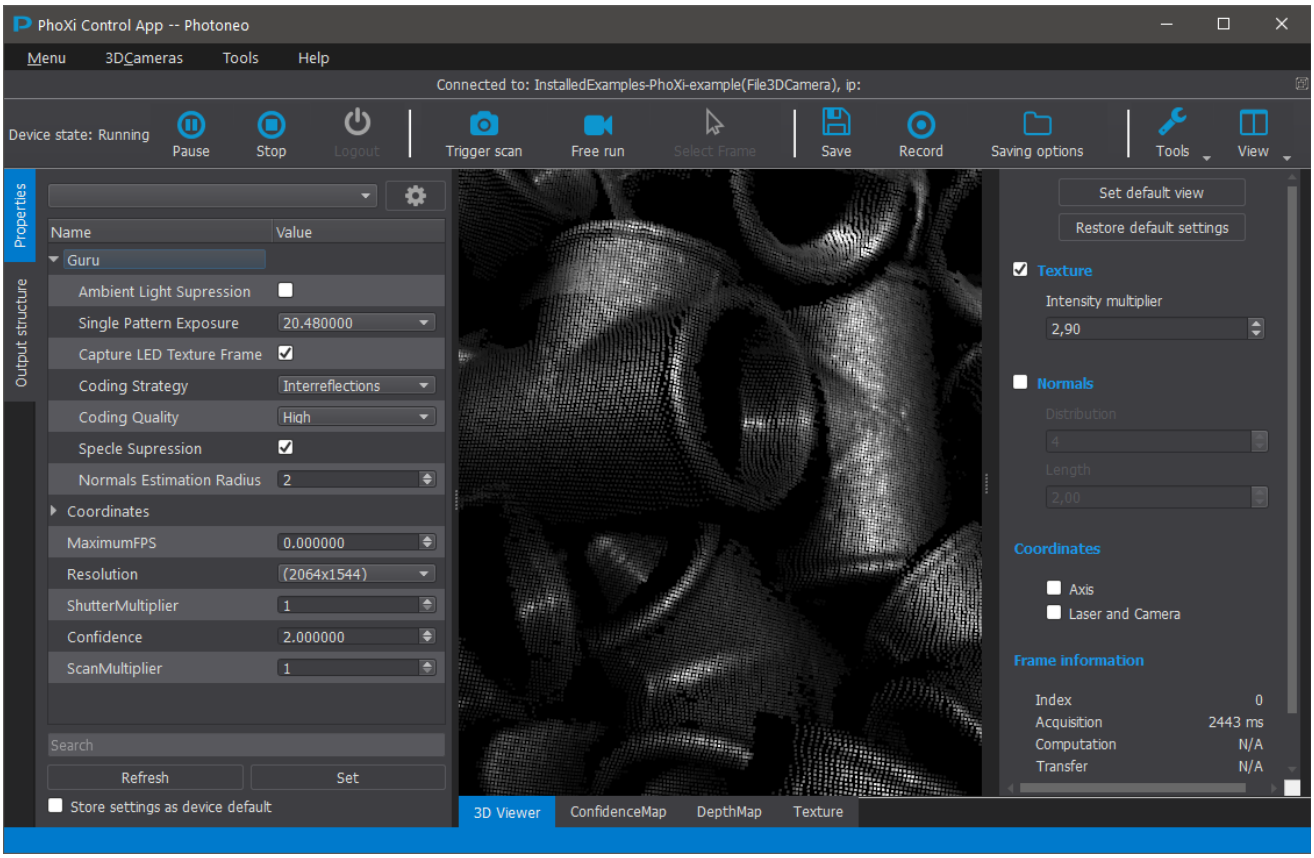


image 5: PhoXi® Control – main window

5) Technical specifications

Standards compliance

The PhoXi® 3D Scanner conforms with the following standards and test specifications. The test criteria for the PhoXi® 3D Scanner are based on these standards and test specifications. Note that certification status may change without notification. It is the user's responsibility to determine applicable certifications by referring to the ratings marked on the product. Consult your local Photoneo representative if you need additional information related to the latest listing of exact approvals.

FCC Rules and Regulations

PhoXi® 3D Scanner complies with the applicable requirements of Parts 2 and 15 of the FCC Rules and Regulations and Industry Canada ICES-003.

CE Approval

The PhoXi® 3D Scanner satisfies requirements and safety related objectives according to the EC directives listed below, and conforms to the harmonized European standards (EN) for the 3D scanners listed in the Official Journals of the European Community.

- EC Directive 2006/25/EC Artifical optical radiation
  - Safety of laser products
    - IEC/EN 60825-1: Equipment classification and requirements
- EC Directive 2004/108/EC (EMC Directive) "Electromagnetic Compatibility"
  - Emission standard
    - EN 61000-6-3: Conducted emmisions
    - EN 61000-6-3: Radiated emmisions
  - Immunity standard
    - EN 61000-6-4-2: Immunity against electrostatic discharges
    - EN 61000-6-4-3: Immunity against HF electromagnetic field
    - EN 61000-6-4-4: Immunity against EFT/Burst pulses

- EN 61000-6-4-6: Immunity against conducted interference

Dimensions

PhoXi® 3D Scanner type	Scanner outer dimension	Scanner weight
PhoXi® 3D Scanner XL	77 x 68 x 941 mm	1200 g
PhoXi® 3D Scanner L	77 x 68 x 616 mm	1050 g
PhoXi® 3D Scanner M	77 x 68 x 416 mm	950 g
PhoXi® 3D Scanner S	77 x 68 x 296 mm	900 g
PhoXi® 3D Scanner XS	77 x 68 x 296 mm	900 g

Parameters

Electrical parameters	
Operating voltage Ue DC	12V
Residual ripple max. (% of Ue)	5%
Rated operating current Ie(Imax)	2000mA (3000mA)
Overcurrent protection	Yes
Over/Undervoltage protection	Yes
Laser radiation	
Light source	Visible red light (laser)
Wavelength	638nm
Laser class	3R (IEC / EN 60825-1, 2014)
Peak / CW Power	314µW
Pulse energy	382nJ
Pulse length	960µs

Projection angle horizontal	47.5° ±1°
Projection angle vertical	36.0° ±2°
Mechanical parameters	
Electrical connection	HR10-10R-12PA(73)
Short circuit protection	Yes (<1s, PTC)
Network connection	HR10A-10R-10SB(71) (RJ45 Adapter provided)[4]
Housing material	Aluminium, Laminate, Carbon
Enviromental conditions - Transport	
Ambient temperature	-20÷45°C (max gradient 10°C/hour)
Humidity	0-95% noncondensing
Atmospheric pressure	1080 to 660h Pa (corresponding to an altitude of -1000 to 3500m)
EN 60068-2-32, Free fall	Consult support@photoneo.com
Enviromental conditions - Operational	
Ambient temperature	0÷30°C
Humidity	0-95% noncondensing
Atmospheric pressure	1080 to 795 Pa (corresponding to an altitude of -1000 to 2000m)
EN 60068-2-27 Mechanical shock	Consult support@photoneo.com

4 - May vary with firmware version

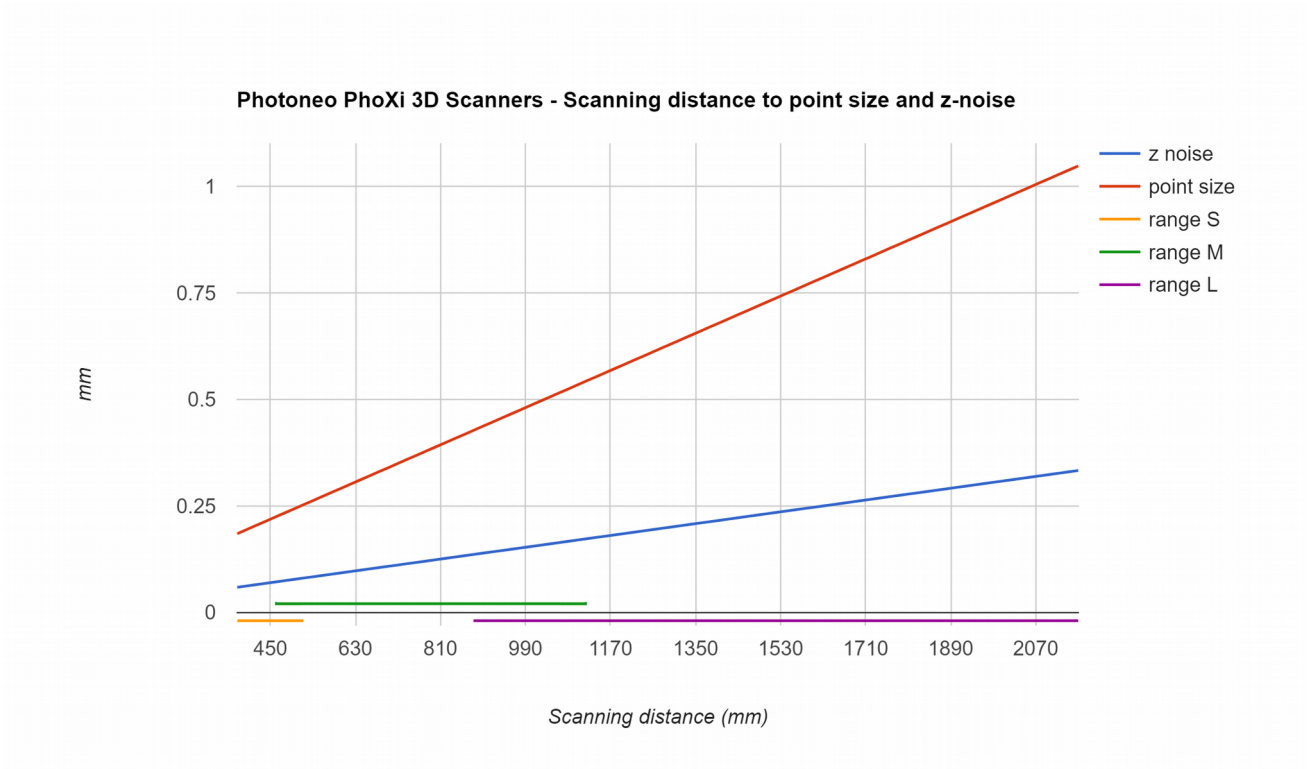


image 6: Z-noise and point size vs. scanning distance

Degree of protection

- **IP40** Mechanical Protection, EN 60529
- Protects against contact of wire with diameter equal or larger than 1mm with high voltage as tested by standard probe. External protection required for dust, dirt, water and foreign objects of < 1mm in diameter.

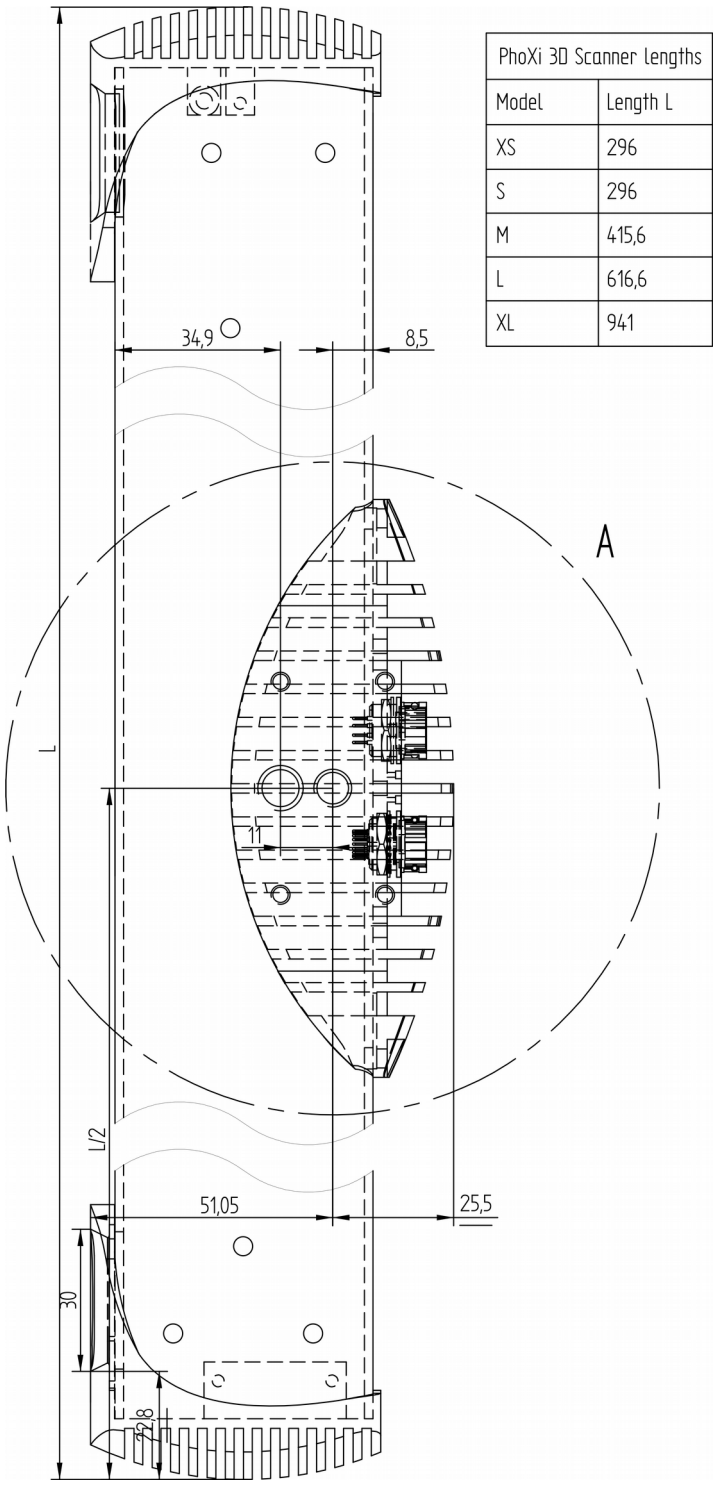
Industrial environments

The PhoXi® 3D Scanner is designed for use in industrial environments.

Application field	Noise emission requirements	Noise immunity requirements
Light industrial	EN 61000-6-3:2007	EN 61000-6-1:2007

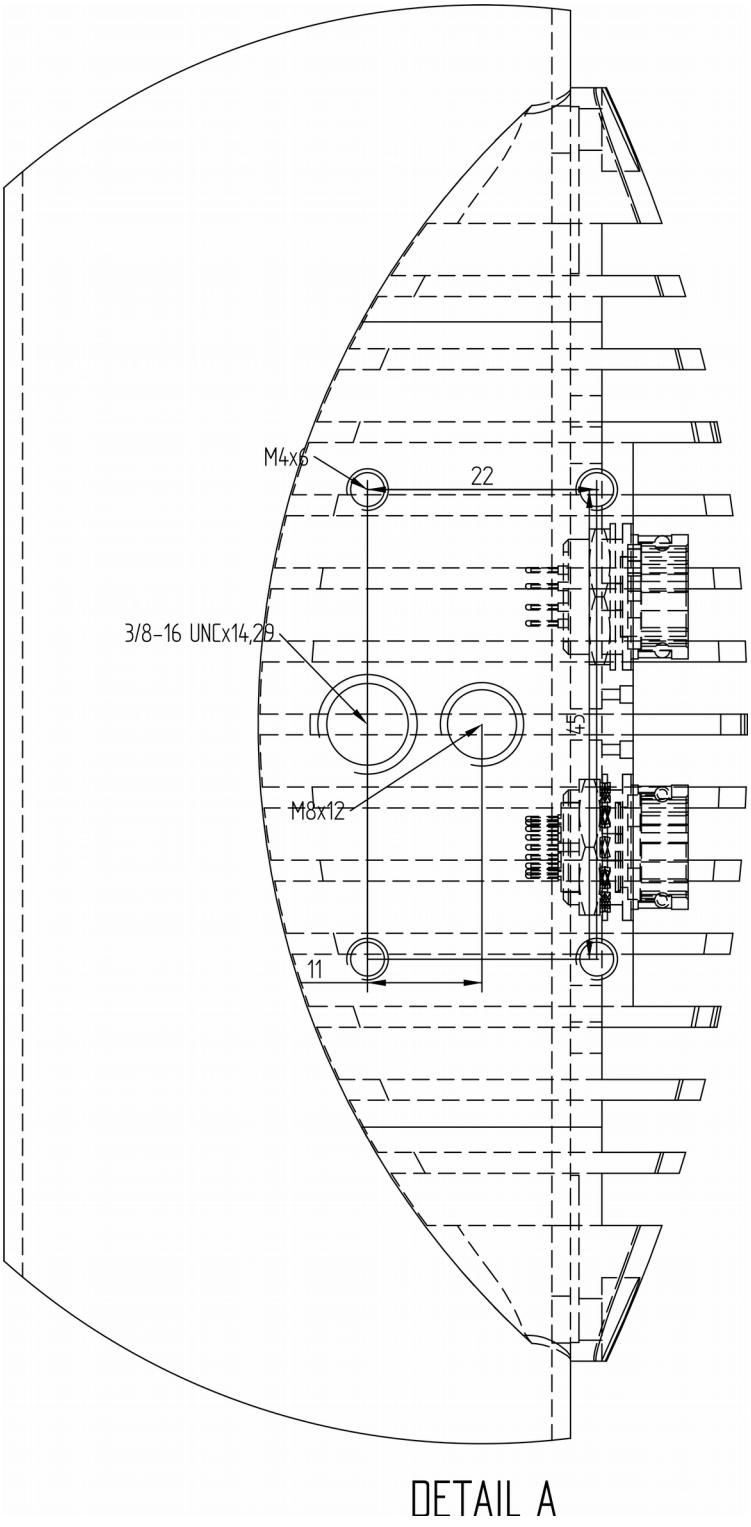
6) Dimensions and drawings

Bottom view: Mounting plate

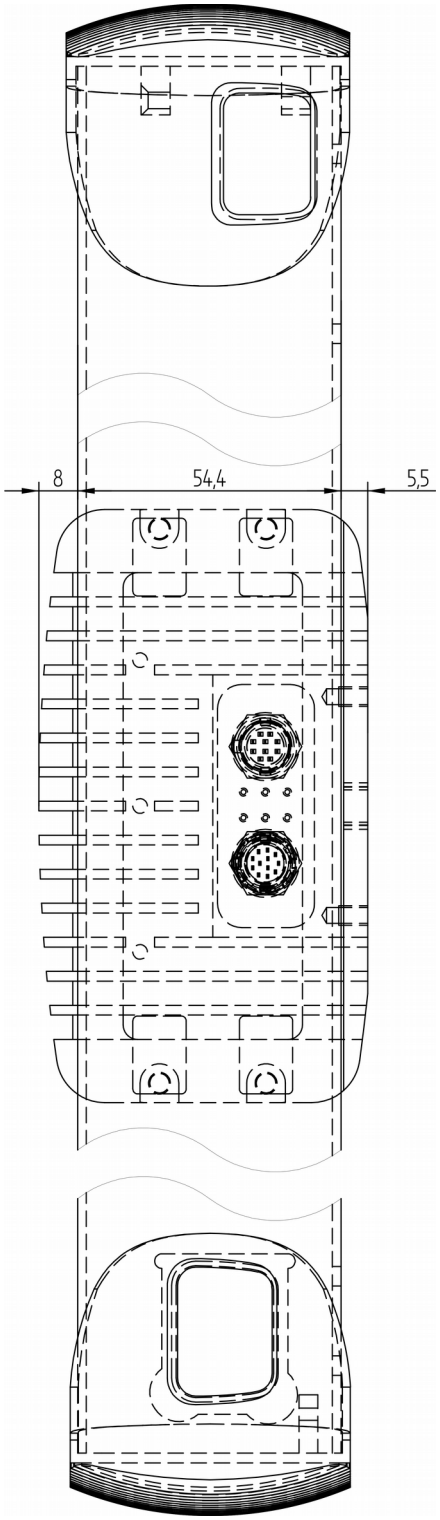


PhoXi 3D Scanner Lengths	
Model	Length L
XS	296
S	296
M	415,6
L	616,6
XL	941

Bottom view: Detail A



Front view: Projection unit and camera



7) Organisation

Business name:	Photoneo s. r. o.
Registered seat:	Jamnického 3, Bratislava 841 05, Slovak Republic
Identification number:	47 353 309
Tax ID:	2023884907
EU VAT ID:	SK2023884907
Contact:	info@photoneo.com, +421 948 766 466

Technical support

- Consult Photoneo Wiki at wiki.photoneo.com
- Contact us at support@photoneo.com