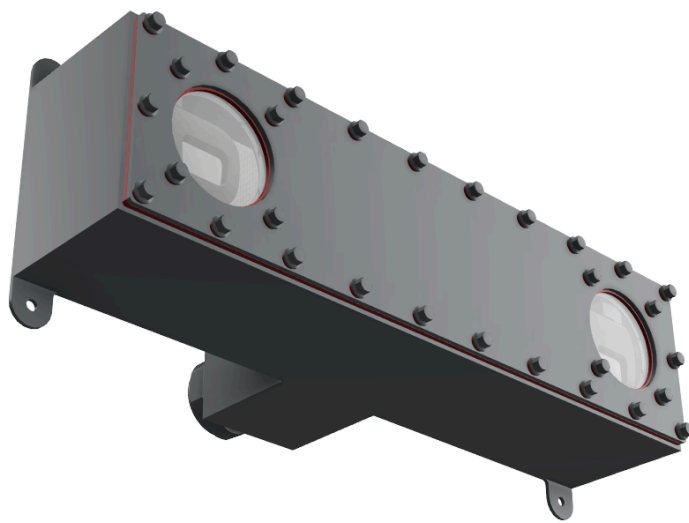


Photoneo 3D Sensor Enclosure by APG

Instruction Manual



apgVISION **Photoneo**

Introduction

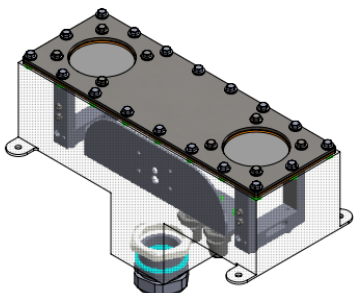
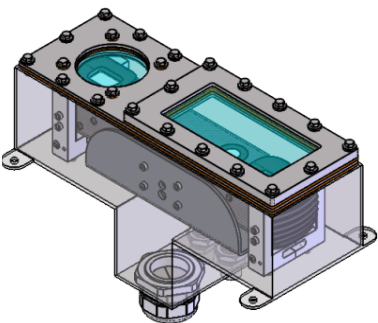
The IP67 enclosure was designed to protect Photoneo's PhoXi 3D Scanner and MotionCam-3D (Color) in harsh industrial environments. This enclosure was developed by APG Vision in cooperation with Photoneo. This guide provides instructions on how to operate the Photoneo 3D Sensor inside the enclosure while ensuring the performance of the device.

Scope of Delivery

The package contains:

- IP67 enclosure for Photoneo 3D Sensor with the mounting plate
- 2x thermal bridge (cannot be used with the MotionCam-3D Gen 2)
- 4x thermal pads (20 x 55 x 1 mm)

Photoneo 3D Sensors

Enclosure revision	Supported devices
 2019-10 (IP67**)	 Alpha 3D Scanner  PhoXi 3D Scanner  MotionCam-3D Gen 2*  MotionCam-3D Gen 3
 2023-02 (IP68**)	 Alpha 3D Scanner  PhoXi 3D Scanner  MotionCam-3D Gen 2*  MotionCam-3D Gen 3  MotionCam-3D Color

*MotionCam-3D Gen2 cannot be used with the thermal bridges, therefore, cooling is limited only to heat dissipation over air. Refer to section [2.1 - Preparation of the Thermal Bridges](#).

**See the [Enclosure Drawings](#).

Note: Enclosure version 2023-02 with a larger cutout for the RGB camera unit was mainly designed for the MotionCam-3D Color, however, it can be used with any other models.

Resources

Enclosure Drawings

- Formfactor S (suitable for models S, S+)
 - [Enclosure 2019-10](#)
 - [Enclosure 2023-02](#)
- Formfactor M (suitable for models M, M+, Alpha 3D Scanner L, XL)
 - [Enclosure 2019-10](#)
 - [Enclosure 2023-02](#)
- Formfactor L (suitable for models L, L+)
 - [Enclosure 2019-10](#)
 - [Enclosure 2023-02](#)
- Formfactor XL (PhoXi 3D Scanner XL only)
 - [Enclosure 2019-10](#)

Photoneo 3D Sensors device resources

- [Datasheets](#)
- [Device manuals](#)

Using the Photoneo 3D Sensor Inside the Enclosure

Temperature regulation

It is recommended that the Photoneo 3D Sensors are kept within the temperature ranges explained in the [device documentation](#).

Cooling the Photoneo 3D Sensor

Photoneo 3D Sensors are designed for natural convection cooling. This type of cooling is significantly inhibited inside the enclosure, therefore the scanner requires additional cooling methods.

The enclosure provides a solution for passive cooling via thermal bridges that dissipate the heat generated by the 3D Sensor to the enclosure itself. Passive cooling is intended for an ambient temperature range of **10 °C to 40 °C**.

Above this range, the scanner needs to be actively cooled using airflow connected to the two holes in the back panel of the enclosure. Use clean, dry instrument air to cool the enclosure. Recommended air pressure is 35 - 70 kPa (5 - 10 psi).

Passive cooling using the thermal bridges is possible on all models except for the MotionCam-3D Gen 2 line-up due to a misalignment of the heatsinks and the thermal bridges. In this case, only the active cooling option is available.

Heating the Photoneo 3D Sensor

Below the temperature range, it is required to heat up the 3D Sensor, using one or two electrical heaters with a thermostat according to the [wiring diagram](#). Besides keeping the 3D Sensor in its optimal operational temperature, heating also prevents the lenses from fogging. The heaters and the thermostats as well as information on the required amount of heaters are available upon request.

Additional Optical Element

Photoneo 3D Sensors use Structured light or Parallel structured light technology, that require projection of one or multiple light patterns to compute 3D information. Inside the enclosure, the laser light passes through an additional optical element - the glass windows of the enclosure. This causes a slight distortion of the final point cloud. The values in the following table are theoretically calculated based on the properties of the glass. The practical implications for applications with additional calibration (e.g. robot-camera calibration, hand-eye calibration) are minor.

	Scanner Model			
	S	M	L	XL
Displacement along the z-axis* of the scanner (towards** the scanner)	1.14 mm	1.14 mm	1.127 mm	1.124 mm
RMS of distortion	90 µm	88 µm	88 µm	92 µm
Maximal distortion	216 µm	220 µm	208 µm	202 µm

* z-axis of the scanner is perpendicular to the front plane of the carbon body

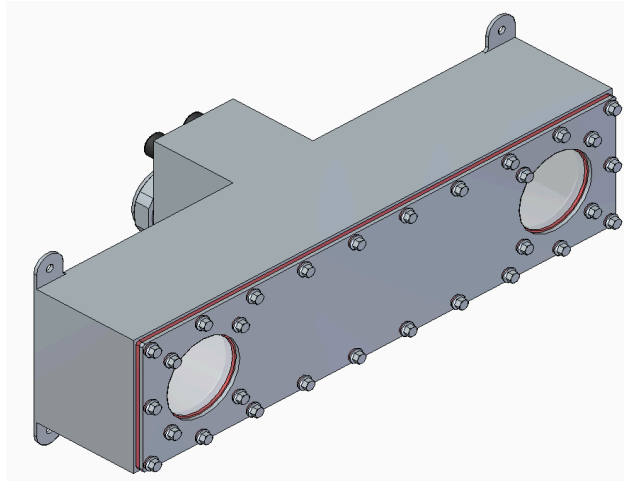
** all points appear to be closer

Installation Instructions

1. Unpackaging

After you open the package, make sure it contains all the parts from the contents list.

Handle the 3D Sensor and accessories with care.



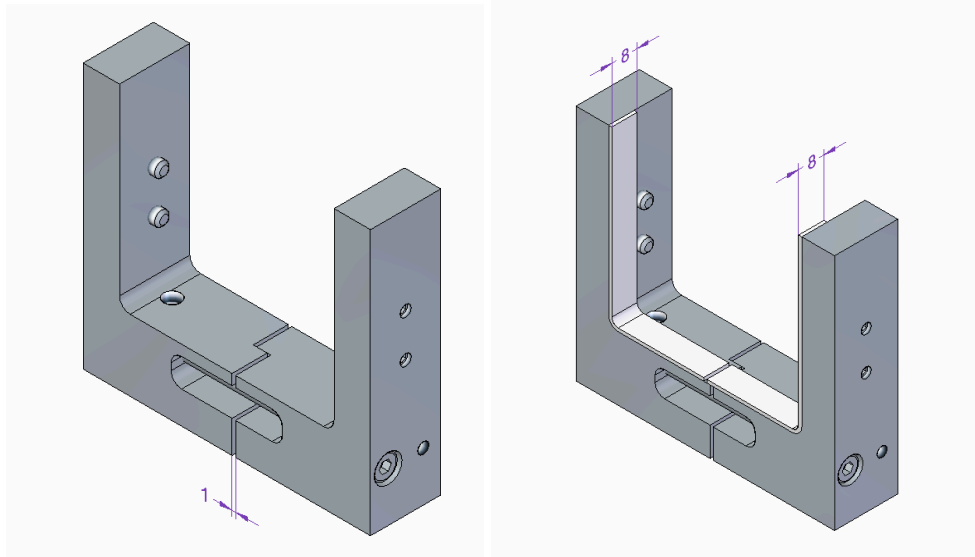
2. Mounting the Scanner

2.1 Preparation of the Thermal Bridges

Note: It is not possible to install the thermal bridges on the MotionCam-3D Gen 2 line-up. It is mounted only using the mounting plate in section [2.3](#).

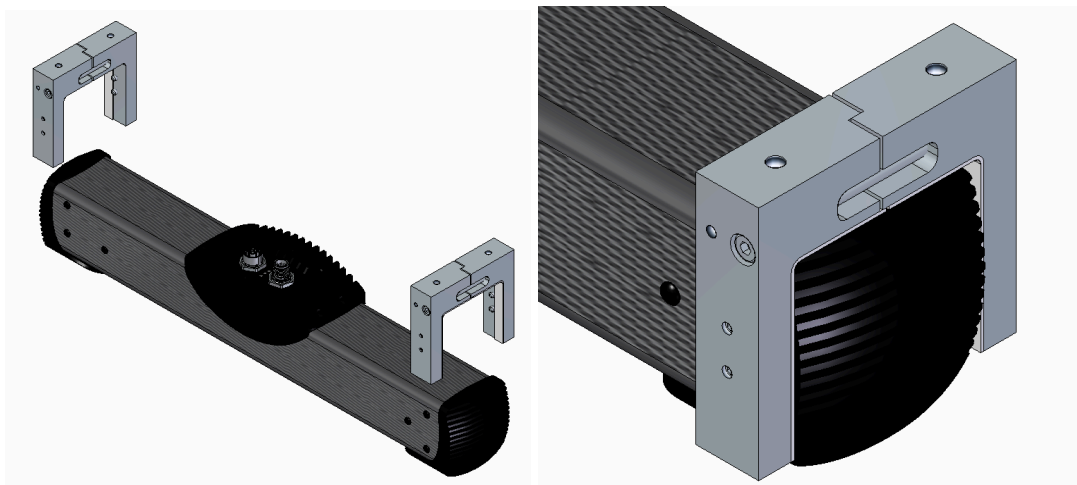
Thermal bridges provide passive cooling of the 3D Sensor by dissipating generated heat to the enclosure itself. Use thermal bridges to cool the 3D Sensor when the ambient temperature is inside the following range: **10 °C to 40 °C**.

Loosen the bracket screws, so there is a 1 mm gap between the L brackets. Apply the 8 mm wide thermal pad as shown below. The headless screws shall protrude 1.5 mm from the inner side.

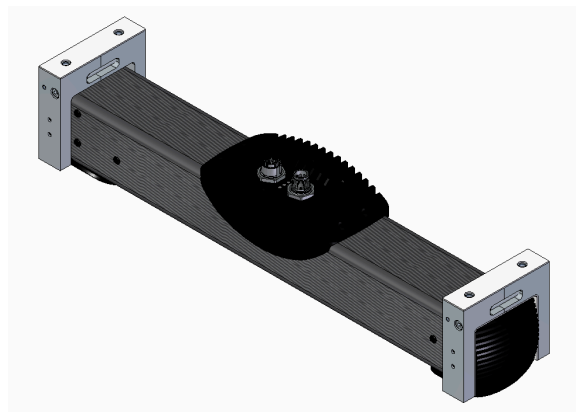
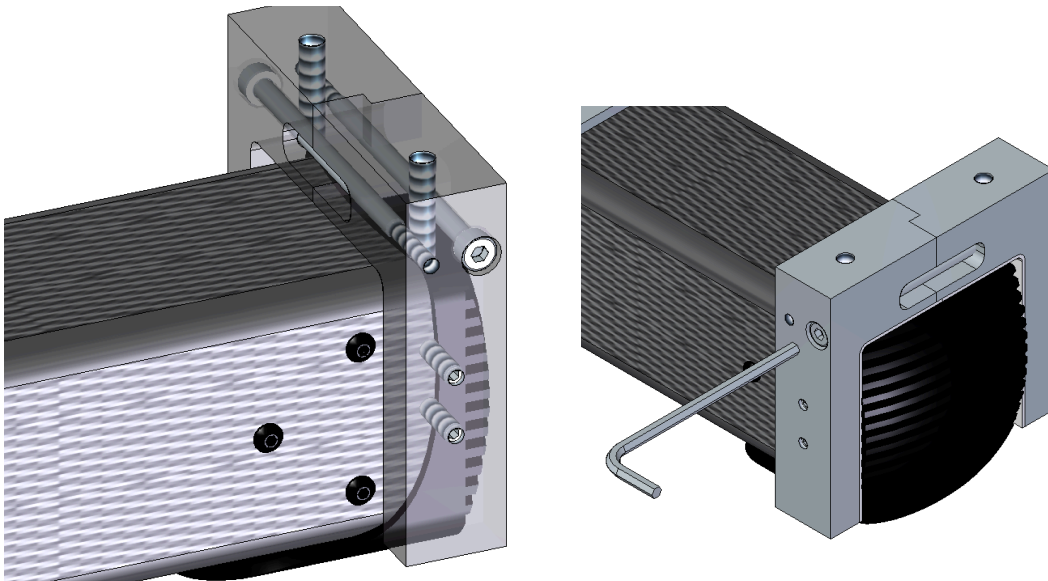


2.2 Mounting the Thermal Bridges on 3D Sensor

Place the brackets on the caps of the device. Make sure the pads are in contact with the aluminum caps on the device.

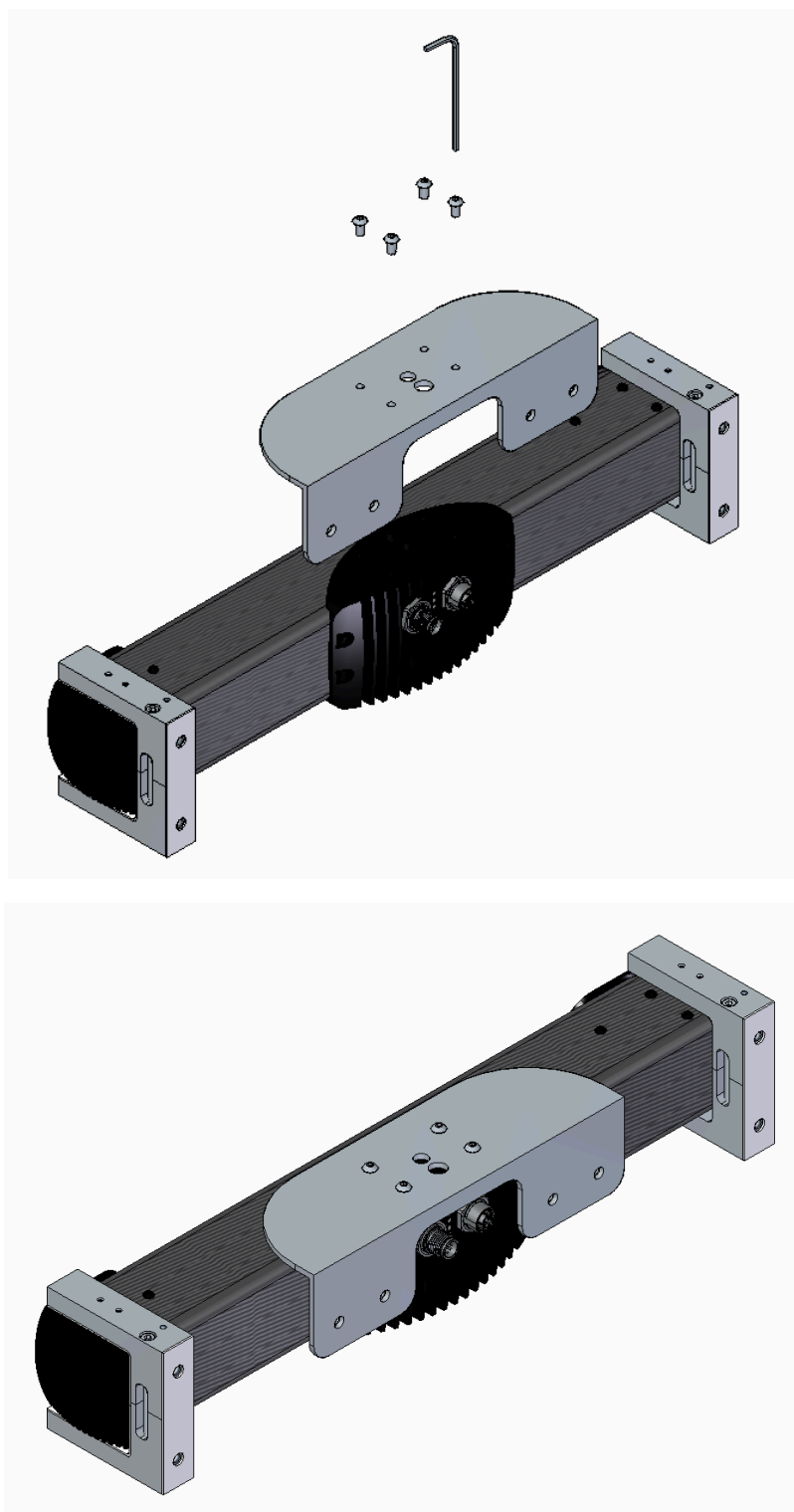


The 2 headless screws from each side should be gently touching the rim of the aluminum scanner caps. This helps you to find the correct position of the bracket. Tighten the two bigger screws using an Allen key. Do not tighten the small headless screws.



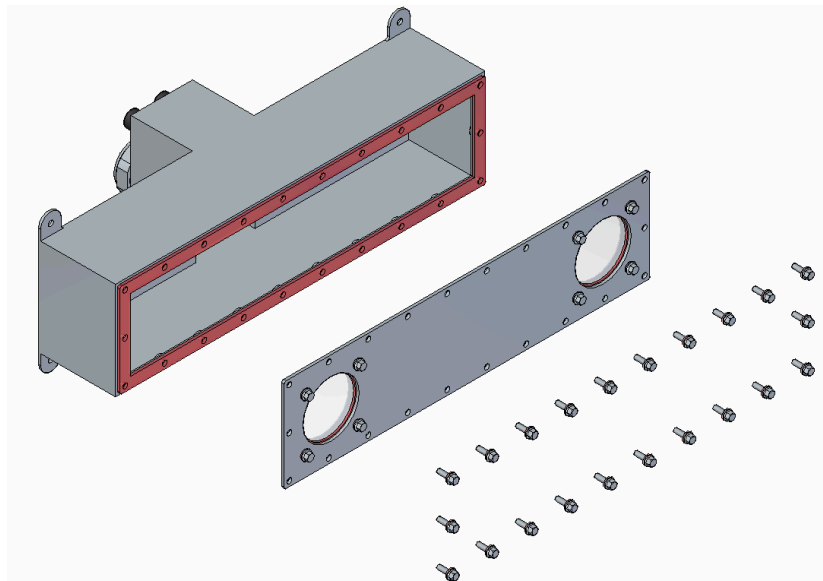
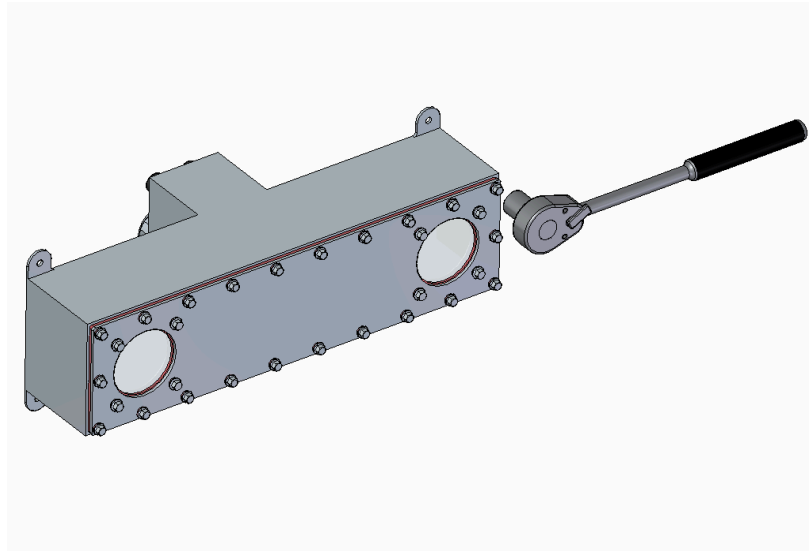
2.3 Mounting the Mounting Bracket on the 3D Sensor

Fit the mounting bracket to the 3D Sensor.

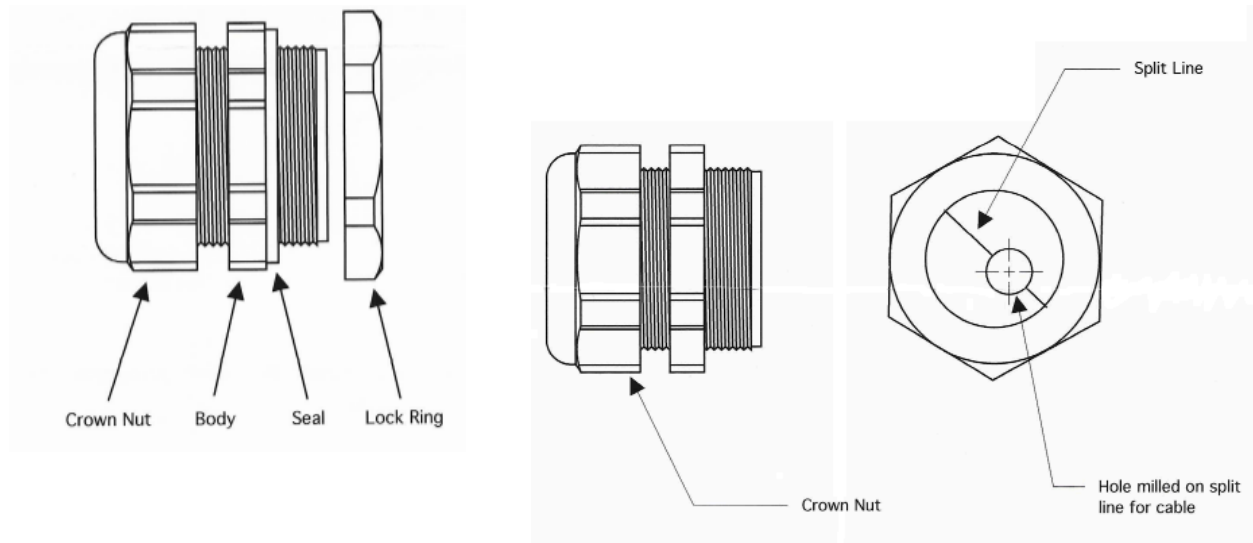


3. Preparing the Enclosure

Unscrew all bolts on the outer rim of the front plate. Do not unscrew the bolts around the glass windows.



4. Preparing the Cable Gland



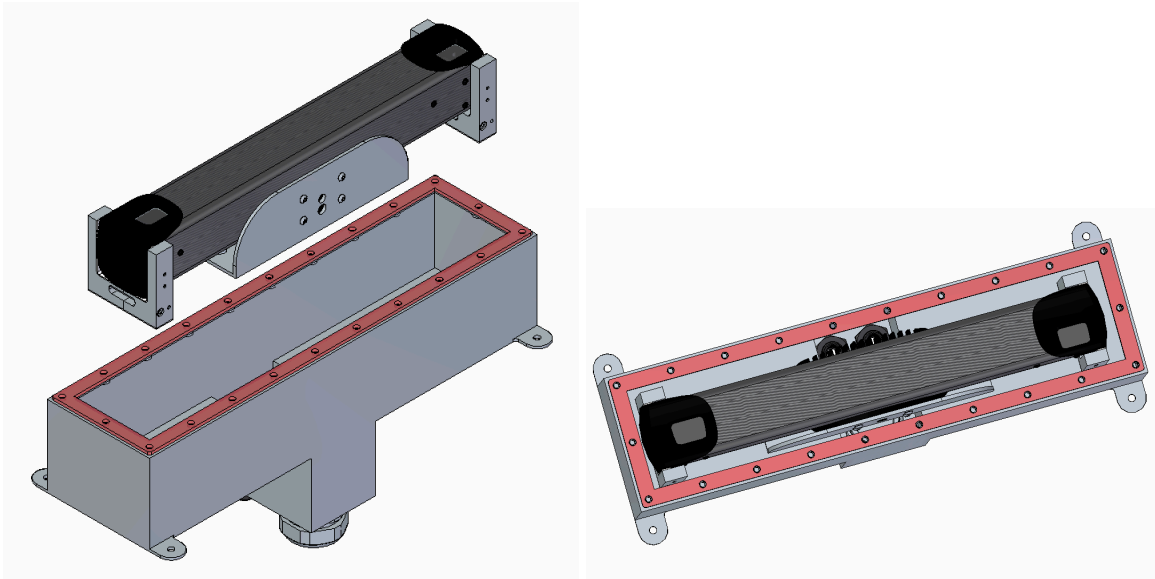
The following instructions on how to correctly prepare the cable glands are taken from the [APG instruction manual](#). Always follow the current version of these instructions provided by APG Vision..

- Determine the diameter of the cable(s) you want to run into the enclosure
- Select an end mill or drill bit of the same diameter. Selecting a tool that is up to 10 % larger will result in an IP rating lowered to IP65.
- Mill or drill a hole centered on the split line in the split insert while the cable gland is assembled.
 - Mill from the crown nut side
 - During milling, back out and clean the mill flutes frequently
 - Chill down the end mill before continuing to the next hole.
- Unscrew the crown nut and remove the split insert
- Slide the cable connector through the hole in the crown nut, then through the hole in the crown nut body
- Join the two sides of the slit insert around the cable
- Press the split insert into the cable gland body
- Tighten the crown nut back on the body

5. Installing the Cables

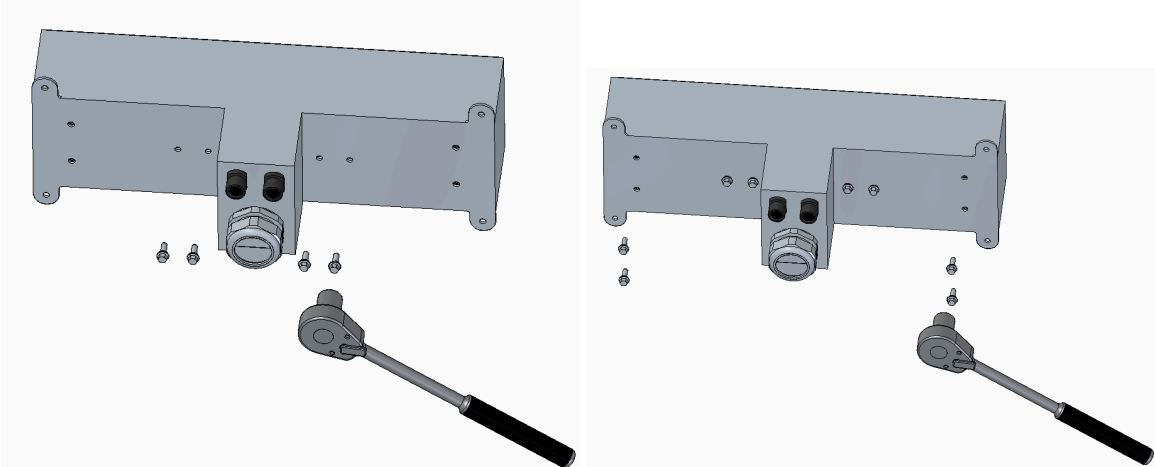
- Protrude cable(s) through the cable gland.
- Connect the cable(s) to the 3D Sensor connector(s).

6. Placing the 3D Sensor Into the Enclosure



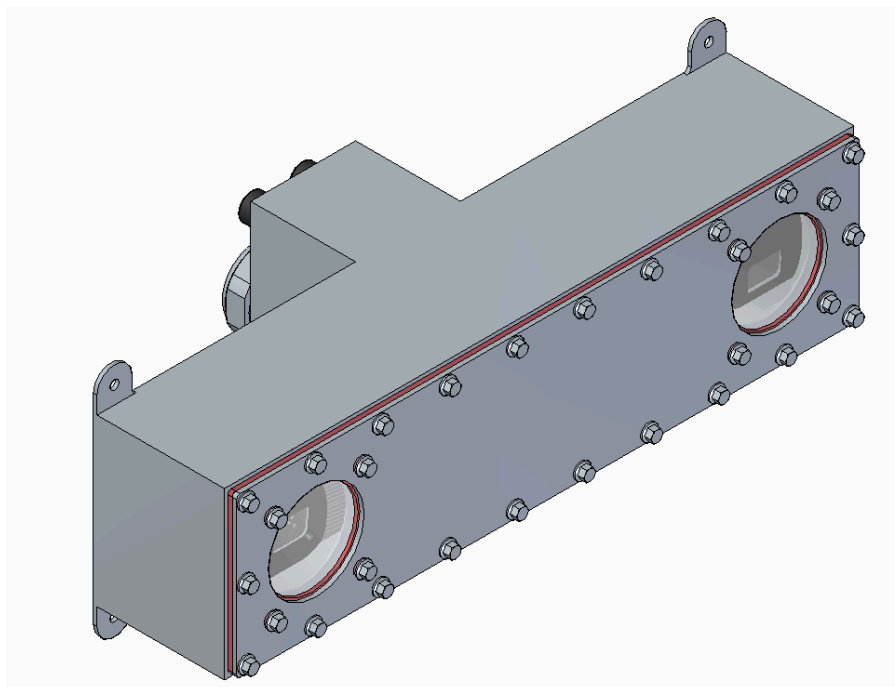
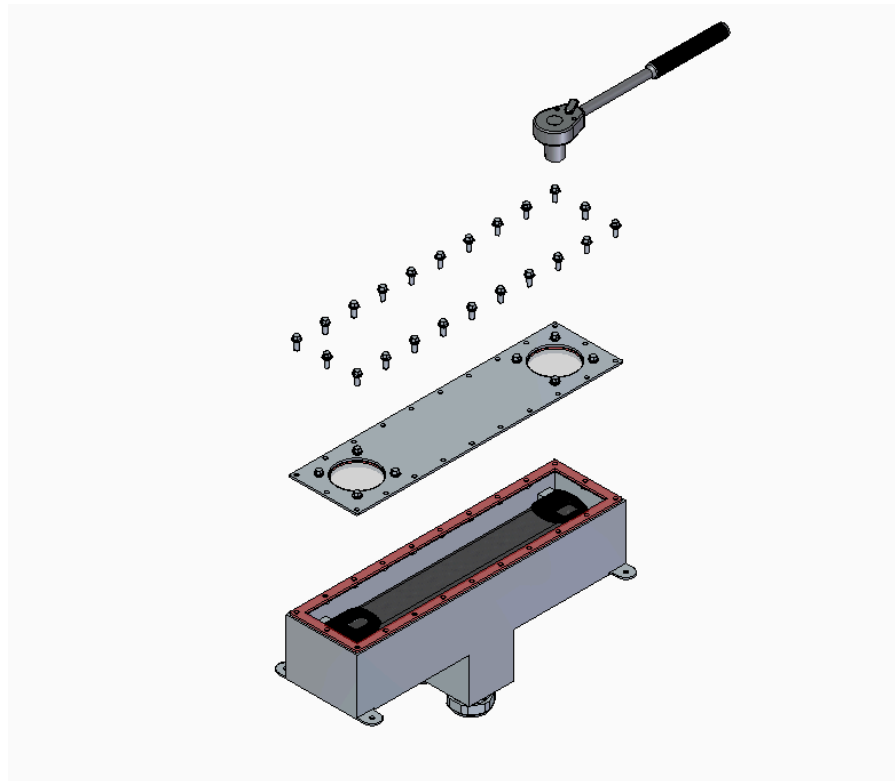
6.1 Securing the 3D Sensor Inside the Enclosure

Install the bolts to hold the brackets.



6.2 Closing the Enclosure

Replace the front plate. Install all bolts, and tighten them evenly. Don't use excessive force.





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