

Revision: 11/28/22

FIRMWARE VERSION: v2.4.x

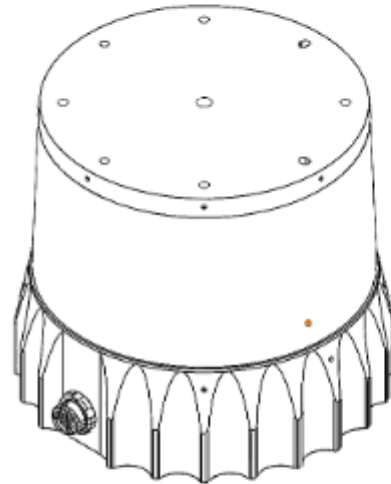
HARDWARE VERSION: 840-102xxx-06 (Rev 06)

SUMMARY

The OS2 offers an industry-leading combination of resolution, range, affordability, performance, reliability, size, weight, and power. It is IP68/69K rated and designed for indoor/outdoor all-weather environments. As the smallest and lightest long-range high-resolution lidar on the market, the OS2 can be directly integrated into machinery, robots, drones, and fixed infrastructure.

HIGHLIGHTS

- Fixed resolution per frame
- Camera-grade near-infrared and intensity data
- Multi-sensor crosstalk immunity
- Fixed intrinsic calibration
- Open source drivers
- 2x signal processing power and 2x data output per pixel with the new L2X Chip
- Introducing Dual Return Mode
- New UDP packet profiles `Single Return` and `Low Data Rate`



OPTICAL PERFORMANCE

| | |
|---|--|
| Range (80% Lambertian reflectivity, 2048 @ 10 Hz mode) | 210 m @ >90% detection probability, 100 klx sunlight 240 m @ >50% detection probability, 100 klx sunlight |
| Range (10% Lambertian reflectivity, 2048 @ 10 Hz mode) | 80 m @ >90% detection probability, 100 klx sunlight 100 m @ >50% detection probability, 100 klx sunlight |
| Minimum Range | 1 m (10% reflective target) |
| Range Accuracy | ±3 cm for lambertian targets, ±10 cm for retroreflectors |
| Precision (10% Lambertian reflectivity, 2048 @ 10 Hz mode, 1 standard deviation) | 1 - 30 m: ± 2.5 cm 30 - 60 m: ± 4 cm >60 m: ± 8 cm |
| Range Resolution | 0.1 cm Note: For <i>Low Data Rate Profile</i> the Range Resolution = 0.8cm |
| Vertical Resolution | 32, 64, or 128 channels |
| Horizontal Resolution | 512, 1024, or 2048 (configurable) |
| Field of View | Vertical: 22.5° (+11.25° to -11.25°) Horizontal: 360° |
| Angular Sampling Accuracy | Vertical: ±0.01° / Horizontal: ±0.01° |
| False Positive Rate | 1/10,000 |
| Rotation Rate | 10 or 20 Hz (configurable) |
| # of Returns | 2 (strongest, second strongest) |

LASER

| | |
|------------------------------|---|
| Laser Product Class | Class 1 eye-safe per IEC/EN 60825-1: 2014 |
| Laser Wavelength | 865 nm |
| Beam Diameter Exiting Sensor | 19 mm |
| Beam Divergence | 0.09° (FWHM) |

LIDAR OUTPUT

| | |
|---|---|
| Connection | UDP over gigabit Ethernet |
| Points Per Second | up to 655,360 (32 channel) up to 1,310,720 (64 channel) up to 2,621,440 (128 channel) |
| Data Rate (Megabits Per Second) (Legacy Mode) | up to 66.2 Mbps (32 channel) up to 129.1 Mbps (64 channel) up to 255 Mbps (128 channel) |
| Data Rate (Megabits per second) (Dual Return Profile) Not applicable for 1024x20 & 2048x10 Modes | up to 43.6 Mbps (32 channel) up to 85.6 Mbps (64 channel) up to 169.4 Mbps (128 channel) |
| Data Rate (Megabits per second) (Low Data Rate Profile) | up to 23.6 Mbps (32 channel) up to 44.6 Mbps (64 channel) up to 86.6 Mbps (128 channel) |
| Data Rate (Megabits per second) (Single Return Profile) | up to 65.6 Mbps (32 channel) up to 128.5 Mbps (64 channel) up to 254.3 Mbps (128 channel) |
| Data Per Point | Range, signal, reflectivity, near-infrared, channel, azimuth angle, timestamp |
| Timestamp Resolution | < 1 μ s |
| Data Latency | < 10 ms |

IMU OUTPUT

| | |
|----------------------|--|
| Connection | UDP over gigabit Ethernet |
| Samples Per Second | 100 |
| Data Per Sample | 3 axis gyro, 3 axis accelerometer |
| Timestamp Resolution | < 1 μ s |
| Data Latency | < 10 ms |
| Details: | InvenSense ICM-20948; datasheet for more details: https://www.invensense.com/products/motion-tracking/9-axis/icm-20948/ |

CONTROL INTERFACE


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|-----------------------|---|
| Connection | TCP and HTTP APIs |
| Time Synchronization | Input sources: <ul style="list-style-type: none">• IEEE1588 Precision Time Protocol (PTP); Accuracy: <1 ms error• gPTP; Accuracy: <1 ms error• NMEA \$GPRMC UART message support• External PPS; Accuracy: <1 ms error• Internal 10 ppm drift clock; Accuracy: <20 ppm error Output sources: <ul style="list-style-type: none">• Configurable 1 - 60 Hz output pulse |
| Lidar Operating Modes | Hardware-triggered angle firing (guaranteed fixed resolution per rotation): <ul style="list-style-type: none">• x 512 @ 10 Hz or 20 Hz• x 1024 @ 10 Hz or 20 Hz• x 2048 @ 10 Hz |

| | |
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| Additional Programmability | Multi-sensor Phase Lock Azimuth Masking Low-power Standby Mode Queryable intrinsic calibration information: <ul style="list-style-type: none"> • Beam angles • IMU pose correction matrix |
|----------------------------|--|

MECHANICAL/ELECTRICAL

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|-------------------|---|
| Power Consumption | 18 - 24 W (28 W peak at startup, 30 W peak if operating below 10 °C) |
| Operating Voltage | 9V - 34 V, 12 V or 24 V nominal |
| Connector | Proprietary pluggable connector (Power + data + DIO) |
| Dimensions | Diameter: 119.6 mm (4.71 in) Height: 98.9 mm (3.89 in) |
| Weight | 1100 g (38.8 oz) |
| Mounting | Bottom: 4x M3 screws, 2x locating 2 mm pin holes, 4x M4 screws, 2x locating 3 mm pin holes, 4x M6 screws Top: 4x M4 screws, 4x locating 3mm pin holes, 1x M6 Screw |

OPERATIONAL

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|-----------------------|---|
| Operating Temperature | -20 °C to +60 °C Between +52 °C to +60 °C, sensor automatically reduces range (max 20% range reduction) |
| Storage Temperature | -40 °C to +75 °C |
| Ingress Protection | IP68 (1m submersion for 1 hour, with I/O cable attached) IP69K (with I/O cable attached) |
| Shock | IEC 60068-2-27 (Amplitude: 25 g, Shape: 10 ms half-sine, 400 shocks x 6 directions) |
| Vibration | IEC 60068-2-64 (Amplitude: 2 G-rms, Shape: 10 - 1000 Hz, Mounting: sprung masses, 3 axes w/ 8 hr duration each) |
| Compliance | <p>For US</p> <p>Laser Safety:</p> <ul style="list-style-type: none"> • IEC/EN 60825-1:2014 Class 1 eye safe • FDA US 21CFR 1040 Laser Notice 56 <p>Product Safety:</p> <ul style="list-style-type: none"> • UL 62368-1 • CSA 22.2 No. 62368-1-19 <p>EMC: FCC 47CFR Part 15, Subpart B, Class A</p> <p>For EU</p> <p>Laser Safety: IEC/EN 60825-1:2014 Class 1 eye safe</p> <p>Product Safety: EN/IEC 62368-1</p> <p>EMC:</p> <ul style="list-style-type: none"> • EN 55032:2012/AC 2013; CISPR 32:2015 • EN 55024:2010; CISPR 24:2010 • EN 61000-3-2:2014 • EN 61000-3-3:2013 <p></p> |

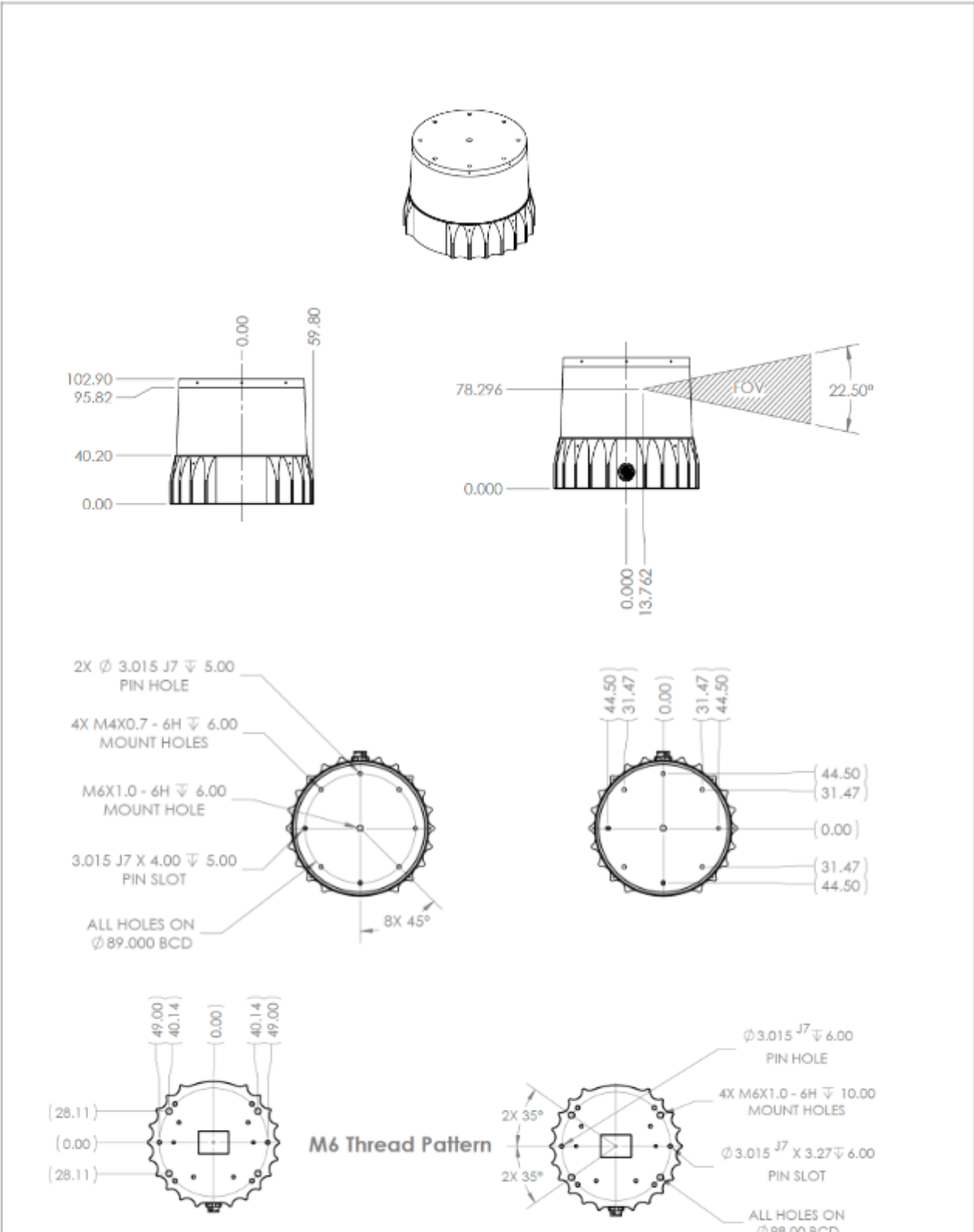
ACCESSORIES

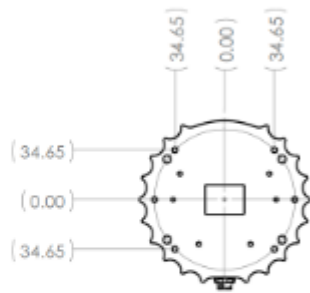
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|------------------------|--|
| Included Interface Box | Polycarb/FR4, 100 g, 75 mm x 50 mm x 25 mm (LxWxH), 2 m CAT6 cable, 24 V power adapter, 5 m sensor cable |
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SOFTWARE

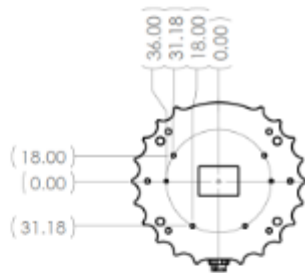
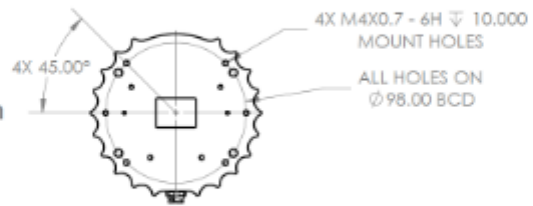
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|----------------|------------------|
| Sample Drivers | ROS, C++, Python |
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EXTERIOR DIMENSIONS

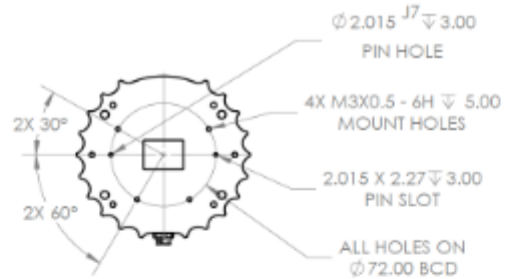




M4 Thread Pattern



M3 Thread Pattern



*Specifications are subject to change without notice and based on engineering targets. Specs are not guaranteed to have passed full validation at the time of publication.