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# RVS™ 3000

## ready for the next rendezvous

The advanced 3D imaging LIDAR for rendezvous and docking.
Acquisition, tracking and imaging of both cooperative and non-cooperative targets.
More powerful than RVS at reduced mass and size.

The Jena-Optronik RVS Rendezvous and Docking Sensor is the most frequently used LIDAR sensor for docking to the International Space Station ISS.

**Up to now a total of 38 flight models have been delivered to customers in the United States, Japan and Europe. All 19 flight models being used in orbit delivered a flawless and fully reliable performance during four ATV dockings as well as four HTV and one Cygnus berthing.**

**Based on the RVS success story, Jena-Optronik is developing the next generation of Rendezvous and Docking Sensors.**

**The new RVS 3000 builds on the experience gained during RVS development, manufacturing, test and operation. It retains the software and data interface as the previous RVS for optional compatibility, but improves upon the existing RVS in several key elements:**

- Compact design – roughly the size of the RVS optical head alone
- Reduced total weight of 8 kg – almost half of RVS
- Reduced power consumption
- Simplified spacecraft integration by an entire box covering optical head and electronics, as well as optical and electrical cabling in between
- Increased operating range
- Operation with non-cooperative targets for generation of 3D point cloud data

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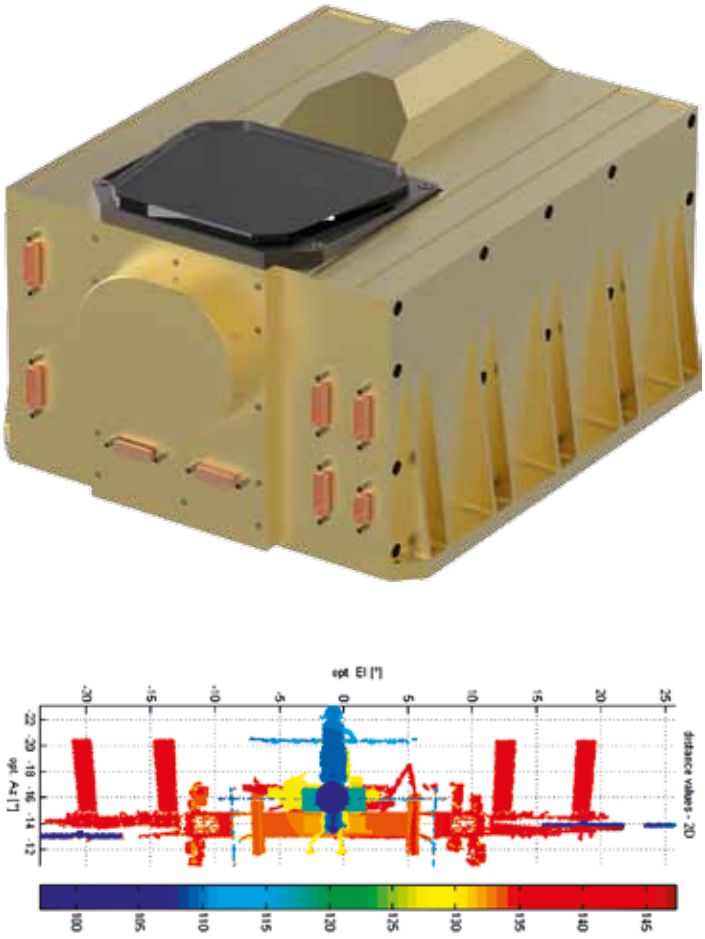


**RVS 3000 is available in two variants for different application scenarios:**

- The standard and cost-effective RVS 3000 for rendezvous and docking to cooperative targets, e.g. ISS
- The more powerful RVS 3000 3D for rendezvous and docking to non-cooperative targets and space robotics applications, like 3D point cloud imaging.

The advanced RVS 3000 technology includes a highly accurate range finder technology, a lightweight scan mirror with fully digital control and a high performance yet robust laser source operating at the eye-safe wavelength of 1.5µm.

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All autonomous and precise dockings of **European ATV** (Automated Transfer Vehicle) to the International Space Station ISS were made possible by in total four sensors each consisting of two RVS TGM (Telegoniometer) and two VDM (Videometer, with SODERN, France). The upcoming ATV-5 mission will also rely on the dependable RVS technology made by Jena-Optronik.

Two Rendezvous- and Docking Sensors RVS each have successfully enabled the fully automated berthings of all four **Japanese HTV** (HII-Transfer Vehicle) with the ISS.

In addition to ATV and HTV, the **American "Cygnus"** spacecraft is using the highly accurate opto-electronic sensors from Jena-Optronik. The "Cygnus" unmanned cargo logistics spacecraft precisely approaches the ISS with the help of three Rendezvous- and Docking Sensors by Jena-Optronik.

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# RVS, RVS 3000 and RVS 3000 3D performance

| | RVS | RVS 3000 | RVS 3000 3D |
|---|---|---|---|
| **Scan Parameter** | | | |
| Field of View | 40° x 40° ... 1° x 1° | 40° x 40° ... 1° x 1° | 40° x 40° ... 1° x 1° |
| Line of Sight 3σ noise | < 0.06° | < 0.05° | < 0.05° |
| **Laser** | | | |
| Wavelenght | 910 nm (eye safe) | 1.5 µm (eye safe) | 1.5 µm (eye safe) |
| **Operating Range Cooperative Targets** | | | |
| Range min. | < 1m | < 1m | < 1m |
| Range max. | > 1500 m | > 3000 m | > 3000 m |
| **Operating Range Non-cooperative Targets** | | | |
| Range min. | n/a | < 1m | < 1m |
| Range max. | n/a | > 100 m | > 1000 m |
| **Power Consumption** | | | |
| Average | 40 W | 30 W | 35 W |
| Minimum | 70 W | 50 W | 60 W |
| **Mechanical Interface** | | | |
| Mass Optical Head | 5.9 kg | 8.0 kg | 8.5 kg |
| Mass E-Box | 7.7 kg | Sum: 14.5 kg | |
| Cabling | ca. 1 kg | | |
| Dimensions Optical Head | 265 mm x 345 mm x 195 mm | 286 mm x 310 mm x 195 mm | 286 mm x 310 mm x 195 mm |
| Dimensions E-Box | 315 mm x 224 mm x 176 mm | | |
| **Electrical Interface** | | | |
| Power | | 27.0 V +/- 1.5 V | 27.0 V +/- 1.5 V |
| Data Interface | MIL-1553B | MIL-1553B, SpaceWire | MIL-1553B, SpaceWire |
| **Output Data** | | | |
| | Relative Position data to target (Azimuth, Elevation, Range) | Relative Position data to target (Azimuth, Elevation, Range) | Relative Position data to target (Azimuth, Elevation, Range), 3D point cloud image data |

**Do you want to benefit from our experience?**
**Provide us with your specific needs for your LIDAR application and we will make RVS 3000 the ideal sensor solution for your successful mission.**

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