

LONG-RANGE  
LASER PROFILE MEASURING SYSTEM

# LPM-321

The Laser Profile Measuring System LPM-321 provides unprecedented flexibility for 3D long range profiling. Hemispheric scanning, automated or manual operation, reflectorless ranging up to 6000 meters, high accuracy and a comprehensive 3D data acquisition software package operable from any standard laptop or PC are included. Without the use of a retroreflector, the LPM-321 calculates the distance to the surface in question, based upon the time-of-flight measurement of a short laser pulse.

The distance meter comprises state-of-the-art digital signal processing and echo waveform analysis, enabling precise distance measurements even under bad visibility conditions. In multi target situations, the distance meter can provide up to 3 target distances per measurement.

The point of impact of the measuring infrared laser beam can be observed by a telescope. The pan & tilt mount serves to position the measuring beam auto-matically by integrated stepper motors with an accuracy of 0.009 degrees. Handwheels for manual operation are provided, too.

The optional combination with an oriented and calibrated high resolution digital camera leads to a hybrid sensor system.

This system provides data which lend itself to automatic or semi-automatic processing of scan data and image data to generate products such as colored pointclouds, textured triangulated surfaces or orthophotos with depth information.

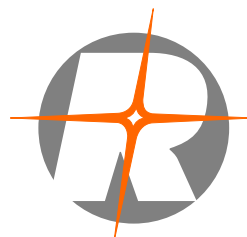
The LPM series provides the user with the sophisticated advances of *RIEGL* laser measuring technology combined with a robust and easy to use design.



- **Range up to 6000 m @ Laser Class 1M**
- **Full waveform target echo analysis**
- **Measurement accuracy typ. 25 mm**
- **Measurement rate up to 1000 points/sec**
- **Field of view up to 150° x 360°**
- **TCP/IP & RS422 data interface**
- **Operated by any standard PC or laptop**

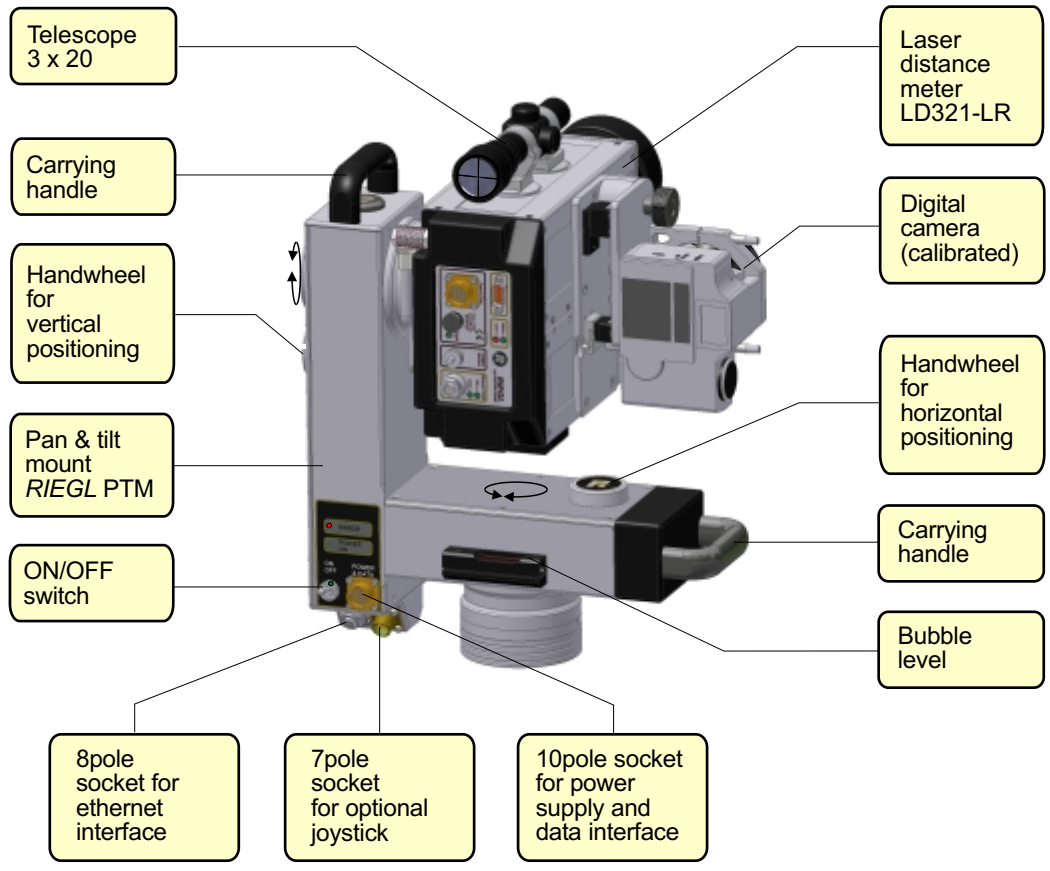
- **Topography & Mining**
- **Monitoring & Civil Engineering**
- **Archaeology**

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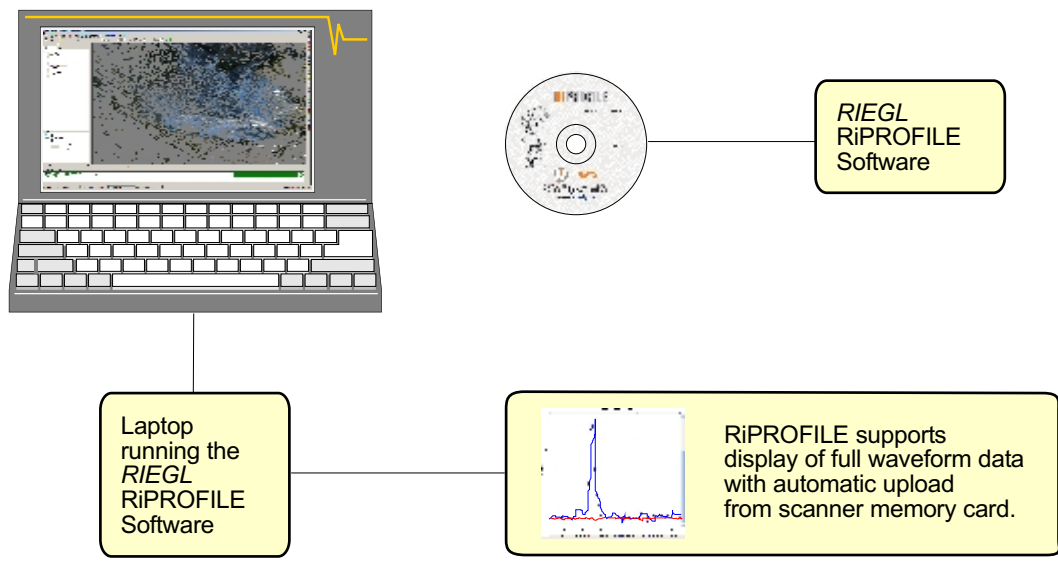


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LASER MEASUREMENT SYSTEMS

## Functional Elements

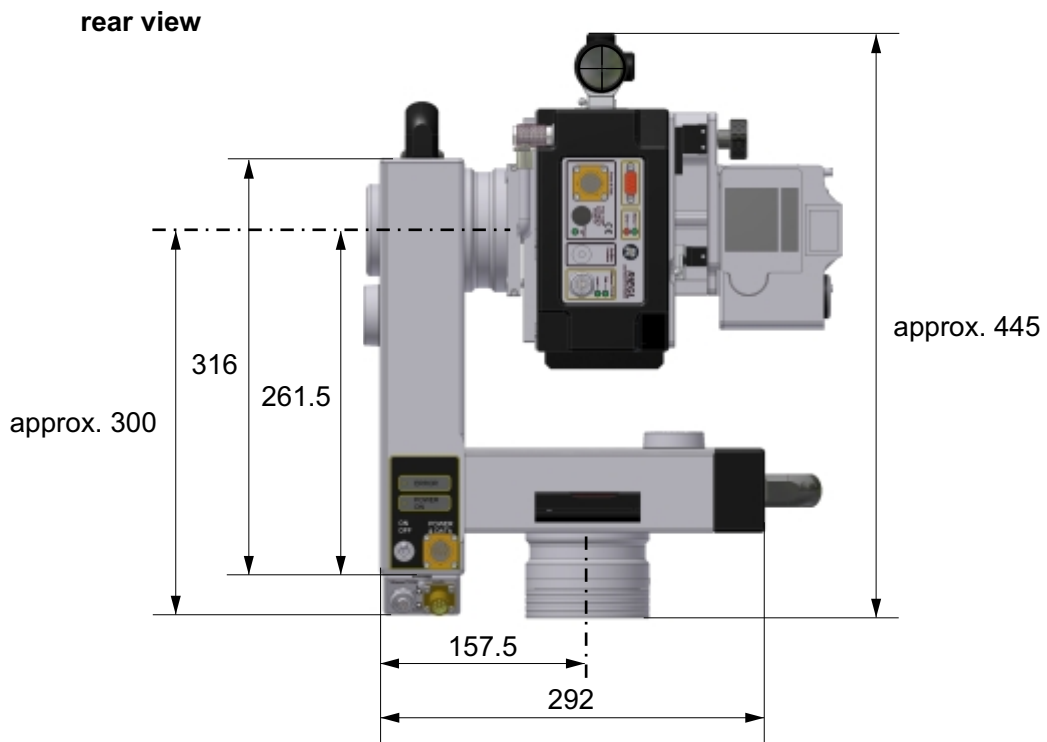
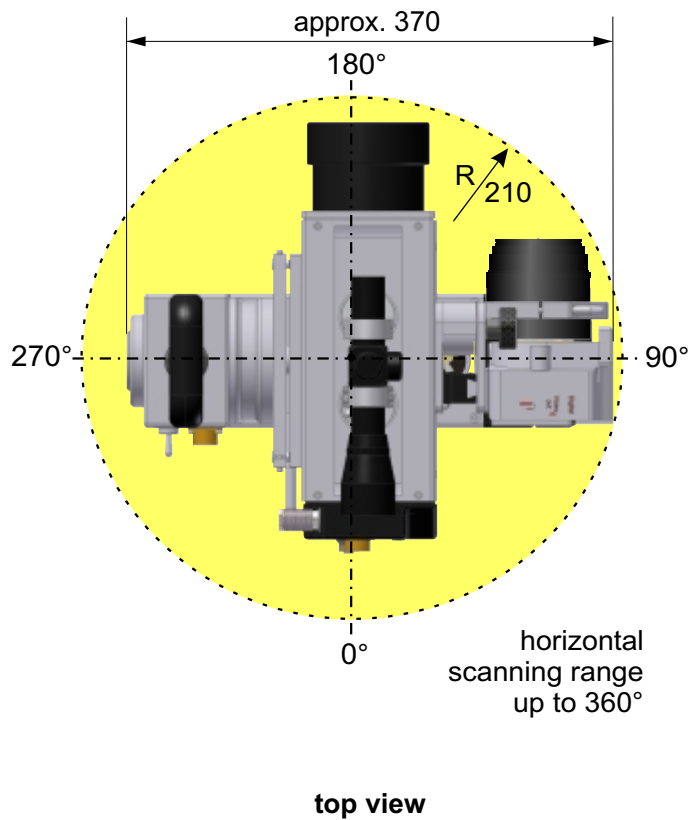
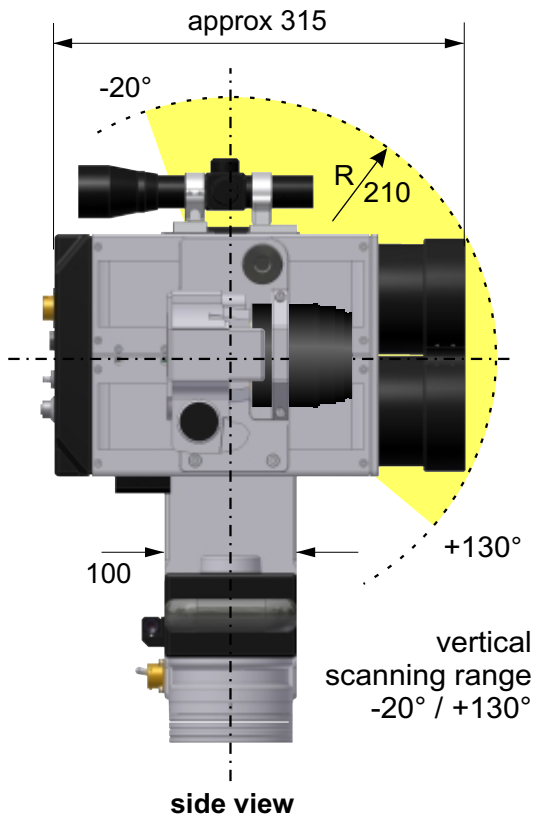


## Interfacing and Data Processing



## Dimensional Drawings

all dimensions in mm



## Technical Data *RIEGL* LPM-321

### Distance Meter Performance

Max. measurement range <sup>1)2)</sup> @ measurement rate	1000 Hz	100 Hz	10 Hz
for natural targets, $r \geq 80\%$ <sup>3)</sup>	$\geq 1500$ m	$\geq 2500$ m	6000 m
for natural targets, $\rho \geq 10\%$ <sup>3)</sup>	$\geq 500$ m	$\geq 850$ m	$\geq 1500$ m
Minimum measurement range	10 m		
Measurement accuracy <sup>2)4)5)6)</sup>	25 mm		
Precision <sup>7)</sup>	15 mm		
System measurement rate <sup>8)</sup>	10 to 1000 points/sec		
Laser beam divergence <sup>9)</sup>	typ. 0.8 mrad		
Telescope	magnification 3 x 20		
Laser wavelength	near infrared		
Eye safety class according to IEC60825-1:1993+A1:1997+A2:2001			
The following clause applies for instruments delivered into the United States: Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated July 26, 2001.			
Full Waveform Mode (logging to internal 2GB memory card)			for up to 2.000.000 measurements



Viewing the laser output with certain optical instruments designed for use at a distance (for example, telescopes and binoculars) may pose an eye hazard.

### Pan & Tilt Mount Performance

Scan angle range <sup>10)</sup>	vertically $\chi$	-20° $\leq \chi \leq$ +130°
	horizontally $\varphi$	0 $\leq \varphi \leq$ 360°
Angle step width $\Delta \chi$ between consecutive measurements		$\Delta \chi \geq 0.018^\circ$ (0.02 gon)
Angle step width $\Delta \varphi$ between consecutive scan lines		$\Delta \varphi \geq 0.018^\circ$ (0.02 gon)
Angular resolution		0.009° (0.01 gon)
Scanning speed	vertically	max 81° (90 gon) / sec
	horizontally	max 36° (40 gon) / sec

### Physical Data

Main dimensions (LxWxH)	approx 315 x approx 370 x approx 445 mm
Weight	approx 16 kg
Protection class	IP64, dust and splash-water proof
Power supply voltage range	12 - 28 V DC
Power consumption	approx 23 W (standby) approx 60 W (both motors in operation)
Data interfaces	· Ethernet TCP/IP interface, 10/100 MBit/sec · RS422, adjustable baud rate up to 460.8 kBd, typically 115.2 kBd
Temperature range (operation / storage)	0°C up to +45°C / -20°C up to +70°C

- 1) Typical values for average conditions. Maximum range is specified for flat targets with size in excess of the laser beam diameter and near to normal incidence of the laser beam. In bright sunlight, the operational range is considerably shorter than under an overcast sky.
- 2) Not specified for retroreflectors.
- 3) For extended targets larger than laser footprint size.
- 4) One sigma standard deviation @ 50 m range under *RIEGL* test conditions.
- 5) Plus distance depending error  $\pm 20$  ppm.

- 6) Accuracy is the degree of conformity of a measured quantity to its actual (true) value.
- 7) Precision, also called reproducibility or repeatability, is the degree to which further measurements show the same result.
- 8) The system measurement rate depends on the selected distance measurement program and is additionally limited by the data transfer rate from distance meter to PTM and by the maximum speed of the line scan axis.
- 9) 0.8 mrad correspond to 80 mm beam width per 100 m distance.
- 10) See dimensional drawings.

Information contained herein is believed to be accurate and reliable. However, no responsibility is assumed by *RIEGL* for its use. Technical data are subject to change without notice. Preliminary Data sheet, LPM-321, 15/01/2008



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