

# RIEGL VQ<sup>®</sup>-480

*high-accuracy ranging based on echo digitization and online waveform processing*  
*high laser repetition rate - fast data acquisition*  
*multiple target capability - unlimited number of targets*  
*perfectly linear scan lines*  
*compact, rugged and lightweight design*  
*electrical interfaces for GPS data string and Sync Pulse (1PPS)*  
*mechanical interface for IMU mounting*  
*integrated LAN-TCP/IP interface*

The V-Line<sup>®</sup> Airborne Laser Scanner **RIEGL VQ-480** provides high speed, non-contact data acquisition using a narrow infrared laser beam and a fast line scanning mechanism. High-accuracy laser ranging is based on **RIEGL's** unique echo digitization and online waveform processing, which allows achieving superior measurement results even under adverse atmospheric conditions, and the evaluation of multiple target echoes.

The scanning mechanism is based on a fast rotating multi-facet polygonal mirror, which provides fully linear, unidirectional and parallel scan lines.

The **RIEGL VQ-480** is a very compact and lightweight scanner, mountable in any orientation and even under limited space conditions on helicopters or UAVs. The instrument needs only one power supply and provides line scan data via the integrated LAN-TCP/IP interface. The binary data stream can easily be decoded by user-designed software making use of the available software library RIVLib.

Typical applications include  
*Corridor Mapping*  
*Power Line Inspection*  
*Cultural Heritage Mapping*



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**RIEGL<sup>®</sup>**  
LASER MEASUREMENT SYSTEMS

## Laser Product Classification

Class 1 Laser Product according to IEC60825-1:2007

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 June 24, 2007.



## Range Measurement Performance

Measuring Principle

time-of-flight measurement, echo signal digitization, online waveform processing

Laser Pulse Repetition Rate PRR <sup>1)</sup>	50 kHz	100 kHz	150 kHz	200 kHz	300 kHz
Effective Measurement Rate (meas./sec) <sup>1)2)</sup>	25 000	50 000	75 000	100 000	150 000
Max. Unambiguous Measuring Range <sup>3)</sup>					
natural targets 20%	950 m	750 m	650 m	550 m	450 m
natural targets 60%	1500 m	1200 m	900 m <sup>4)</sup>	700 m <sup>4)</sup>	450 m <sup>4)</sup>
Max. Operating Flight Altitude AGL <sup>2)</sup>	750 m (2450 ft)	600 m (2000 ft)	550 m (1800 ft)	450 m (1500 ft)	350 m (1150 ft)
Max. Number of Targets per Pulse	practically unlimited (details on request)				

Minimum Range

10 m

Accuracy <sup>5)7)</sup>

25 mm

Precision <sup>6)7)</sup>

25 mm

Laser Pulse Repetition Rate PRR <sup>1)8)</sup>

up to 300 kHz

Max. Effective Measurement Rate <sup>1)</sup>

up to 150 000 meas./sec (@ 300 kHz PRR & 60° FOV)

Echo Signal Intensity

for each echo signal, high-resolution 16 bit intensity information is provided

Laser Wavelength

near infrared

Beam Divergence

0.3 mrad

Laser Beam Footprint (Gaussian Beam Definition)

31 mm @ 100 m, 75 mm @ 250 m, 150 mm @ 500 m

1) Rounded values.

2) Reflectivity 20%, ±30° FOV, additional roll angle ±5°.

3) The following conditions are assumed: target larger than the footprint of the laser beam, perpendicular angle of incidence, visibility 23 km, average ambient brightness.

4) Limited by maximum unambiguous range.

5) Accuracy is the degree of conformity of a measured quantity to its actual (true) value.

6) Precision, also called reproducibility or repeatability, is the degree to which further measurements show the same result.

7) One sigma @ 150 m range under *RIEGL* test conditions.

8) User selectable.

## Scanner Performance

Scanning Mechanism

rotating multi-facet mirror

Field of View (selectable)

60° (+30° / -30°)

Scan Speed (selectable)

10 - 100 scans/sec

Angular Step Width (selectable)  
between consecutive laser shots

0.006° 0.24°

Angle Measurement Resolution

0.001°

Internal Sync Timer

for real-time synchronized time stamping of scan data

Scan Sync (optional)

scanner rotation synchronization

## Data Interfaces

Configuration

LAN 10/100/1000 Mbit/sec

Scan Data Output

LAN 10/100/1000 Mbit/sec

GPS-System

Serial RS232 Interface for data string with GPS-time information,  
TTL input for 1 PPS synchronization pulse

## Mechanical Interfaces

Mounting of Laser Scanner

mounting plate (with 6 x M6 thread inserts)

Mounting of IMU Sensor

3 x M6 thread inserts in the bottom plate  
(rigidly coupled with the internal mechanical structure)

## General Technical Data

Power Supply Input Voltage

18 - 32 V DC

Power Consumption

typ. 65 W

Main Dimensions / Weight

192 x 345 mm (diameter x length), 9.9 kg

Humidity

max. 80% non condensing @ +31°C

Protection Class

IP64, dust and splash-proof

Max. Flight Altitude (operating)

16 500 ft (5 000 m) above MSL

Max. Flight Altitude (not operating)

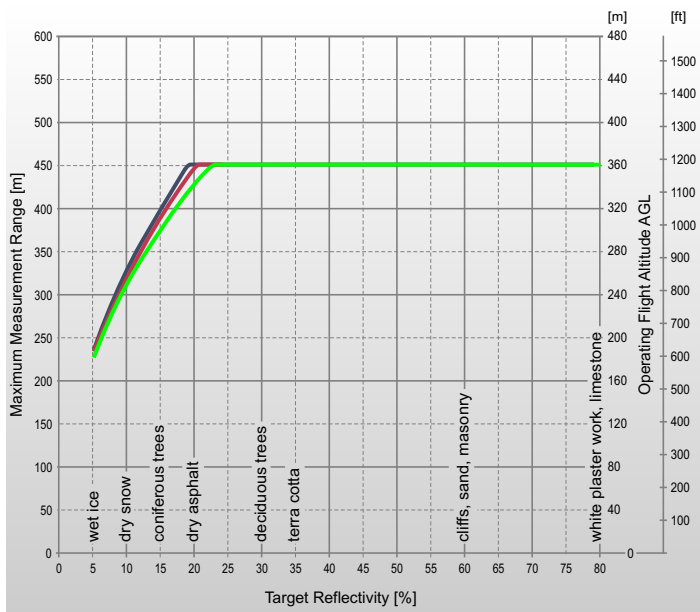
18 000 ft (5 500 m) above MSL

Temperature Range

-10 °C to +40 °C (operation) / -20 °C to +50 °C (storage)

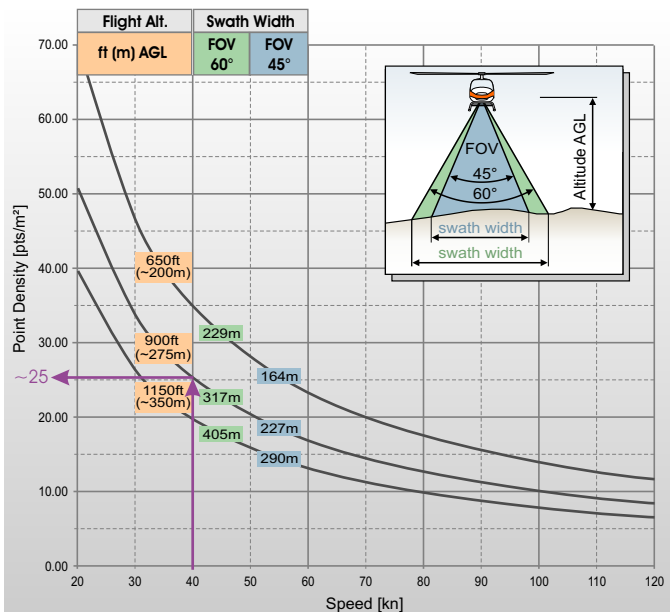
# Maximum Measurement Range & Point Density for RIEGL VQ<sup>®</sup>-480

PRR = 300 kHz



— @ visibility 23 km  
 — @ visibility 15 km  
 — @ visibility 8 km

PRR = 300 kHz

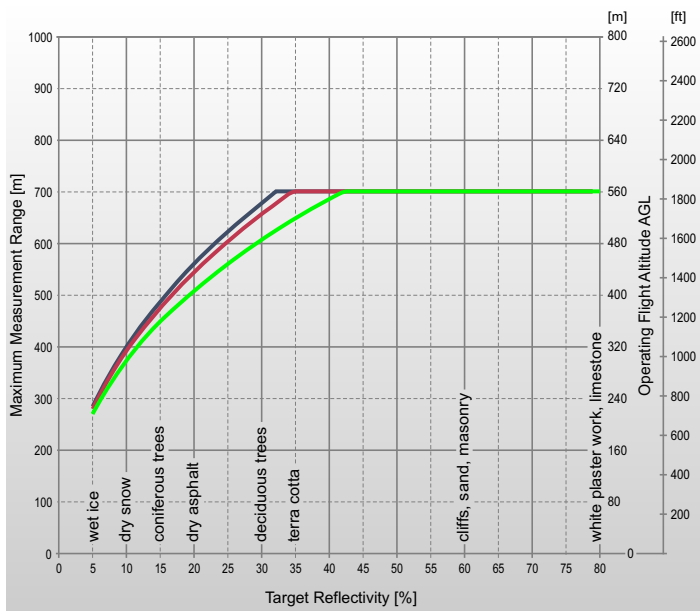


Example: VQ-480 at 300,000 pulses/second  
 Altitude = 900ft AGL, Speed = 40 kn  
 Resulting Point Density ~ 25 pts/m<sup>2</sup>

**For the Operating Flight Altitude AGL, the following conditions are assumed**

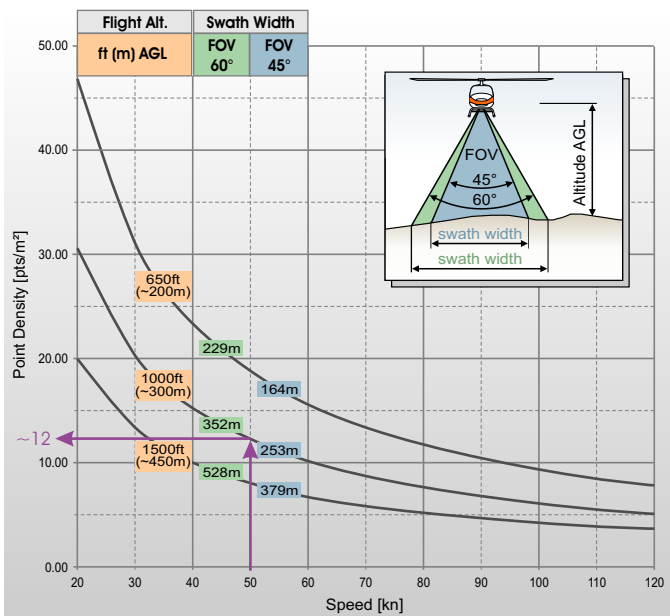
- target size laser footprint
- average ambient brightness
- scan angle 60°
- roll angle +/- 6°

PRR = 200 kHz



— @ visibility 23 km  
 — @ visibility 15 km  
 — @ visibility 8 km

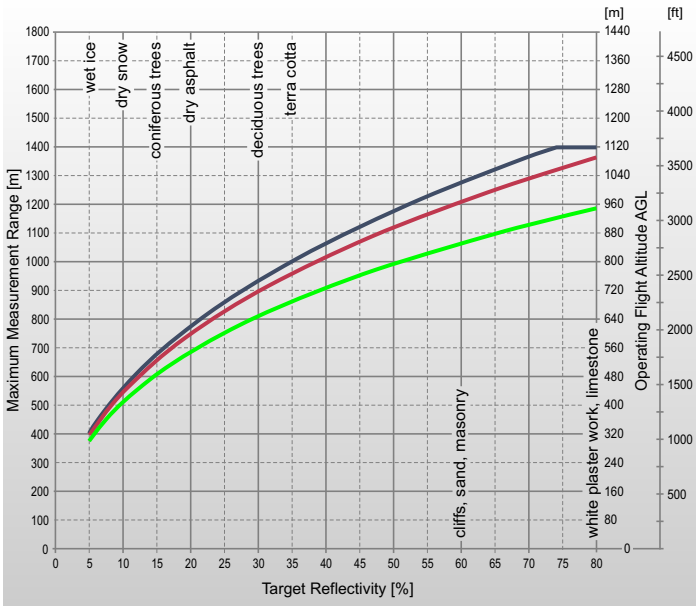
PRR = 200 kHz



Example: VQ-480 at 200,000 pulses/second  
 Altitude = 1000ft AGL, Speed = 50 kn  
 Resulting Point Density ~ 12 pts/m<sup>2</sup>

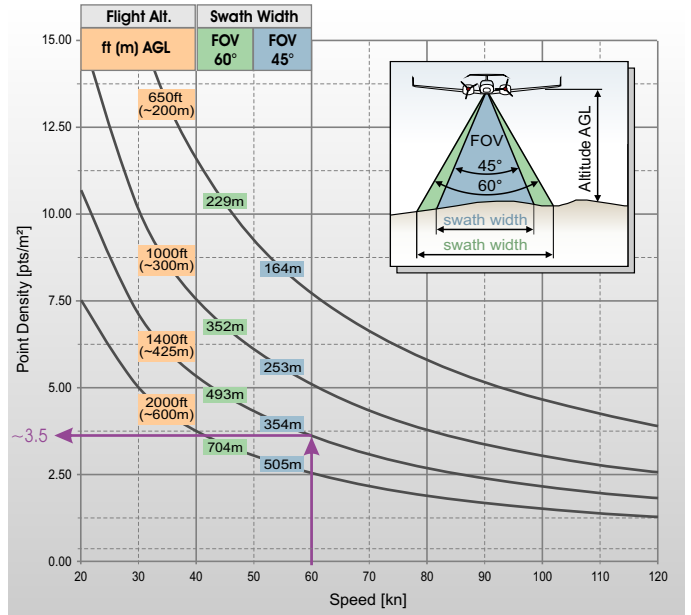
# Maximum Measurement Range & Point Density for RIEGL VQ<sup>®</sup>-480

PRR = 100 kHz



— @ visibility 23 km  
 — @ visibility 15 km  
 — @ visibility 8 km

PRR = 100 kHz

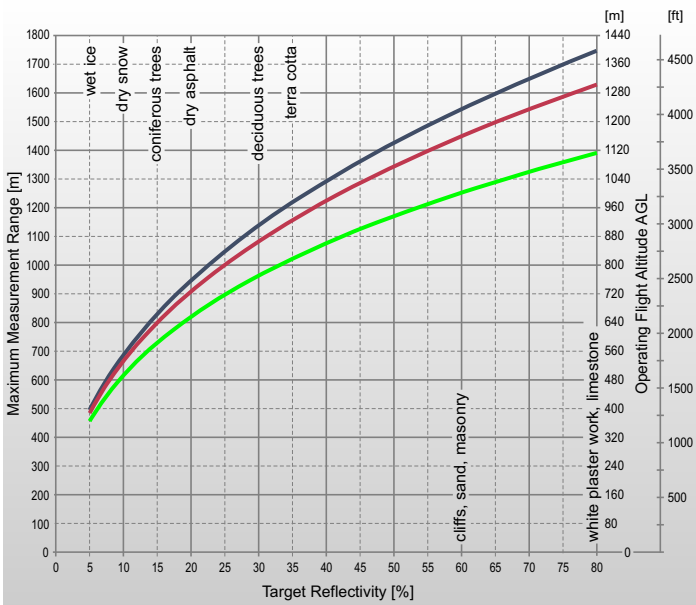


Example: VQ-480 at 100,000 pulses/second  
 Altitude = 1400ft AGL, Speed = 60 kn  
 Resulting Point Density ~ 3.5 pts/m<sup>2</sup>

**For the Operating Flight Altitude AGL, the following conditions are assumed**

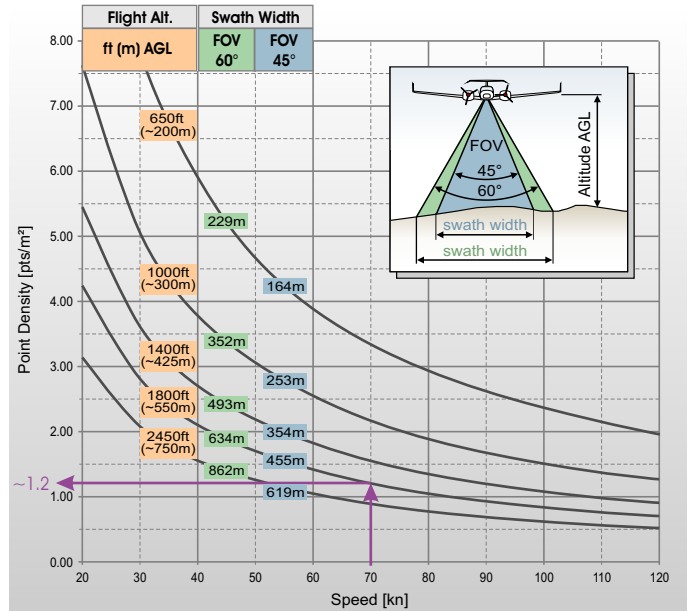
- target size laser footprint
- average ambient brightness
- scan angle 60°
- roll angle +/- 6°

PRR = 50 kHz



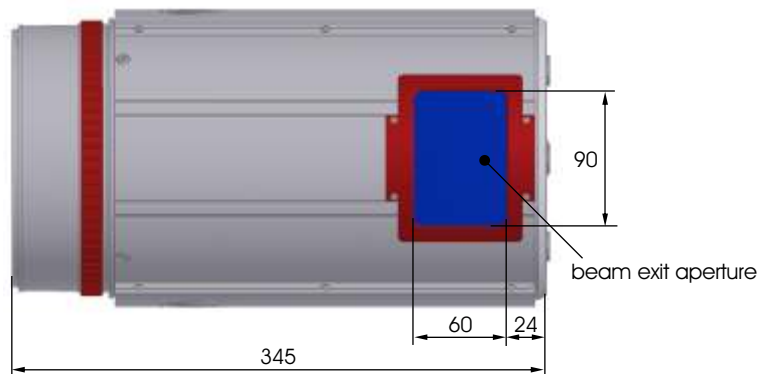
— @ visibility 23 km  
 — @ visibility 15 km  
 — @ visibility 8 km

PRR = 50 kHz

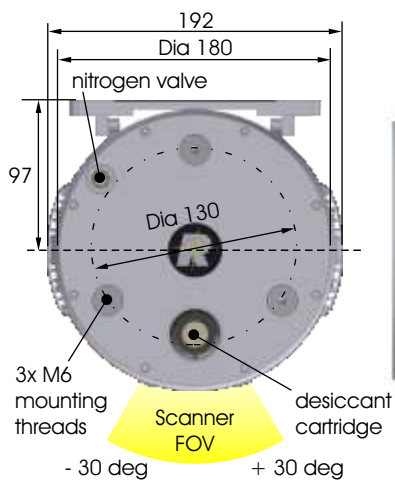


Example: VQ-480 at 50,000 pulses/second  
 Altitude = 1800ft AGL, Speed = 70 kn  
 Resulting Point Density ~ 1.2 pts/m<sup>2</sup>

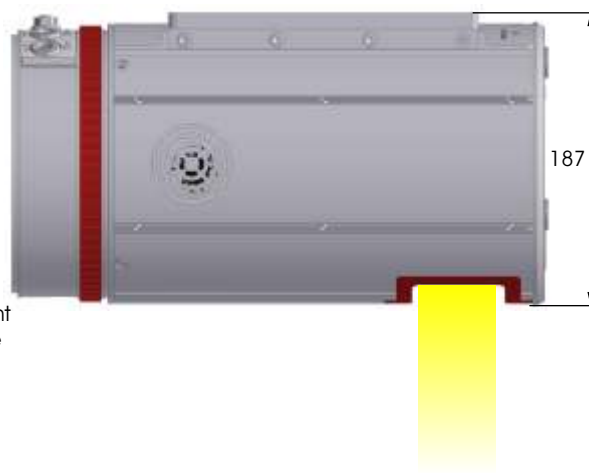
front view



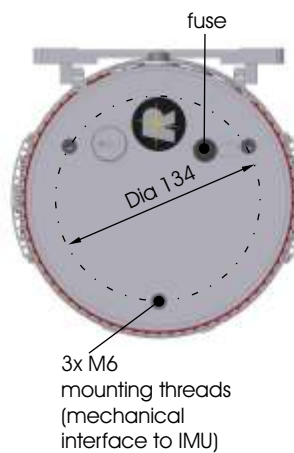
top view



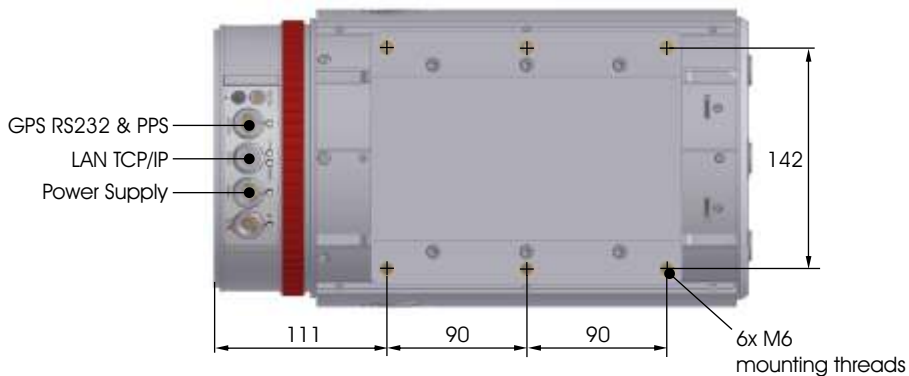
side view



bottom view



rear view



all dimensions in mm



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*RIEGL Laser Measurement Systems GmbH*, 3580 Horn, Austria  
Tel.: +43-2982-4211, Fax: +43-2982-4210, E-mail: [office@riegl.co.at](mailto:office@riegl.co.at)  
*RIEGL USA Inc.*, Orlando, Florida 32819, USA  
Tel.: +1-407-248-9927, Fax: +1-407-248-2636, E-mail: [info@rieglusa.com](mailto:info@rieglusa.com)  
*RIEGL Japan Ltd.*, Tokyo 1640013, Japan  
Tel.: +81-3-3382-7340, Fax: +81-3-3382-5843, E-mail: [info@riegl-japan.co.jp](mailto:info@riegl-japan.co.jp)

[www.riegl.com](http://www.riegl.com)