

RIEGL VQ[®]-580

- **especially designed to measure on snow & ice**
- **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[®] Airborne Laser Scanner **RIEGL VQ-580** provides high speed, non-contact data acquisition using a narrow near-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-580** 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

- **Glacier Mapping**
- **Snowfield Mapping**
- **Moist Grassland Mapping**
- **Corridor Mapping**



visit our website
www.riegl.com

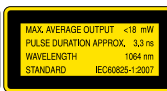


RIEGL[®]
LASER MEASUREMENT SYSTEMS

Laser Product Classification

Class 3B 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 ¹⁾	50 kHz	100 kHz	150 kHz	200 kHz	300 kHz	380 kHz
Effective Measurement Rate (meas./sec.) ^{1) 2)}	25 000	50 000	75 000	100 000	150 000	190 000
Max. Measuring Range ^{3) 4) 5)}						
natural targets $\rho \geq 20\%$	1500 m	1100 m	900 m	800 m	650 m	600 m
natural targets $\rho \geq 60\%$	2350 m	1750 m	1500 m	1300 m	1100 m	1000 m
Max. Operating Flight Altitude AGL ²⁾	1200 m 3950 ft	900 m 2950 ft	750 m 2450 ft	650 m 2150 ft	550 m 1800 ft	500 m 1650 ft
Max. Number of Targets per Pulse	practically unlimited (details on request)					

1) Rounded values.
 2) Reflectivity $\rho \geq 20\%$, $\pm 30^\circ$ FOV, additional roll angle $\pm 5^\circ$.
 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) In bright sunlight the operational range may be considerably shorter than under an overcast sky.
 5) Ambiguity to be resolved by post-processing with RIMTA software.

Minimum Range

Accuracy ^{6) 8)}

Precision ^{7) 8)}

Laser Pulse Repetition Rate ^{1) 9)}

Max. Effective Measurement Rate ¹⁾

Echo Signal Intensity

Laser Wavelength

Laser Beam Divergence

Laser Beam Footprint (Gaussian Beam Definition)

10 m

25 mm

25 mm

up to 380 kHz

up to 190 000 meas./sec. (@ 380 kHz PRR & 60° FOV)

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

near infrared

0.2 mrad

22 mm @ 100 m, 52 mm @ 250 m, 102 mm @ 500 m

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

9) User selectable.

Scanner Performance

Scanning Mechanism

Field of View (selectable)

Scan Speed (selectable)

Angular Step Width $\Delta \vartheta$ (selectable)

between consecutive laser shots

Angle Measurement Resolution

Internal Sync Timer

Scan Sync (optional)

rotating polygon mirror

$60^\circ (+30^\circ / -30^\circ)$

10 - 150 scans/sec

$0.003^\circ \leq \Delta \vartheta \leq 0.36^\circ$

0.001°

for real-time synchronized time stamping of scan data

scanner rotation synchronization

Data Interfaces

Configuration

Scan Data Output

GPS-System

LAN 10/100/1000 Mbit/sec

LAN 10/100/1000 Mbit/sec

Serial RS232 interface for data string with GPS-time information,

TTL input for 1PPS synchronization pulse

Mechanical Interfaces

Mounting of the Laser Scanner

Mounting of IMU sensor

mounting base block (with 8 x M8 thread inserts and 6x mounting slots)

3 x M6 thread inserts in the bottom and the top plate

(rigidly coupled with the internal mechanical structure)

General Technical Data

Power Supply Input Voltage

Current Consumption

Main Dimensions / Weight

Humidity

Protection Class

Max. Flight Altitude (operating)

Max. Flight Altitude (not operating)

Temperature Range

18 - 32 V DC

typ. 65 W

360.5 x 219 mm (length x width), approx. 13 kg

max. 80 % non condensing @ $+31^\circ\text{C}$

IP64, dust and splash-proof

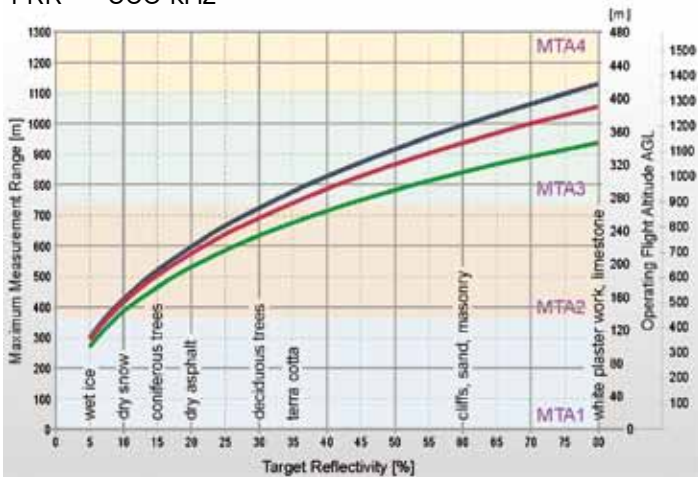
16 500 ft (5 000 m) above MSL

18 000 ft (5 500 m) above MSL

-10°C up to $+40^\circ\text{C}$ (operation) / -20°C up to $+50^\circ\text{C}$ (storage)

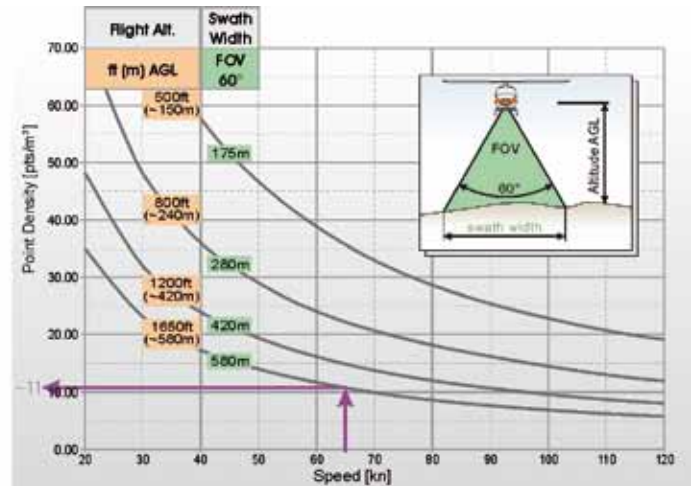
Maximum Measurement Range & Point Density for RIEGL VQ®-580

PRR = 380 kHz



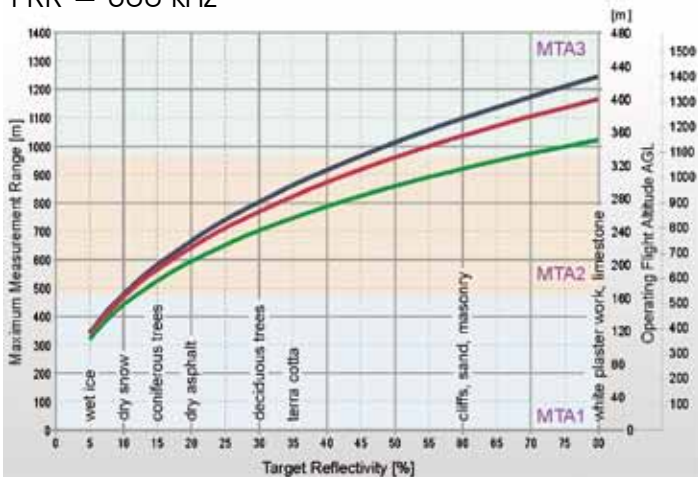
MTA1: no ambiguity / 1 pulse „in the air“
 MTA2: 2 pulses „in the air“
 MTA3: 3 pulses „in the air“
 MTA4: 4 pulses „in the air“

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



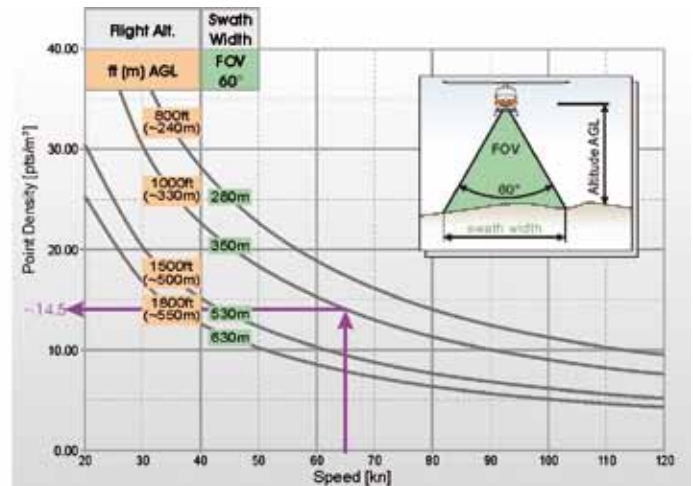
Example: VQ-580 at 380,000 pulses/second
 Altitude = 1650ft AGL, Speed = 65 kn
 Resulting Point Density ~ 11 pts/m²

PRR = 300 kHz



MTA1: no ambiguity / 1 pulse „in the air“
 MTA2: 2 pulses „in the air“
 MTA3: 3 pulses „in the air“

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

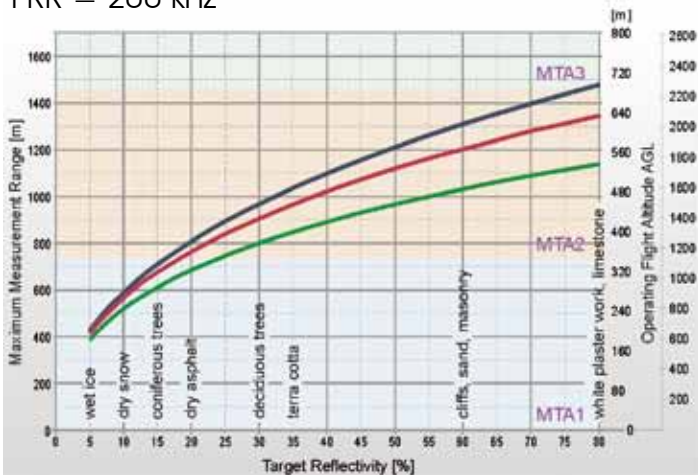


Example: VQ-580 at 300,000 pulses/second
 Altitude = 1000ft AGL, Speed = 65 kn
 Resulting Point Density ~ 14.5 pts/m²

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

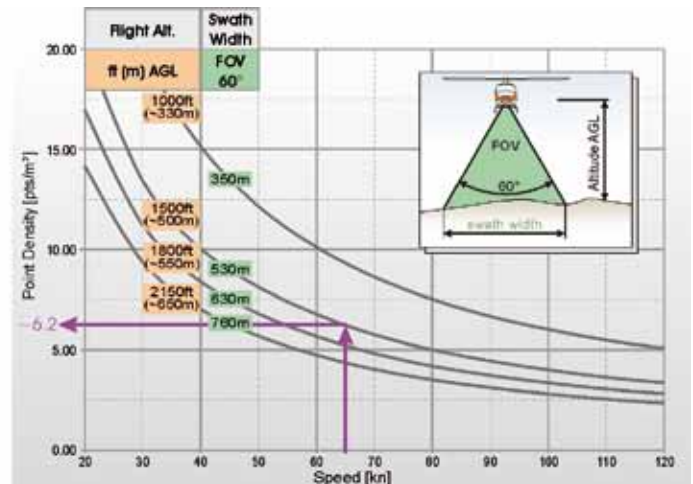
- target size \geq laser footprint
- average ambient brightness
- scan angle 60°
- roll angle +/- 6°

PRR = 200 kHz



MTA1: no ambiguity / 1 pulse „in the air“
 MTA2: 2 pulses „in the air“
 MTA3: 3 pulses „in the air“

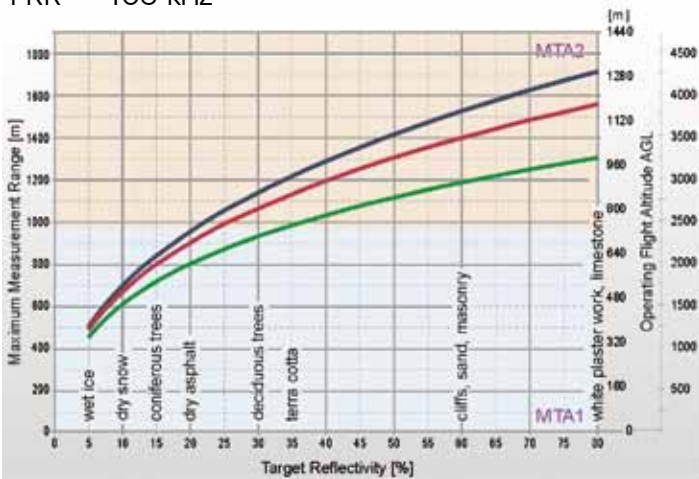
— @ visibility 23 km
 — @ visibility 15 km
 — @ visibility 8 km



Example: VQ-580 at 200,000 pulses/second
 Altitude = 1500ft AGL, Speed = 65 kn
 Resulting Point Density ~ 6.2 pts/m²

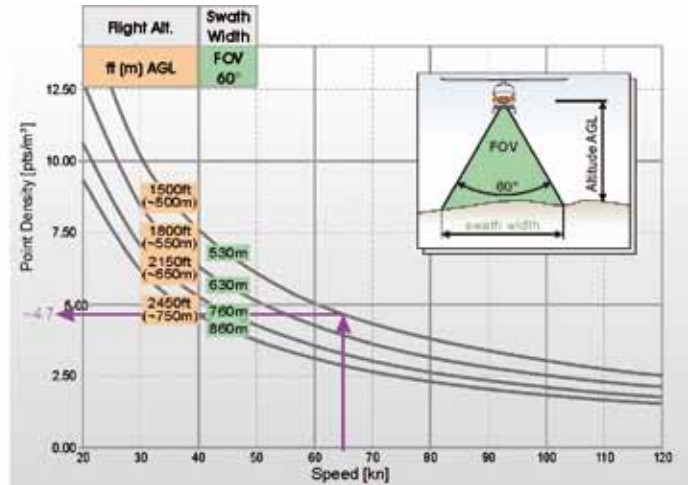
Maximum Measurement Range & Point Density for RIEGL VQ®-580

PRR = 150 kHz



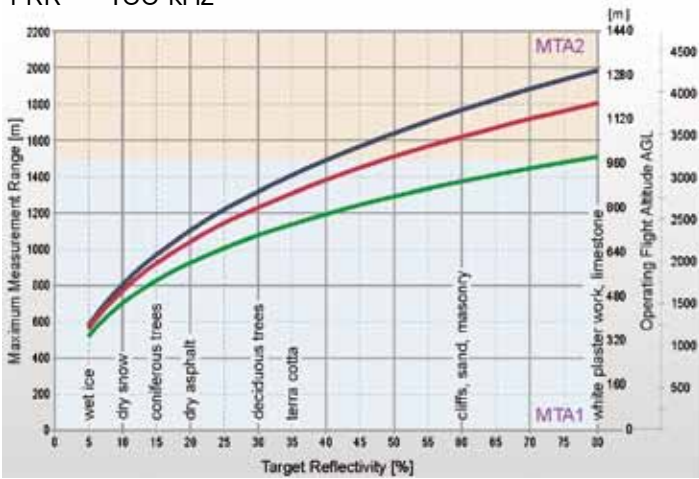
MTA1: no ambiguity / 1 pulse „in the air“
 MTA2: 2 pulses „in the air“

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



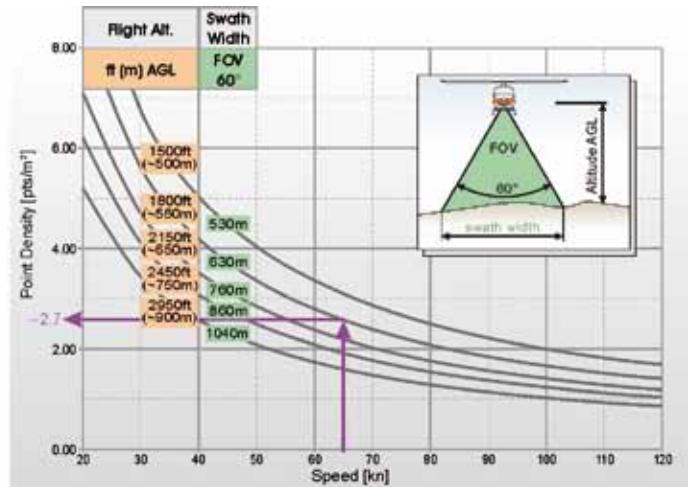
Example: VQ-580 at 150,000 pulses/second
 Altitude = 1500ft AGL, Speed = 65 kn
 Resulting Point Density ~ 4.7 pts/m²

PRR = 100 kHz



MTA1: no ambiguity / 1 pulse „in the air“
 MTA2: 2 pulses „in the air“

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

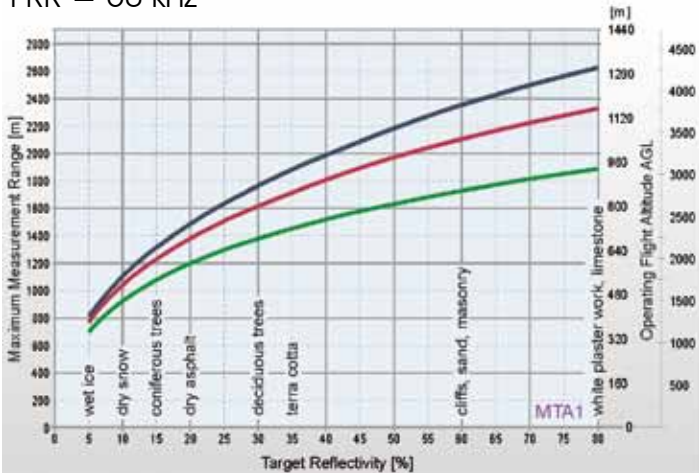


Example: VQ-580 at 100,000 pulses/second
 Altitude = 1800ft AGL, Speed = 65 kn
 Resulting Point Density ~ 2.7 pts/m²

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

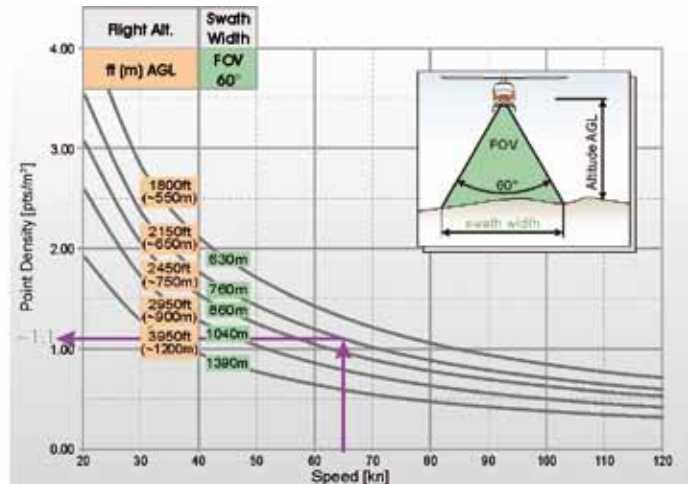
- target size ≥ laser footprint
- average ambient brightness
- scan angle 60°
- roll angle +/- 6°

PRR = 50 kHz



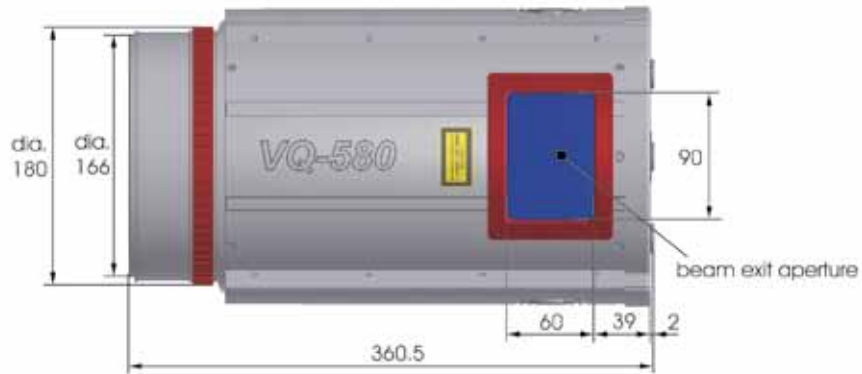
MTA1: no ambiguity / 1 pulse „in the air“

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

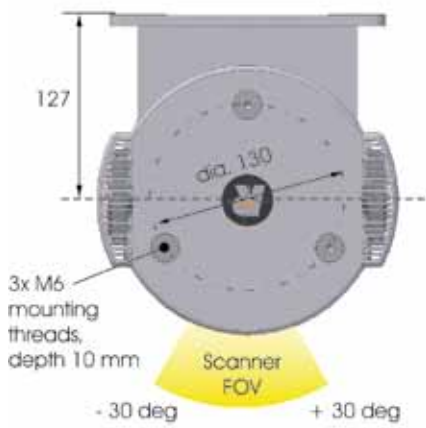


Example: VQ-580 at 50,000 pulses/second
 Altitude = 2150ft AGL, Speed = 65 kn
 Resulting Point Density ~ 1.1 pts/m²

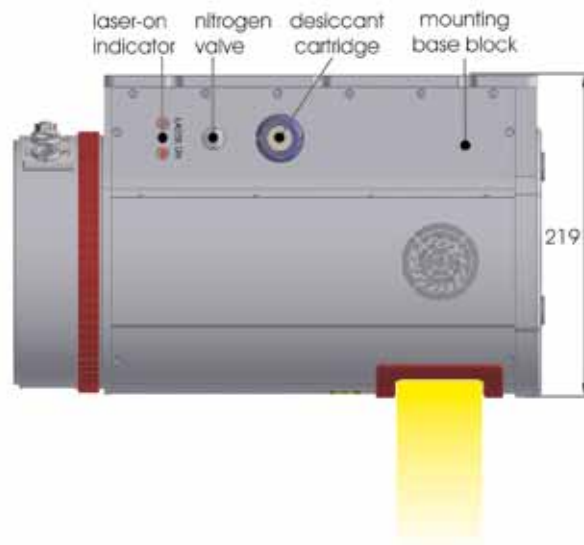
front view



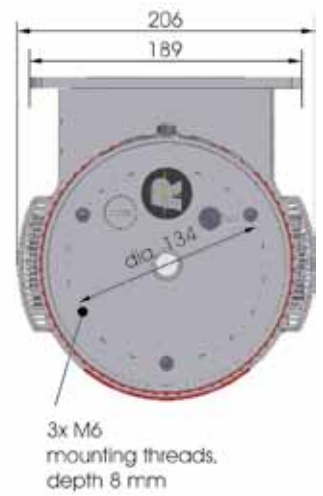
top view



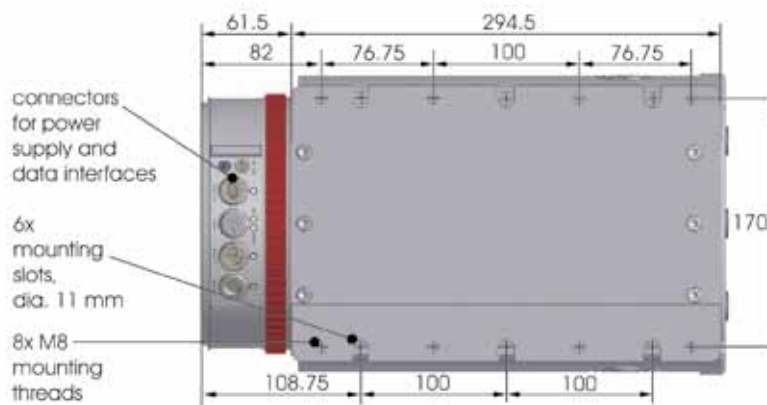
side view



bottom view



rear view



all dimensions in mm



RIEGL[®]
LASER MEASUREMENT SYSTEMS

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