

RIEGL VZ-400

*very high speed data acquisition
wide field-of-view, controllable
while scanning
high-accuracy, high-precision
ranging based on echo digitization
and online waveform analysis
multiple target capability
superior measurement capability in
adverse atmospheric conditions
high-precision mounting pads for
optional digital camera
integrated inclination sensors and
laser plummet
integrated GPS receiver
with antenna
various interfaces (LAN,
WLAN, USB 2.0)
internal data storage
capability*

The new **RIEGL VZ-400** 3D Terrestrial Laser Scanner provides high speed, non-contact data acquisition using a narrow infrared laser beam and a fast scanning mechanism. High-accuracy laser ranging is based upon **RIEGL's** unique echo digitization and online waveform analysis, which allows achieving superior measurement capability even under adverse atmospheric conditions and the evaluation of multiple target echoes.

The line scanning mechanism is based upon a fast rotating multi-facet polygonal mirror, which provides fully linear, unidirectional and parallel scan lines. The **RIEGL VZ-400** is a very compact and lightweight surveying instrument, mountable in any orientation and even under limited space conditions.

Modes of Operation

*stand-alone data acquisition without the need of a notebook, basic configuration and commanding via the built-in user interface
remote operation via RISCAN PRO on a notebook, connected either via LAN interface or integrated WLAN
well-documented command interface for smooth integration into mobile laser scanning systems
Interfacing to Post Processing Software*

User Interfaces

*integrated Human-Machine Interface (HMI)
for stand-alone operation without computer
high-resolution 3,5" TFT color display, 320 x 240 pixel,
scratch resistant cover glass with anti-reflection coating
and multi-lingual menu
water and dirt resistant key pad with large buttons
for instrument control
loudspeaker for audible signaling of messages by voice*

As-Built Surveying
Architecture & Facade Measurement
Archaeology & Cultural Heritage Documentation
City Modelling
Tunnel Surveying
Civil Engineering

visit our webpage
www.riegl.com



RIEGL
LASER MEASUREMENT SYSTEMS

System Configuration



Scanner Hardware RIEGL VZ-400

allows high-speed, high resolution and accurate 3D measurements

Range up to 500 m @ Laser Class 1
Repeatability 5 mm
Measurement rate up to 125 000 measurements/sec
Field of View up to 100° x 360°
LAN/WLAN data interface, easily allowing wireless data transmission
Operated by any standard PC or Notebook or cable less
Fully portable, rugged & robust

Software RiSCAN PRO

RIEGL software package for scanner operation and data processing

Data archiving using a well-documented tree structure in XML file format
Object VIEW / INSPECTOR for intelligent data viewing and feature extraction
Straightforward Global Registration
Interfacing to Post Processing Software



Digital Camera (optional)

provides high resolution calibrated color images

NIKON D700, NIKON D300(s), NIKON D200
- D300(s): 12.3 Megapixel
- D700: 12.1 Megapixel, Nikon FX format
- D200: 10.2 Megapixel
- USB interface

Mounting device with digital camera can be easily fixed by means of two knurled head screws. Precise position and orientation is provided by three supporting points.

The combination of the key components Scanner, Software and Camera results in

- Automatic generation of high resolution textured meshes
- Photorealistic 3D reconstruction
- Exact identification of details
- Online position and distance measurements
- Online setting of any virtual point of view

Global Scan Position Registration



Stand-alone Registration

integrated GPS receiver (L1), up to 2.5 m accuracy
integrated biaxial inclination sensors (tilt range $\pm 10^\circ$, accuracy typ. $\pm 0.008^\circ$)
RiSCAN PRO Processing and Multistation Adjustment Module (MSA)

Registration via control points

precise and fast fine scanning of retro-reflectors
RiSCAN PRO Processing

Totalstation-like-Registration

setup above well known point (integrated laser plummet)
integrated inclination sensors
precise fine scanning of well known remote target (reflector)
RiSCAN PRO Processing Backsighting function

Operating Elements and Connectors



WLAN antenna

Carrying handles

High-resolution color TFT display

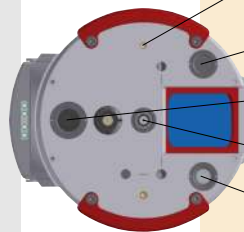
Key pad for instrument control

Connectors for power supply and LAN interface 10/100 MBit/sec, power off/on button

Communication and Interfaces

LAN interface 10/100/1000 MBit/sec within rotating head
 LAN interface 10/100 MBit/sec within base
 integrated WLAN interface with rod antenna
 USB 2.0 for external storage devices (USB flash drives, external HDD)
 USB 2.0 for connecting the optional digital camera
 connector for GPS antenna
 two connectors for external power supply
 connector for external GPS synchronization pulse (1PPS)

TOP VIEW



Mounting points for digital camera (2x)

Connector for GPS antenna (optional)

USB connector for digital camera

Connector for GPS antenna

Connector for WLAN antenna

USB 2.0 slot for external memory devices

Scan Data Storage

internal 8 GByte flash memory
 external storage devices (USB flash drives or external hard drives) via USB 2.0 interface



LAN 10/100/1000 MBit/sec, for rapid download of scan data

Power Supply



Add-on rechargeable battery

optional add-on rechargeable battery pack (high power, high capacity NiMH cells)
 compact slim disc design, short-circuit-proof and protected connection pins
 rechargeable during standard scan operation via external power supply
 integrated micro-controller based charging electronics
 easily pluggable to base of the laser scanner by central locking screw
 DC voltage source (11-32 V DC) sufficient for recharging

External power supply

Intelligent power supply management (up to three independent external power sources can be connected simultaneously for uninterrupted operation)
 Reliable under- and over voltage protection
 Wide external voltage supply range 11-32 V DC
 LED indicators for power status



Technical Data 3D Scanner Hardware *RIEGL* VZ-400

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 July 26, 2001.



Rangefinder Performance¹⁾

	Long Range Mode	High Speed Mode
Laser PRR (Peak) ²⁾	100 kHz	300 kHz
Effective Measurement Rate ²⁾	42 000 meas./sec	125 000 meas./sec
Max. Measurement Range ³⁾ for natural targets 80% for natural targets 10%	500 m 160 m	300 m 100 m
Max. Number of Targets per Pulse	practically unlimited ⁴⁾	practically unlimited ⁴⁾
Accuracy ^{5) 7)}	5 mm	5 mm
Precision ^{6) 7)}	3 mm	3 mm

Minimum Range
Laser Wavelength
Beam Divergence⁸⁾

1.5 m
near infrared
0.3 mrad

1) with online waveform analysis

2) rounded values

3) Typical values for average conditions. Maximum range is specified for flat targets with size in excess of the laser beam diameter, perpendicular angle of incidence, and for atmospheric visibility in excess of 23 km. In bright sunlight, the operational range is considerably shorter than under an overcast sky.

4) details on request

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 @ 100 m range under *RIEGL* test conditions.

8) 0.3 mrad correspond to 30 mm increase of beamwidth per 100 m of range.

Scanner Performance

Vertical (Line) Scan

Scan Angle Range

Scanning Mechanism

Scan Speed

Angular Stepwidth⁹⁾

between consecutive laser shots

Angle Measurement Resolution

total 100° (+60° / -40°)

rotating multi-facet mirror

3 lines/sec to 120 lines/sec

0.0024° 0.288°

better 0.0005° (1.8 arcsec)

Horizontal (Frame) Scan

Scan Angle Range

Scanning Mechanism

Scan Speed¹⁰⁾

Angular Stepwidth⁹⁾

between consecutive scan lines

Angle Measurement Resolution

max. 360°

rotating head

0°/sec to 60°/sec

0.0024° 0.5°

better 0.0005° (1.8 arcsec)

Inclination Sensors

Internal Sync Timer

integrated, for vertical scanner setup position

integrated real-time synchronized time stamping of scan data

9) selectable

10) frame scan can be disabled, providing 2D operation

General Technical Data

Interfaces

Data Storage

Power Supply Input Voltage

Power Consumption

Main Dimensions

Weight

Temperature Range

Protection Class

LAN, 10/100/1000 MBit/sec within head

LAN, 10/100 MBit/sec, integrated WLAN

USB 2.0

internal 8 GByte flash memory

11 - 32 V DC

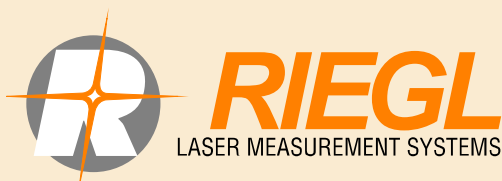
typ. 65 W

308 mm x 180 mm (length x diameter)

9.8 kg

0°C to +40°C (operation), -10°C to +50°C (storage)

IP64, dust and splash-proof



RIEGL Laser Measurement Systems GmbH, A-3580 Horn, Austria
Tel.: +43-2982-4211, Fax: +43-2982-4210, E-mail: 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

RIEGL Japan Ltd., Tokyo 1640013, Japan
Tel.: +81-3-3382-7340, Fax: +81-3-3382-5843, E-mail: info@riegl-japan.co.jp

www.riegl.com