

## **3D Laser Scanner**

## VS1000 User Manual





### **1 VS1000 Introduction**

VS1000 3D Laser Scanner based on pulses ranging principle, could quick acquire massive point cloud data from the complex geometry of the scene, can be used in engineering surveying, urban building surveying, topographic mapping, mining, deformation monitoring, factory / large structures / pipeline design, aircraft and ships manufacturing, road and rail construction, tunneling, bridge reconstruction, water conservancy, airport and port engineering and other fields.

Through an external full- frame camera Canon 5D Mark II, which can get the point cloud and image data from the measured object in each surveying. VS1000 Field-of-View up to  $360 \circ x \ 100 \circ$ , angle control precision 5 ", the effective measuring distance 600m, Data acquisition speed of up to 36,000 points / sec, point accuracy  $\pm 1.2$ mm @ 50m, distance measurement accuracy  $\pm 50$ mm, 7- inch touch screen control, reserved data communication and memory interface.

Also has WiFi hotspot functionality, could be remotely controlled via tablet PC, PDA or smart phone, could be operated easily in outdoors. The work organization, data storage checking and files output will be convenient, it's suitable for variety of field data collection. It's the ideal tool for field topography measurement data acquisition, with excellent value for money, suitable for batch using for each corporation.

For the convenience of customers using, We provide point cloud processing software Cloud Processor, which developed based on the Windows platform, supporting large data management, intelligent editing, multi-station stitching and color matching, 3D modeling, DSM, DTM, DEM, special effects production. It provide a comprehensive solution for fast 3D scene reconstruction, roaming, virtual reality and visual simulation.

### 1.1 VS1000 Presentation



- Effective measuring distance up to 1000 m
- Class I Infrared Laser
- ♦ Field-of-View up to 360 °x 100 °
- Data acquisition speed of up to 36,000 points / sec
- ♦ Built-in 32G SD card
- Built-in tilt compensation
- Built-in GPS positioning system
- Built-in lithium battery working duration over 8 hours
- External million pixel digital camera
- Optional PDA, tablet computer manipulation (WiFi)



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### **1.2 Specifications**

Instrument Type	Pulsed, High-speed, Long distance 3D laser scanner			
Camera	External Canon 5D Mark II			
Туре	VS1000			
		Position	±1.2mm@50m	
Accuracy of single measurement(50m)	Accuracy of single measurement(50m) Distance		±50mm	
Angle(horizontal/vertical)		norizontal/vertical)	5″	
	Туре		Pulsed	
Wavelength       Laser Scanning       Laser Class		Wavelength	905nm	
		Laser Class	Class I ( EN60825-1 )	
System	Range		1200m@90% 600m@18%	
	<b>G</b> (	Highest rate	36,000pts/sec	
	Scan rate	Average rate	Based on the scanning density and range	
	Bea	am divergence	1.9 mrad	
Scanning density	Optional		Points resolution can be selected independently of the horizontal and	
Seaming density			vertical directions	
	Angle (hor	control accuracy izontal/vertical)	2"	
Field_of_View		Horizontal	360 °(maximum)	
Theid-of-view		Vertical	100 °(maximum)	
Scanning Optic		tic	Vertically rotating mirror on horizontally rotating base;	
	eening op		Automatically spins or oscillates for minimum scan time	
Data storage capacity		pacity	32GB SD Card	
External Camera		nera	single image 100 °×100 °. 21 megapixels(2592 x1944) Full 360 ° x 100 ° dome:14 images	
Onboard display		lay	Touch screen control,	
प्र	emote Con	rol	WiFi	
Instrument	t position an	d alignment	Laser alignment and GPS positioning (optional RTK)	
I	Level indica	tor	External bubble	



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		Built-in high accuracy tilt sensor, automatic compensation	
	Power supply	24V DC ( Built-in lithium battery )	
Power	Power consumption	<35W	
	Duration	>8 h (room temp)	
Environmental	Operating temp.	$0^{\circ}$ C to $+40^{\circ}$ C	
	Storage temp.	-25°C to +65°C	
	Lighting	Fully operational between bright sunlight and complete darkness	
	Humidity	Non-condensing atmospheric state	
	Dust/humidity	IP55	

#### 1.3 Accessories & Instrument Mounting

#### 1.3.1 Accessories

When you open the instrument case, check and make sure the instrument and accessories are complete. Instrument box shall have the following items: ①3D Scanner; ②32GB SD card; ③ Base with laser shaft alignment ; ④ Camera mounting bracket; ⑤Wifi antenna; ⑥GPS antenna & supporting rod; ⑦Battery Charger; ⑧Networking cable; ⑨ waterproof cap; ⑩DC-Points Software. Optional Canon 5D Mark II camera, camera bag placed alone.

#### **1.3.2 Instrument Mounting**

The instrument should be Mounted on special three tripod for surveying and mapping, Leveled & alignment before measurement, with the following steps: ①Press and hold the switch with more than 2 seconds, the alignment laser will activation, red laser speckle on the ground will be visible; ②Adjust the base knob to make the round vesicular in center, adjust the laser speckle to the ground point at the same time ;③The laser will shut down in one minute automatically, ready for the normal measurement.

### **2** Working Interface Introduction

Boot: Press and hold the power switch for more than 3 seconds, the screen lights up, wait for the system to start, then inserting the SD card(support 4GB, 8GB, 16GB,32GB or 64GB), or insert the SD card firstly and then boot.

### 2.1 Interface



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	nde haar een die aan daar waard die heer die
	进入主页进行设置

Click "Enter the home page..." into the home page for scanning setting and management.

工程:	Project1	Resolution_100	
		V:	0.01°-360°(0.1°)
站点位置:	ScanPos001	H:	30°-130°(0.1°)
		Point Distance:	0.1745m(100m)
扫描模式:	Resolution_100	Scan Time:	0:21:36
		开始扫描>>	

2.2 "Home Page" ——Main Interface

This interface display the settings of the project name, site name, scan mode and other information, "Photo" Button for the camera setting, "Setting" Button for the system setting, "Modes" Button for the corre

This interface display the default scanning modes and the user can edit scanning modes:

Fine Scan——Single point scanning mode, just record the measured point distance and reflectance information;

Line Scan—Line scanning mode, record scanning data point line;

Overview——Overview scanning mode, the default full field high-speed scanning;

Resolution\_25----0.025 degree angular resolution full field scanning;

Resolution\_50---0.050 degree angular resolution full field scanning;

Resolution\_75——0.075 degree angular resolution full field scanning;

Resolution\_100--0.100 degree angular resolution full field scanning;

Rectangle——Scanning range and angular resolution editable for scanning.

### 2.2.2 Rectangle Scanning Mode



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扫描模式	
矩形扫描	
垂直方向开始[°]:	0.01
垂直方向停止[°]:	360.00
垂直分辨率[°]:	0.1
水平方向开始[°]:	30.00
水平方向停止[°]:	130.00
水平分辨率[°]:	0.1
预计时间:	0:21:35
主页	保存返回

The scanning range and the angular resolution for user setting.

### 2.3 Setting- Main Menu

工程&扫描设置	状态	
仪器位置设置	文件浏览	]
系统设置	扫描模式详情	
辅助设备		\$
主页	帮助	返回

Main menu include: "Project&Scanning Setting...", "Position Setting...", "System Setting...", "Auxiliary Equipment...", "Status...", "File Browser..." & "Scanning Mode Details...".

### 2.3.1 Project & Scanning Setting

工程&扫描设置	
工程名:	Project1
无线网:	ON
日志文件:	ON
最小距离启动:	OFF
最小范围[m]:	1.5
位置自动估计:	OFF
图像获取:	ON
主页	确定

"Project &Scanning Setting" page for the management of project, wireless network, log files, position and camera.

#### 2.3.2 Position Setting



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"**Position Setting**" page for the origin position setting of scanner, choosing "Auto" setting the origin position automatically rely on internal tilt sensor and GPS board or choosing "Input" manual input the GPS coordinate and tilt data.

Choose "Auto" or "Input", Click "Setting" button, enter the page "Position Estimation" or "Position Setting".

仪器位置估计			
	GPS位	置	
经度	E :	•]	
纬度	E	٩]	
高度	E Constanti de la constanti de		
	HMS	iL	
航向	11		
横滚	Ē:	460802	
俯仰	1:	0.26	
主页		保存配置 返回	

Automatic Position Setting

CIII.					
		输入GPS	位置		
2	준度:			•	
ŧ	韦度:			0	
10	6度:				
		HMSI	-		
角	亢向:				
ŧ	<b>黄滚:</b>				
ť	府仰:				
主页			确定		返回
	4	经度: 经度: 病度: 高度: 航向: 横滚: 備液: 備你: 主页	・ 後入GPS	输入GPS位置 经度:	输入CPS位置       经度:     •       纬度:     •       高度:     •       航向:     •       横凉:     •       備仲:     •

Input the GPS coordinate and tilt data

### 2.3.3 System Setting

系统菜单	
网络&无线网	日期&时间
版本&型号信息	电源管理
扫描仪信息	系统维护
界面设置	
	2
主页重置	关机 返回

"System Setting" page include: "Network&Wireless...", "Version&Type Information...", "Scanner Information...", "Interface Setting...", "Date & Time Setting...", "Power Management...", "System Update...". Although include the



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"Reset" and "Shut" buttons.

bps)			面设置	
			通田・	
配置:	DHCP_SERVER		西·····	<u>д</u> ф. т.
IP地址:	192.168.0.103			TX P
IP子网掩码:	255.255.255.0		拼'保时'[l][S]:	300
IP网关:	192.168.0.1		预览最小反射率:	-250
设备编号:	\$99900001		时间日期设置 日期:	2013-9-25
型号:	VS1000		时[日]:	10:10:46
修改:	NONE		时区:	PRC
固件:	40.xx.1.42		自动测量开始时间间隔[s]:	00:00:10
3.3 Scanner In 2.25年 2.25 2.55 2.5	nformation \$99900001 V\$1000 NONE 40.xx.1.42 Brancher,r5207		2.3.3.6 Power Mai	nagement
3.3 Scanner Lo 3.5 2.5 2.5 2.5 2.5 2.5 2.5 2.5 2.5 2.5 2	nformation  S99900001 VS1000 NONE 40.xx1.42 Brancher,r5207 1.4.4.3.207P70		2.3.3.6 Power Mai 3.3.3.7 System U	nagement Jpdate
3 Scanner In 時	nformation	-	2.3.3.6 Power Mar	nagement

In "**System Setting**" page the IP address, Language, Screensaver Time, Date&Time can be set, Version, Type and Scanner Information can be looked up, and also include the Power Management and System Update.

### 2.3.4 Auxiliary Equipment

辅助设备	
GPS	
相机	
可充电电池	
	\$
主页	帮助 返回

"Auxiliary Equipment" page for the management of internal GPS, Camera and Battery.



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GPS		相机				
基础数据:						
GPS模式:	INTERNAL GPS		相机:	< D	90 >	
同步状态:	失败		校验:	C	N	
经度:	٥]		图像获取:	C	N	
纬度:	٩		图像重叠率(01):	0.	05	
高度:			HDR	影像 -	\$	
扩展数据:		•	1.010	<i>w</i> px		
精度:	2m					
卫星:						
水平偏差:						
垂直偏差:						
主页	返回	主页	图像	校验	适	ÍD

Internal GPS Data

Manage the Camera

### 2.3.5 Status

状态			
	温度[℃]:	+37.5	
	电压[V]:	23.48	
	电量[%]:	50	
	错误:	0	Þ
	储存到:	INTERN	N
	连接:	WLAN开启	
_			
	主页错误详情	返回	

"Status" page, Scanner working state can be looked up.

### 2.3.6 File Browser

查找	/home/yzx/workdir/qt/\	/S1000_omap	<u> </u>	)
Co…	ies res	fullScreenWidget.o	📄 main.o	n
📷 root	ColorTable2.h	📄 global.h	mainwindow.cpp	n
	config_init	📄 if.h	📄 mainwindow.h	n
	custom_dialog.cpp	inputmethod.cpp	📄 mainwindow.o	n
	custom_dialog.h	inputmethod.h	Makefile	n
	custom_dialog.o	inputmethod.o	📄 moc_custom_dialog.cpp	n
	📄 📄 dpram.h	keyboard.cpp	📄 moc_custom_dialog.o 📄	n
	fileViewer.cpp	keyboard.h	📄 moc_fileViewer.cpp 🛛 🔓 📄	n
	fileViewer.h	keyboard.o	moc_fileViewer.o	n
	fileViewer.o	📄 keyboard.ui	📄 moc_fullScreenWidget.cpp 📄	p
	fullScreenWidget.cpp	language	moc_fullScreenWidget.o	p
	fullScreenWidget.h	main.cpp	moc_inputmethod.cpp	p
	a			D
文件名			确定	
文件类型	All Files (*)			

"File Browser" page, view the scanned engineering documents.

### 2.3.7 Scanning Mode Details



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选择放大 放大 详储

"Scanning Mode Details" page, view the last scanning data.

### **3 Quick start**

a. Set project name, Home page "Setting" - "Project &Scanning Setting..." -Project Name (Default Project1) -"OK";

b. Set Scan Position name, Home page "New" -Set Scan Position name (Default ScanPos001);

c. Choose the Scanning Mode, Home page "Modes" -Choose or Set the Scanning Mode- "OK" ;

d. Choose the Camera (Optional), Home page "Photo" - "Image acquisition: ON" - "Home" 或"Back";

e. Choose GPS Position (Optional), Home page "Setting" - "Position Setting..." -

Choose "Auto" - "Setting" - enter the page "Position Estimation" - "Save configuration" ;

Choose "Input" - "Setting" - enter the page "Position Setting" - Input the GPS coordinate and tilt data;

f. Back to Home page, Click "Start>>", start scanning, if choose the camera, camera will work after scanning;

g. After complete scanning, area can be selected on the touch screen for fine scanning.