

# FiX1

## Fixed Installation Scanner



The Fixed Installation Scanner (FiX1) from Carlson provides a simple, automated method for obtaining volumetric data of stockpiles in many different installation scenarios. The system can be scheduled to scan, process and deliver a result without any user intervention. With remote connectivity through Cellular and Wi-Fi networks, the FiX1 can be permanently installed into inaccessible areas. It can be left to carry out volumetric scans that are triggered manually or by a user-defined schedule.

Several FiX1 units can be configured into a single system. One unit acts as the HUB, with multiple spokes connected to it. All the spokes are accessed and controlled through the HUB unit.

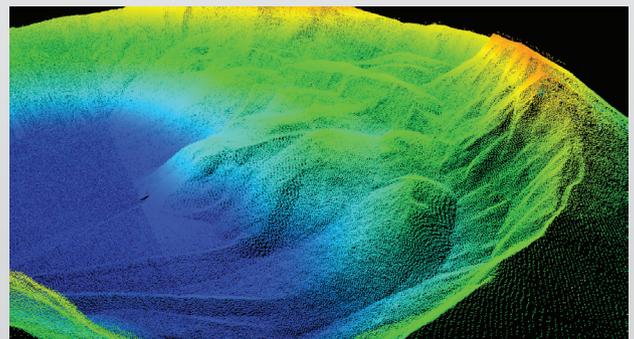
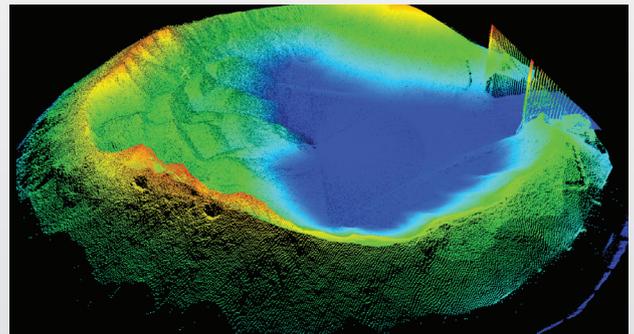
The FiX1 is not limited to volumetric data. At its simplest, it will output a volume at the end of any scan. However, it also stores a timestamped archive of the collected point clouds which can be downloaded via the numerous connection options. This allows the FiX1 to be used as a standard laser scanner.

## Advantages

- Automated delivery of volumetric data
- Provides stockpile volume information or detailed scans in geographically remote areas without assigning manpower and measurement tools
- After installation, no knowledge of surveying, data processing or point cloud manipulation is required by users
- Improves safety by removing the need for personnel on the ground in potentially hazardous areas, such as quarries or open pit mining
- Identify trends in material stockpiling or usage
- Multiple units can be connected in a network to allow the monitoring of large stockpiles or distinct unrelated locations within a site
- Resolution of scans can be adjusted to meet time requirements. A fast, low-resolution scan can be completed in 5 mins. Slower, high-resolution scans can take 25 minutes
- Versatile mounting plate supplied for easy installation
- Options to mount the unit hanging down or sat upright
- Serial and USB ports provide opportunities to interface with external sensors for more advanced configurations
- Rugged design for durability in extreme conditions:
  - IP67
  - Temperature range of -40°C to +50°C

## How it works – System

- The FiX1 instrument is accessed through a user interface, the FiX1 Web UI, across three connectivity options: Cellular, Wi-Fi and Ethernet.
- The FiX1 Web UI presents a complete history of scans and volumes that the user can download if required.
- Scheduled scans can report completion and volumetric results via email and SMS.
- The FiX1 Web UI provides access to all settings and diagnostics such as scheduling of scans, system performance, laser and motor configurations.
- Fault reporting can be accessed through the FiX1 Web UI and email alerts.
- Updates to the FiX1 Web UI are automatically deployed.
- In multiple system configurations, the HUB provides the connection to all networked systems so that they can be configured and accessed through a single interface.



### FiX1 Web UI on the Carlson RT4

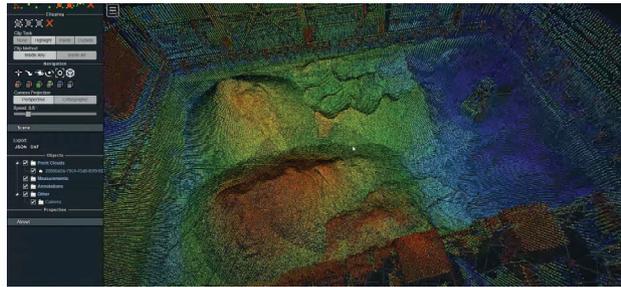
Manage settings, diagnostics, scan scheduling, and view performance over three connectivity options:

- Cellular
- Wi-Fi
- Ethernet



## How it works – Volumetric Data

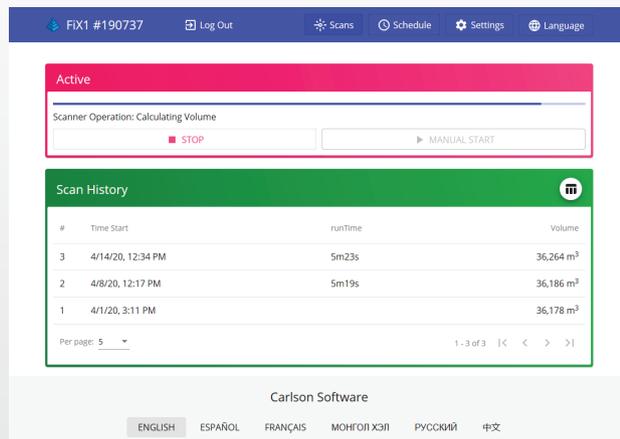
- If a volumetric scan is activated the FiX1 Web UI will generate a point cloud, extract the region of interest and automatically calculate the volume of material in that area. The volume is presented to the user through the UI without the need for any user intervention.
- Volumes can be verified by examining the linked point cloud data for foreign objects and anomalies.
- Scan density and coverage can be user-defined through the setting of laser and angle resolutions in the FiX1 Web UI.
- The FiX1 Web UI provides a graphical representation of how volumes have changed over time.
- Data for a multiple FiX1 systems is automatically stitched together based on references created during installation and therefore a total volume can be calculated without the need for manual intervention.



Instant scan review in the FiX1 Web UI

## How it Works – Laser Scanning

- Pre-existing base data can be uploaded to provide a geo-referenced 'floor' from which to compute volumes.
- Survey in the FiX1 during installation to ensure collected scan data is matched to the base data.
- Automatic stitching of the point clouds in a multiple scanner system is carried out by the referencing of each FiX1 during installation.
- Point clouds for distinct and isolated FiX1 systems in a multiple scanner setup can be downloaded in isolation through the FiX1 HUB.
- Point cloud manipulation and processing can remain 'invisible' to the user for regular operations.

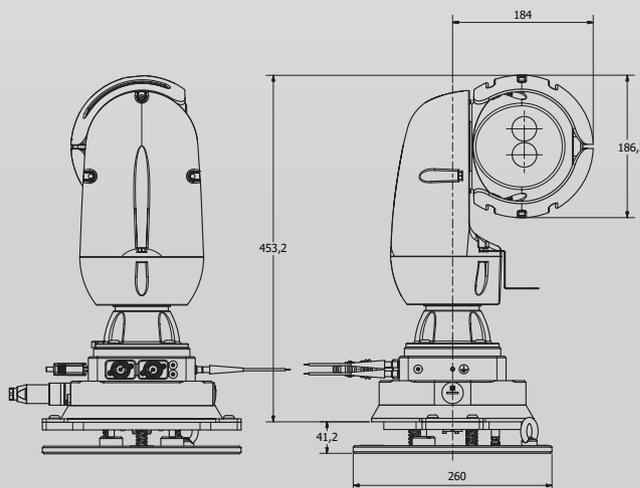


Volume and scan history in the FiX1 Web UI

## Applications

- Road Salt Barn/Dome Stockpiles
- Interior/Exterior Ore Stockpiles
- Stockyard Monitoring
- Quarry & Open Pit Mine Operations

## Dimensions



Laser Module	
Type	InGaAs Laser Diode
Wavelength (typical)	905nm
Accuracy*	±10mm
Maximum Energy per Pulse	0.461uJ
Beam Divergence	2.25 x 1.5 mrad
Range Resolution	10mm
Maximum Range to Passive Target**	250m
Minimum Range	0.5m
Lens Aperture Size and Location	28mm located in tilt head
Beam Footprint at 50m	141mm x 103mm
Maximum Measurement Rate (points per second)	15,000Hz

Physical Data	
Size	(H x W) 495mm x 314mm (rotational clearance 368mm)
Weight	12.5kg
Power	85 – 265VAC, 80W

Environmental	
Water & Dust Resistance	IP67
Operating Temperature	-40°C to +50°C
Storage Temperature	-40°C to +85°C

Angle Measurement	
Type	Opto-electronic Encoder
Angular Accuracy	0.0055°
Pan Angle Resolution	0.0055°
Tilt Angle Resolution	0.0055°
Pan Range	360°
Tilt Head Range	360°
Scanning Field of View (Pan)	360°
Scanning Field of View (Tilt)	200°
Motion	Servo controlled Brushless DC Motor

External Connections	
Serial	Rugged 9-Pin D-Type
Ethernet	Rugged RJ45
USB	Rugged STD USB A Female
Antenna	3 x 50Ω SMA (IP67)
Power	4-pin Rugged Binder Connector
SIM Card	Access via IP67 threaded plug

Web UI Connectivity	
Serial	115200baud, with 12V, 1A power. Isolated data and power.
USB	Full Speed USB2.0 with 5V, 500mA isolated power.
Ethernet	10/100 Base T
Wi-Fi	<ul style="list-style-type: none"> <li>High performance 2.4/5 GHz IEEE 802.11 a/b/g/n</li> <li>Up to 100Mbps (UDP), and 80Mbps (TCP)</li> </ul>

Cellular	
USA	LTE Cat 4; 3G fallback; LTE bands 2, 4, 5, 13, 17
Europe, Asia	LTE Cat 4 2G and 3G fallback; LTE Bands 1, 3, 5, 7, 8, 20
APAC, S. America	LTE Cat 4 ; 2G and 3G fallback; LTE Bands 1, 3, 5, 7, 8, 28



**CLASS 1 LASER PRODUCT**

\* Max measuring accuracy recorded at 50 m against Kodak white card (90% reflectivity) to 1σ. Accuracy is defined as the degree of conformity of the measured sample mean range to its actual (true) value, measured with reference to a total station under Carlson test conditions.  
 \*\* Max measuring ranges are recorded against Kodak white card (90% reflectivity).