

# **WiSen® Vision Unit**

## **User Manual**

**Wuxi Wisen Innovation Co., Ltd.**

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## Revision History and Clarification

Rev.	Issue Date	Revisions	Written By	Revised By
V1.0	12/07/2021	1 <sup>st</sup> Issue	Xiaoyan Huang	Dr. Yan Wu

### Document Definition:

It defines the specifications (i.e., introduction, technical features, deployment and maintenance methods) of the WiSen® Vision Unit. It is responsible to:

- When a Vision Unit is deployed at Control centre/Data centre, the LED warnings can be configured with one or more projects. So that a visual and auditory warning system can be established in the centre. This frees the operators from frequent checking of warning emails;
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### Scope:

Customer Site Project Managers and Engineers, Wisen Service Engineers, etc.

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# 1. Product Introduction



The WiSen® Vision Unit is one of the key products in our patented WiSen® geotechnical safety monitoring system.

Our product has IP66 and is designed to work in a tough environment. It is small in size, reliable in performance, easy for maintenance, has high precision during sampling, and has strong immunity to radio-interference.

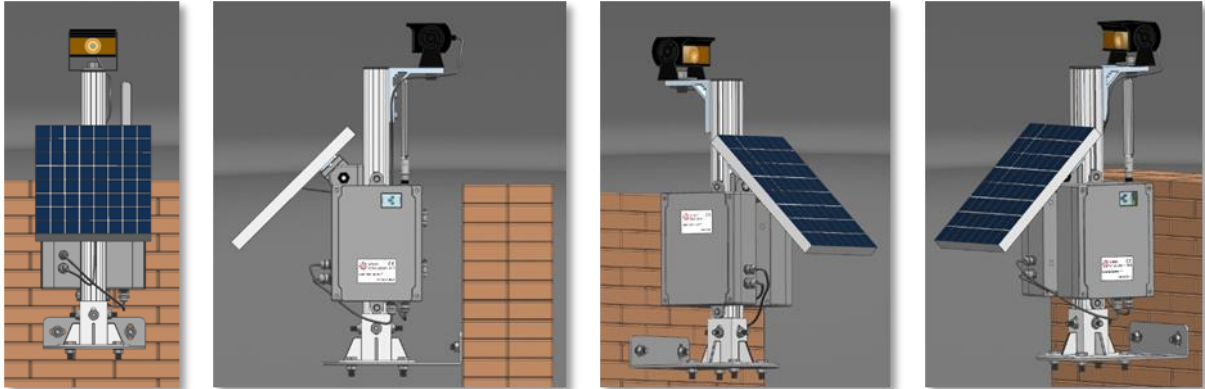


Figure 1. Vision Unit Overview.

Note: Vision Unit relies on a stable 4G connection, so its image data can be transferred smoothly and furthermore, the LED warnings can be received from a remote control centre.

## 2. System Structure Layout

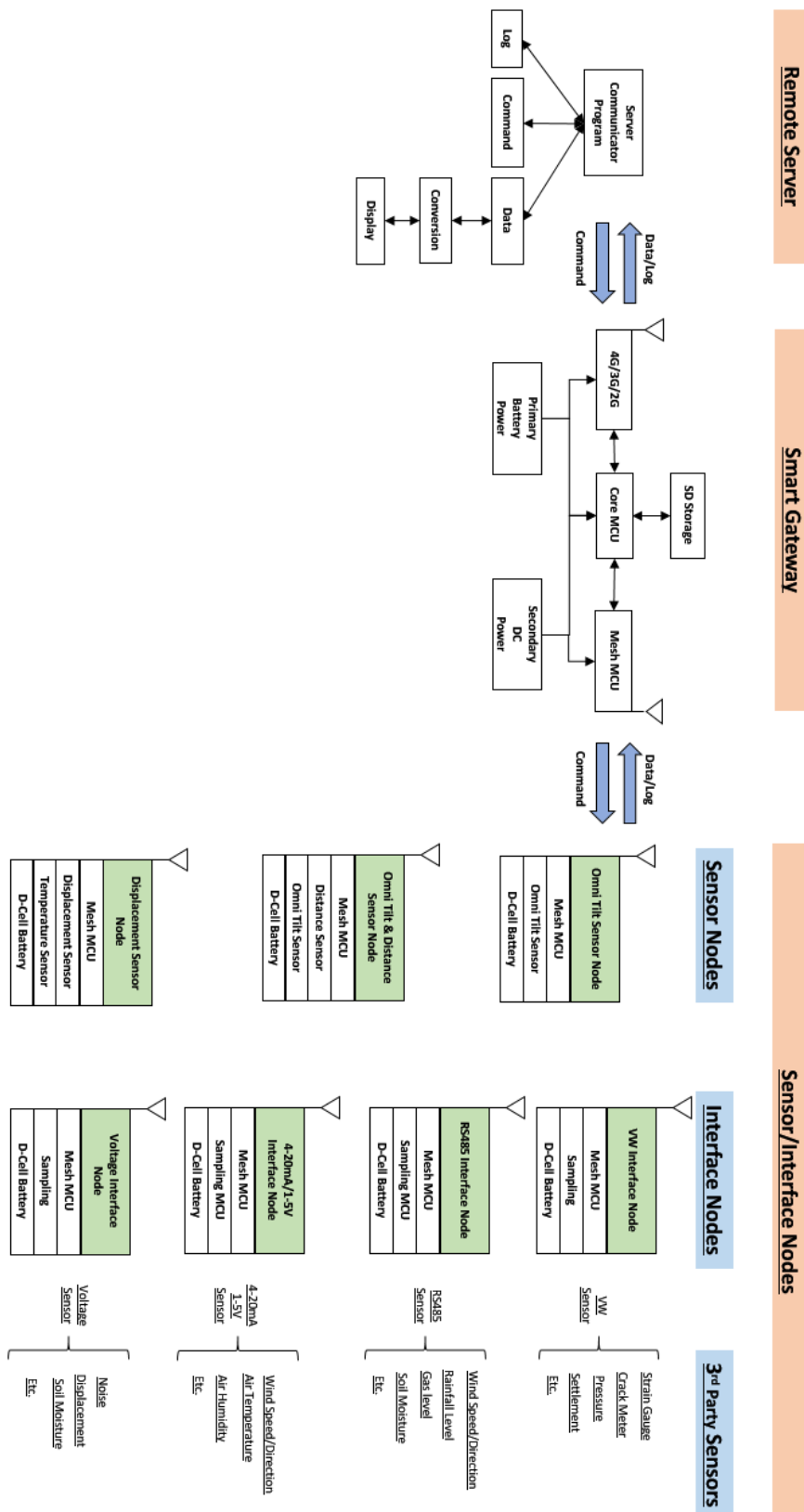


Figure 2. System Structure Layout.

### 3. Node & Radio Features

#### Node Features:

Basics		
Primary Battery Power	Qty. x 4 (3.6V Lithium primary D-Cell ER34615)	
Secondary DC Power	7 - 32VDC @ Min. 2A (e.g. 110-240VAC to 12VDC adaptor) or Solar Unit	
4G Network Stop Voltage	2.1V	
Local Storage	≥180 days @T=10min, i.e., 26000 Images	
L x W x H	180 x 140 x 60mm	
Weight	≤ 2.0kg	
Cable Gland	Qty. 1 x EMC-CMA12 for Camera connection; Qty. 1 x EMC-CMA14 for external DC input power connection	
Camera Mode (Factory Default Setting: Active Mode @ T=5min @ Lower Power LED Status)		
Passive Mode & Battery Life	Photo is not taken until a Photo-Taken command is sent, more specifically:  - At T < 5min, a photo comes back at close to real time, internal battery life ≈ 10 days;  - At T ≥ 5min, a photo comes back with a delay of 1-2Ts, internal battery life ≈ 44 days @T=5min.	
Active Mode & Battery Life (@ 4G Connection)	Photo is automatically taken at every T.	
	Sampling Time Interval - T	No.
	1min	3d
	5min (Default Setting)	16d
	15min	53d
	30min	91d
	60min	162d
	24hr (@Low Power Green Mode)	5Yrs+
Sampling Time Interval T	[1min, 1day]. Notice: at both Active and Passive modes,  1. The bigger the T value is, the more delay a user has when getting a photo; 2. The bigger the T value is, the less power consumption a node is, i.e., internal battery life can last longer.	
Camera Image		
Image sensor	CMOS 2MP Colour	
Image resolutions	1920 x 1080	

Image compression	JPEG	
Angle of view	Horizontal Plane 85°/ Vertical Plane 45°	
Lens	3.6mm	
External Cable Length	1.0m	
Night vision image	Black & White	
Night Vision Distance	1.0 to 8.0m	
LEDS/Buzzer and On-Site Warning Issuing		
Volume	Max. 90dB@10cm	
No. of LEDs	LED x 3 of Green/Blue/Red Colours + Low Power LED x 1 of Green	
LED Flashing/Buzzer Frequency	Red + Buzzer Warning (the highest warning level)	Twice at every 2s
	Blue + Buzzer Warning	Once at every 3s
	Green/Low Power Green Mode (normal level) No Buzzer	Once at every 4s
External Interface		
Wireless Module	ONLY Wisen 7600E or plus Daughter Board @ Micro SIM card, WiFi module	
Wired Port	RS232, Ethernet module	
WSN Interface		
Mesh Wireless Interface	WiSen® Protocol	
Standard System Parameter		
Temperature	Range: -40 to 85°C; Accuracy: ±1°C; Resolution: 0.1°C	
Voltage	Accuracy: ±0.1V	
Industrial Standard		
Casing and Painting Materials	Aluminium-Alloy Die Castings 12 (Epoxy Polyester Powder Coating)	
IP Rating	≥ IP66	
Operating Temperature	-40 to 85°C	
Fire Proof	Approved	
Certificates	-	

## 4. Terminologies



Figure 3. 4-Channel Laser Distance Sensor Node Internal Configuration Terminologies, where:

No.	Terminology
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1	4G Daughter Board
2	LED Board
3	LED Switch
4	Camera wire terminal
5	Buzzer
6	Buzzer Switch
7	ON/OFF Switch

## 5. Operation Procedures



### 5.1. System Deployment Notifications

- 1) Location: The deployment location of a Vision Unit is usually determined by the desired monitoring or inspection location;
- 2) Clear notes must be taken so that the Laser Units direction of a monitored structure can be correctly interpreted;
- 3) All the Serial Numbers of the Vision Unit must be recorded against their site references;
- 4) All the node should have its antenna point upwards/downwards.

### 5.2. Deployment Procedures

- 1) Open the box: Take the node out of the package and open its lid;
- 2) Insert Battery: By default, a unit does not contain a D-Cell battery. Therefore the battery needs to be inserted.  
Notice ⚠️: +ve and –ve orientation must be correct, otherwise, the internal circuit may be damaged;
- 3) Antenna Installation: screw the antenna tightly onto the unit;
- 4) Power On: switch on the Vision Unit by On/Off Switch. Now you should be able to see 3 LEDs flashing 3 times, this means the node is on;
- 5) Tighten the 4 Cap-Hex-Head screws of the lid to secure the enclosure IP rating;
- 6) To validate the data/photo, please visit Wisen Visualisation Platform for further details.

### 5.3. Mounting Options

The node fixings must be rigid for the sensor to measure accurate data. Movement in the fixings will affect the readings.

## 6. General Maintenance and Notification



- 1) Once a Vision Unit is installed in the field, please minimise any man-made disturbance so that data quality can be maintained;
- 2) Radio communication will be impaired if the antenna is covered by metal or very moist soil material;
- 3) Due to the discharge characteristics of the recommended battery, a battery replacement should be carried out;
- 4) Our product will use all the possible capacity in a battery down to a stop (minimum) voltage, which has been specified in the Features table. When this occurs, our WiSen protocol will send you a warning then it will enter a deep sleep mode until a new battery is installed;
- 5) If the data/photo from units are shown unexpected results or are not being sent back, then please carry out investigation using the following two stage procedure:
  - A. Remote Inspection of historical data, to identify the following:
    - a) Whether the heart-beat message has been sent back successfully at each time interval;
    - b) Whether the battery voltage is too low, if yes, please change the battery unit;
    - c) Whether the 4G signal strength has become significantly weaker than it was previously. If yes, please check the antenna has been screwed on firmly.
  - B. On-site Inspection: If all the above are good, please arrange an on-site inspection to check:
    - a) Whether the Vision Unit has visible external damage;
    - b) Check the box lid to see if it is firmly tightened;
    - c) Whether the antenna is bent or damaged and that the node is not blocked by new construction, e.g., hoardings;
    - d) When it is possible, check that the signal strength is normal by using a spectrum analyser;
    - e) Open the lid, to see whether the battery is firmly attached to its holder;
    - f) Use a multi-meter to measure the battery voltage. If it is below the stop (minimum) voltage, replace the battery.

#### Notices :

- i. Case One: If any change has been made from the list above, please inspect the data from the remote server;
- ii. Case Two: If all the actions from the list above have not cured the problem, please contact Wisen. We will be happy to help.

## 7. Package and Accessories



Standard:

No.	Items	Dimension (mm)	Qty.
1	Vision Unit	180x140x60	1
3	4G Antenna	200	1
5	Cap-Hex-Head Screw	M6x14	4
6	User Manual*	Downloadable from Wisen Visualisation Platform.	
7	Inspection Report*		

## 8. Safety and Warning



Warning: Please read the following instructions carefully.

### 1) Operation Safety

- Before taking any action, please read all the information provided carefully, and keep the guidance documents safe;
- Ensure that any procedures and installations are correctly carried out. The communication cable and the case must be grounded.
- This product has been designed to meet a certain water-proof level. However, it becomes water vulnerable when the lid is open or if the cable gland has not been sealed properly.

### 2) Electric Safety

- To install the battery into a holder, please follow the “+” (positive) and “-” (negative) signs in any Wisen product.

Wrong orientation of a battery could potential cause unit damage. Notice🚫: The orientation of battery can vary among products.

- When disconnecting the battery, please take special care not to apply excessive force, otherwise the battery holder and the nearby circuitry may be damaged.

### 3) Warning

- The battery in the product has a relatively high capacity, so please take special care during storage and usage.
- This product must not be disassembled under any circumstances, to do so will void the warranty and may leave the product in a dangerous state;
- If all the above are not followed, the manufacturer cannot be held responsible for any damage and injury caused to the users.

### 4) Caution

- Danger of explosion if battery is incorrectly replaced. Replace only with the type recommended by the manufacturer.
- When disposing of the batteries, please contact your local authorities or dealer and ask for the correct method of disposal.

## 9. Contact

- Wuxi Wisen Innovation Co., Ltd.: [www.wisencn.com](http://www.wisencn.com)
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