

GAZOSCAN™

Handheld Remote
Methane Leak Detector

Operating Manual



an ecotec company

WARNING

GAZOMAT™ reserves its right to update the contents of this manual, in line with the evolution of the product.

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1 INTRODUCTION

GAZOMAT™ has extended its range of laser spectroscopy based (Tunable diode Laser Absorption Spectroscopy – TDLAS) gas detector with the GAZOSCAN™ detector.

GAZOSCAN™ is an ultra-light and highly sensitive handheld remote methane leak detector (RMLD) which uses infrared lasers to remotely detect methane leaks. A smart sensor using infrared (TDLAS) technology guarantees measurement efficiency.

GAZOSCAN™ comes with Bluetooth capability that can transfer measurement data in real-time to a dedicated APP supplied on option. Users can use the APP to check, record and export the data.

1.1 Key features of a device with highly intuitive handling

- Methane selectivity
- Excellent detection at 100 meters (328 feet)
- Detects through glass
- 5 ppm sensitivity per meter
- Fast response time, 0.1s
- Lightweight, 0.76kg (1.68lbs) with battery
- Visual and audio alarms with configurable alarm threshold
- Large color 2.8in LCD screen
- Bluetooth® data transmission
- Green guide laser light
- Red dot sight for precise targeting in bright sunlight or ambient light

1.2 Purpose

Ultralight, compact and easy to use, the GAZOSCAN™ device is designed for rapidly inspecting difficult-to-access installations and equipment in industrial sites. The GAZOSCAN™ is suited to any situation where field technicians cannot operate close to the inspection zone:

- Because it is not accessible – overhead installations...
- Or for safety reasons.

IECEX and ATEX certified, it can be used in explosive atmospheres in confined and unconfined areas.

1.3 Areas of application

The GAZOSCAN™ meets the safety and performance requirements of a large range of applications including but not limited to:


1. Natural gas transmission and distribution pipeline leak inspection (inspection on street, between buildings, inspection of overhead pipelines, valves, service galleries of bridges...)
2. Inspection of buildings (entrances, staircases, through windows) and fenced residential properties
3. Safety of first responders' interventions
4. Industrial site monitoring (refineries, natural gas production, processing and storage plants, compression stations, injection/extraction wells...).

2 MARKING

The markings include the following:

GAZOMAT™ North America, LLC.
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Colton, CA 92324 – United States

Ex ib op is IIA T3 Gb

 II 2 G Ex ib op is IIA T3 Gb

IECEX Certificate Number: IECEX NEP 19.0022X

ATEX Certificate Number: Baseefa19ATEX0076X

3 INSTRUMENT COMPOSITION

Components:

1-Handheld Remote Methane Leak Detector	1-Lens Cap	1-Battery	1-Power Adapter	1-Charging Base
		Use only replaceable battery pack GAZOSCAN-B from GAZOMAT™ NA		Use only charger GAZOSCAN-C from GAZOMAT™ NA
				
		A second battery provided on option		

Carrying case to fit all above listed components.

4 WARNINGS AND RECOMMENDATIONS

4.1 Reading obligation

Prior to using this device, it is imperative that all users read this manual for their own safety, the safety of those around them and the safety of the device. Users are required to use the device as instructed by the manufacturer to get the most out of the device and keep it protected from damage.

GAZOMAT™ shall not be liable if the device is used other than as instructed.

The manufacturer shall not be liable in the event of any abnormal use of the product or any malicious tampering with the product.

In case of malfunction, please contact:

GAZOMAT™ North America, LLC.
 850 South Via Lata, Suite 115
 Colton, CA 92324
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5 SAFETY REQUIREMENTS FOR THE USE OF GAZOSCAN™



It is strictly forbidden:

- **to open the detector or the battery, particularly, in a hazardous or supposedly hazardous atmosphere.**

It is strictly forbidden:

- **to change, to modify or to adapt external or internal parts or components of the detector.**

5.1 Body safety

1. **Do not use the instrument if the outer case is broken or wet.**
2. Stop using the instrument instantly and take out the battery in case of smoke, strange smells, short-circuit, or fire.
3. The enclosure rating of the instrument is IP54. Do not immerse in liquid. Stop using the instrument and pull out the battery if any liquids have gotten inside.
4. Do not look directly at the laser while using the instrument.
5. Do not point the laser at others.
6. **Do not attempt to open the instrument, there are no user serviceable parts inside the instrument.**
7. Do not touch the LCD screen if it is broken.

NOTE: Should any damage of anodizing layer of the heat sink of middle shell or sight base occur, then the product must no longer be used in hazardous atmospheres.

FCC ID: 2ASO2HS4000

This device complies with part 15 of the Federal Communications Commission (FCC) rules.

Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

5.2 Battery and charger safety

1. Use only the original manufacturer supplied batteries (GAZOSCAN-B) and chargers (GAZOSCAN-C).
2. Do not pull off the battery in explosive atmospheres.
3. Do not charge the battery in flammable or explosive atmospheres.
4. Use GAZOMAT™ provided charger (GAZOSCAN-C) only.
5. Do not charge the battery if the charger or the battery is broken or damaged.
6. Keep surrounding environments safe when charging.
7. Keep the charger and battery clean to avoid a short-circuit.
8. Stop charging instantly and unplug the charger immediately if any observable issue arises while charging (smoke, strange smells, a short-circuit, or fire).
9. Do not short-circuit the terminals of the battery pack.
10. Do not -or attempt to- dismantle, modify, or repair the battery.
11. Do not touch the battery with wet hands.
12. Do not hit or throw the battery.
13. Do not dispose of the battery in the fire. Observe disposal regulations to preserve the environment.
14. Should the battery leak and come in contact with the skin or clothes, rinse with clean water and seek medical attention if necessary.
15. Store batteries in a well-ventilated, cool and dry environment. Do not place the battery in a place with too high or too low temperatures.
16. Do not store the device with the battery installed when not using the device for a long time.
17. Do not store or transport the battery together with metal objects. Observe relevant regulations when Lithium batteries are in transit.

5.3 Laser safety

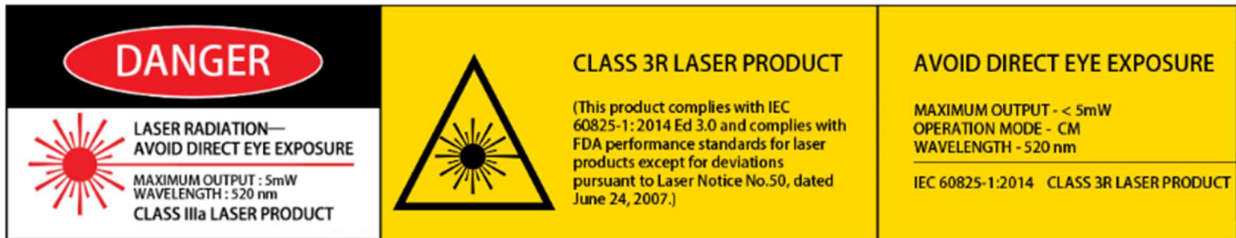
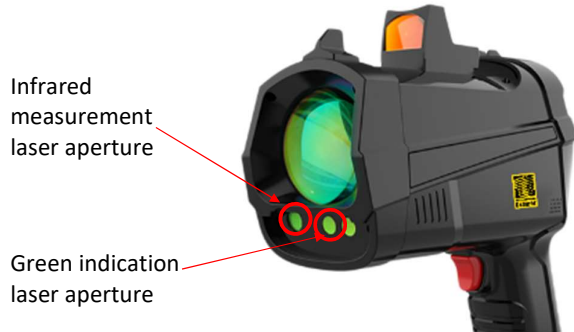
Infrared measurement laser: Class 1 eye safety, wavelength: 1651 nm, <10mW.

Green indication laser: Class 3R, wavelength: 520 nm, <5mW.

Do not stare into the beam. Do not point the laser at humans, livestock or other animals.

The device satisfies the requirements of:

- International Electrotechnical Commission Standards:
 - IEC 60825-1:2014
 - IEC 60825-1:2007
- US CRH standard: 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No.50, dated June 24, 2007;
- People's Republic of China's standard: GB7247.1-2012.



5.4 Usage safety

Operating temperature: -20°C to +45°C (-4°F to 113°F).

Operating humidity: <80% RH, Non-condensing.

1. Avoid electromagnetic interference when using this product.
2. Do not forcefully push the buttons or subject the device to strong shocks.
3. Use the strap when using the device to avoid breakage and foot injury caused by dropping of the device.

5.5 Storage and transportation safety

1. Store this product in a cool and dry environment. Do not store the instrument in an area with extreme temperatures.
2. Do not store instrument with battery installed.
3. Transport this product within its dedicated casing to avoid damage from strong shock or vibrations

5.6 Tips and recommendations

1. Unlike other battery types, Lithium batteries operate at a high level and then drop suddenly. An optional second battery is recommended.
2. If there is dust on the lens or body of the instrument, wipe with a lint free dry clean cloth or premoistened optical wipe. Do not use napkins or other rough materials which could damage the lens surface.

6 USER INTERFACE

6.1 Device buttons

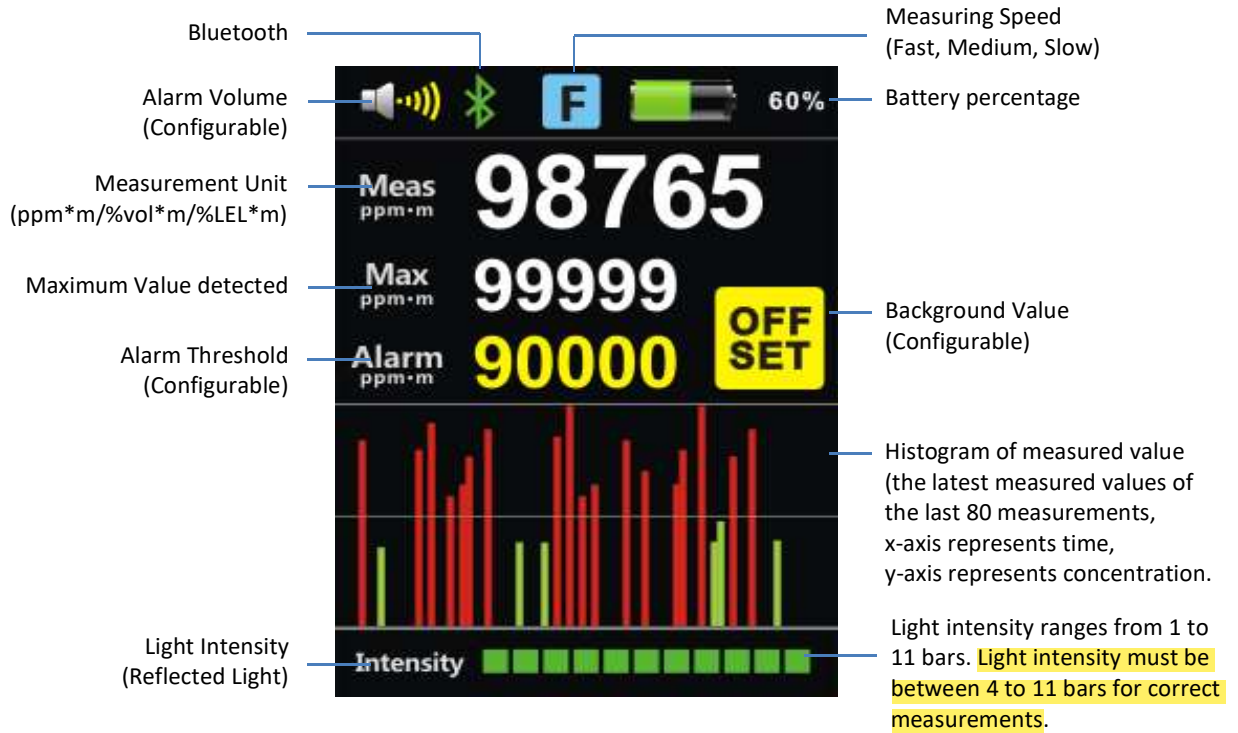


No.	Picture	Button	Descriptions
01		Power/Return Button	Hold the power button about 3 seconds to start up the device
02		Enter Button	Enter the menu/confirm selection
03		Up Button	Move up the cursor
04		Down Button	Move down the cursor
05		Test Button	Click once to start testing. The green indication laser is visible. Click again to stop testing
06		Battery Compartment Button	Used to remove the battery

6.2 Light instructions

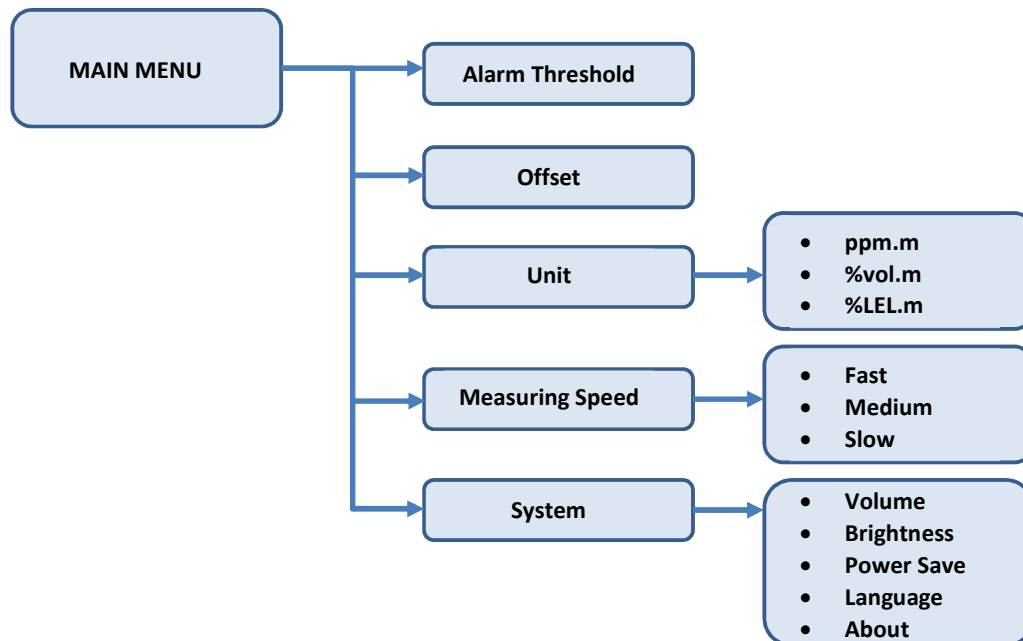
No.	Designation	Comments
a	Infrared Laser Emitter	-
b	Indication Laser (Green)	Class 3R, Avoid Direct Eye Exposure The indication light will start to blink when the device starts measuring and detecting.
c	Working Light (Blue)	The blue working light will turn on on the process of device self-test. It will not light after the device is started.
d	Receiving Lens	-

6.3 Interface display



NOTE: Measurements must be taken when the light intensity is between 4 to 11 bars to avoid the measurement error caused by too weak or too strong light intensity.

6.4 Setting menus



Main Menu gives access to submenus to adjust the instrument's settings.

6.5 Menus and default settings



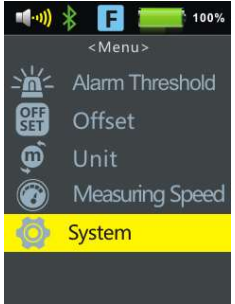


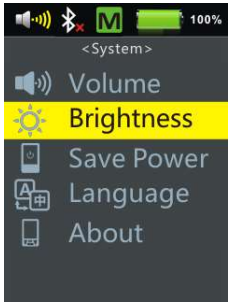


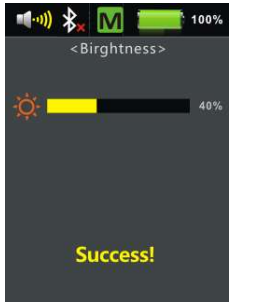

6.5.1 Default settings

Through the setting menus, users can set the alarm threshold value, alarm volume, screen display brightness, screen standby time and system language. Users can also check the device hardware and software version through About menu. Menus are subject to change depending on software updates.






Designation	Default setting
Alarm Threshold	200 ppm*m
Offset	0 ppm*m
Unit	ppm*m (Options: ppm*m/%vol*m/%LEL*m)
Measuring speed	Fast (Options: Fast; Medium; Slow)
Alarm Volume	ON, volume 100% (Options: ON/OFF)
Brightness	100%
Power Save	3 Min (Options: 3 Min /10 Min/30 Min/60 Min/120 Min/ Never)
Language	English (Options: Chinese/English/French/Spanish)
About	Hardware Version; Firmware Version; Device Serial NO; Bluetooth Address

Example of menu and submenu access procedure:

To have access to menus, the test button must not be activated (green indication light not visible).

 And 		 And 		 And 		
1. Use Up/Down button to move inside Menu 2. Press Enter button to select item from menu	3. Use Up/Down button to move inside Menu 4. Press Enter button to select item	5. Use Up/Down button to adjust the value 6. Press Enter button to confirm 7. Press Power/Return button to return				

6.5.2 Changing settings

<p>Step 1</p>  [Enter/Validation Button] <i>Press Enter button to enter the Menu</i> <p> [Up Button] [Down Button] <i>Use Up/Down button to select the item in the Menu</i></p>	<p>Step 2</p>  [Up Button] [Down Button] <i>Use Up/Down button to adjust the value of the selected item</i> <p> [Enter/Validation Button] <i>Use Enter button to confirm the setting</i></p>	<p>Step 3</p>  [Power/Return Button] <i>Press shortly Power button to exit and return</i>
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7 BATTERY OPERATION

7.1 Charging the battery

1. Connect the power adapter cord to the charging base
2. Insert the battery into the charging base
3. Plug the power adapter into a power outlet
4. Unplug the adapter and remove the battery when charging is complete.

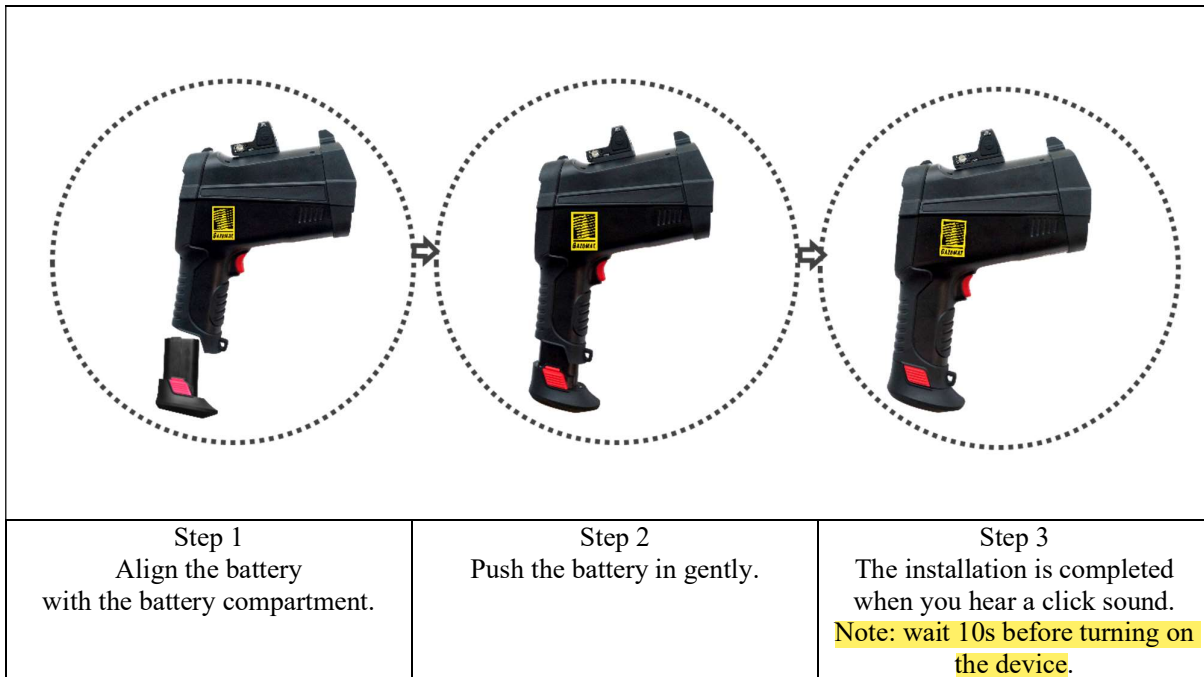


7.2 Battery charging information

1. There are two lights on the battery charging base:
 - a. The fault indicator light
 - b. The charging indicator light
2. If the fault indicator light is on, stop charging immediately, unplug the charger, and contact GAZOMAT™ for maintenance.
3. The charging indicator lights up during charging and turns off when the battery is fully charged.
4. When the adapter is plugged in, but the battery is missing from the charging base, the charging indicator light will blink.

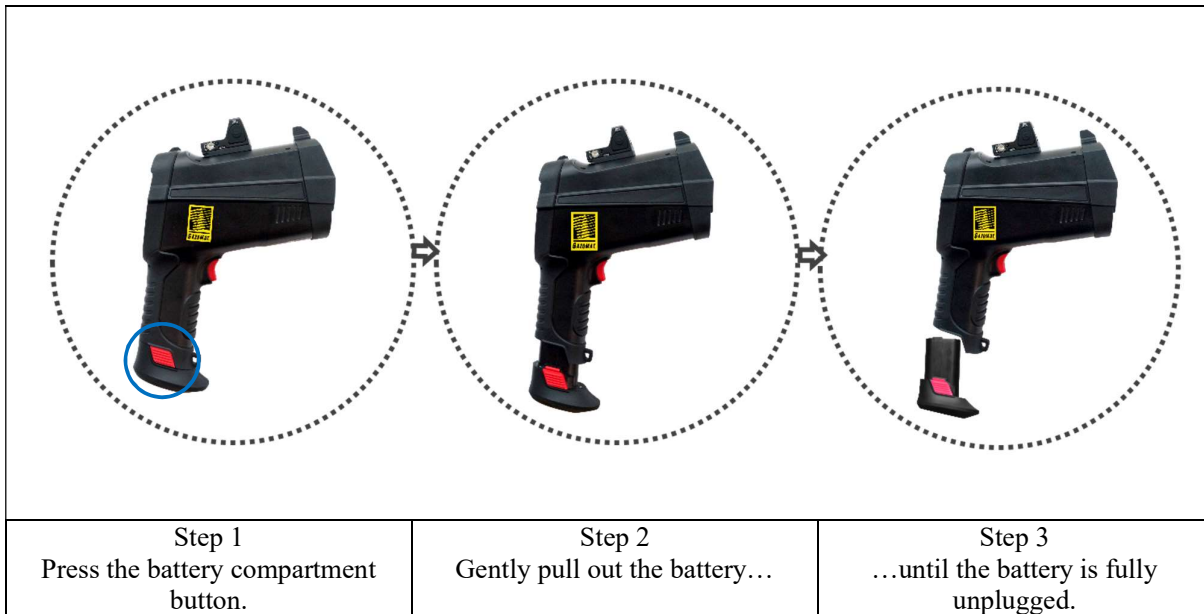


7.3 Inserting the battery



NOTE: Keep surrounding environments safe.

7.4 Removing the battery



NOTE: Keep surrounding environments safe.
Always store the instrument with the battery removed.

8 SELF-TEST, RED DOT SIGHT AND BLUETOOTH

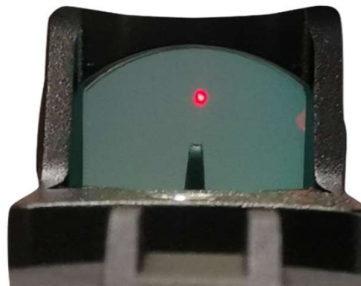
8.1 Initialization /Self-test

The GAZOSCAN™ automatically performs a Self-Check when powered on. The initialization Self-Check is performing a series of internal diagnostics to verify the integrity and performance of the sensor and components. The device will continue to the subsequent user screens upon a successful result of the diagnostics analysis. If any errors are found during the Self-Check, an error screen will occur. In this case, contact your local GAZOMAT™ service center for assistance.

8.2 Instructions on the red dot sight

Users can look through the red dot sight to achieve better aiming. The red dot sight is powered by the device. It automatically lights up after powering on the device.

NOTE: The sight is effective when aiming over 15m away. If the distance from the measured object is too short, the red dot will not overlap with the green indication laser.



Red dot sight diagram

If the red dot and the green indicator laser do not overlap when aiming for a long distance (>15m), the red dot calibration can be performed by adjusting the knob on the sight.

<p>If the red dot is higher than the green indication laser, turn the knob counterclockwise to make it lower.</p> <p>If the red dot is lower than the green indication laser, turn the knob clockwise to move it up.</p>		<p>If the red dot is to the right of the green indication laser, turn the knob counterclockwise to shift it to the left;</p> <p>If the red dot is to the left of the green indication laser, turn the knob clockwise to shift it to the right.</p>	

8.3 Bluetooth connection

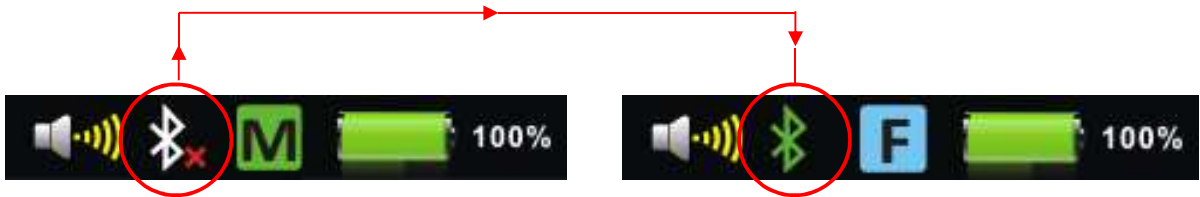
8.3.1 Functions

The GAZOSCAN™ detector uses Bluetooth for communication tool. The Bluetooth communication enables real-time transfer data to a dedicated App (optional) running on iOS, Android or Microsoft Windows mobile devices.

NOTE: Contact GAZOMAT™ to obtain the App.

8.3.2 How to connect using Bluetooth

1. Turn on Bluetooth on the mobile device and follow instructions given by the App.
2. The Bluetooth icon on the top of the device screen will turn green to indicate successful connection.
3. Use the dedicated App to read, record and export data.



NOTE: To enable Bluetooth connection, always press the Test button (in that case the green indication laser is visible).

9 OPERATING THE DETECTOR

9.1 Start to use

	<p>Step 1 – Insert the battery</p> <p>Take the device out of the carrying case.</p> <p>Insert the battery in its compartment.</p>
	<p>Step 2 – Remove the lens cap</p> <p>Remove the cap that protects the lens.</p>
	<p>Step 3 – Turn ON the device</p> <p>Once the installation of the battery is completed, wait AT LEAST 10s to turn ON the device.</p> <p>Hold the Power button until the device turns ON.</p>
	<p>Step 4 – Prepare for measuring</p> <p>Press shortly the Test Button to start measuring.</p> <p>Do not hold the button.</p> <p>Point the aim indicator towards the object that needs to be measured.</p> <p>To modify the reading frequency, go to “Measuring speed” submenu.</p>
	<p>Step 5 – Connect to App (optional)</p> <p>Start the App and follow provided instructions to connect to App.</p>

9.2 After use

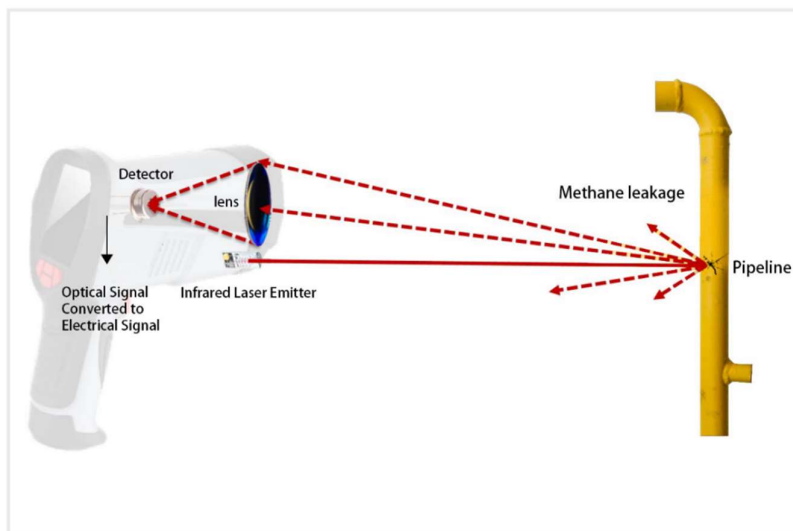
	<p>Step 1 – Stop measuring</p> <p>Press the test button to stop measuring.</p>
	<p>Step 2 – Turn OFF the device</p> <p>Hold the Power Button until the device turns OFF.</p>
	<p>Step 3 – Remove the battery</p> <p>Press the Battery Compartment Button.</p> <p>Remove the battery.</p>
	<p>Step 4 – Lens cover</p> <p>Cover the lens with the protective cap.</p>
	<p>Step 5 – Store the device</p> <p>Put battery and device with lens cap back into the case.</p> <p>Always store the device with battery removed.</p>

10 TECHNICAL PRINCIPLES – DO's and DON'TS

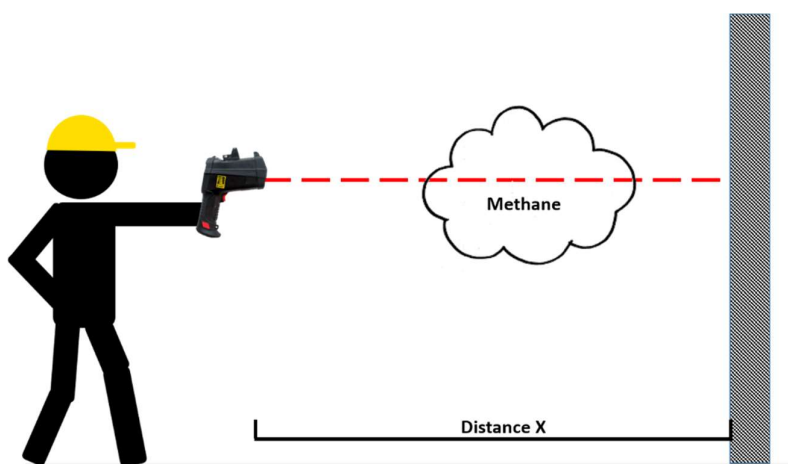
10.1 Working principle

For the GAZOSCAN™ to detect a leak is the result of a laser beam passing through a gas plume and reflecting off a surface.

The reflected light is collected by the GAZOSCAN™ and converted into a methane concentration.



- The GAZOSCAN™ emits an infrared laser at 1.65 μm .
- The laser beam travels to the target, is partially absorbed by the gas, then reflected all the way back into the receiver.
- The reflected laser is collected and converted to an electrical signal that carries information needed to deduce the relative methane concentration.
- The reading is expressed by a methane column density ($\text{ppm} \cdot \text{m}$). It is the integral of the methane concentration (ppm) and the distance (m) on the optical path.



10.2 PPM*M measurement unit

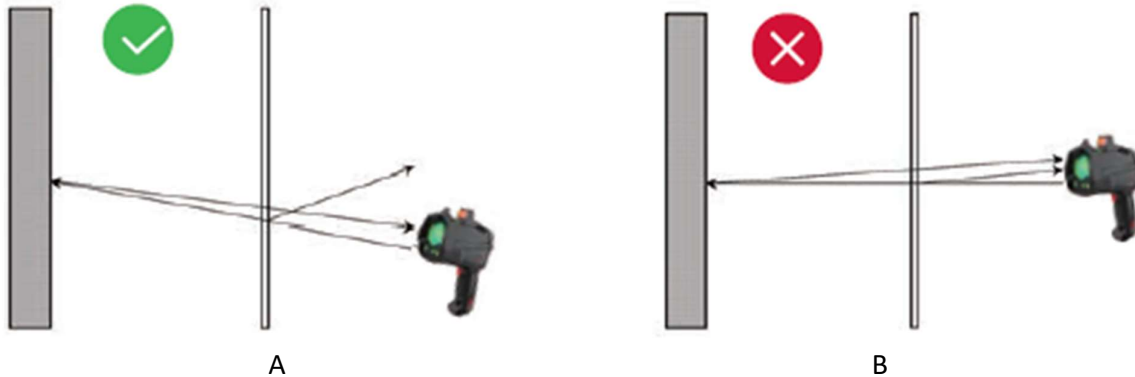
$\text{ppm} \cdot \text{m}$ is the Parts Per Million concentration that a gas plume 1 meter in depth would have.

- Therefore a 1-meter plume of methane at a concentration of 5000 ppm would be read as 5000 $\text{ppm} \cdot \text{m}$.
- While a gas plume that was 0.5 meter in depth with the same concentration of 5000 ppm would be read as 2500 $\text{ppm} \cdot \text{m}$.
- In the case of a 2-meter plume of methane at the same concentration of 5000 ppm , the reading will be 10000 $\text{ppm} \cdot \text{m}$.

10.3 Detection Do's and Don'ts

10.3.1 Case 1 – **Detection through glass**

When detecting through the glass, if the infrared laser is incident on the glass vertically, part of the light reflected by the glass will be received by the device, which will cause the light intensity saturation or inaccurate measurement result. In such case, the GAZOSCAN™ needs to be pointed as shown in figure below to avoid receiving the light reflected by the glass.

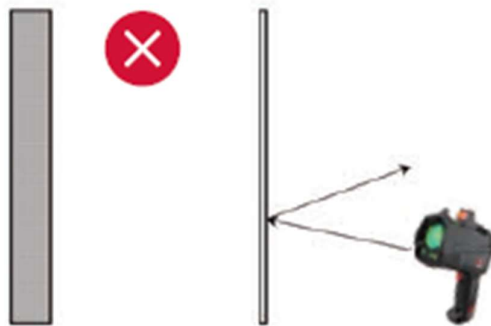


Case 1: Detecting through glass

10.3.2 Case 2 – **Detection through materials with strong absorption or reflection effect on the infrared laser**

Avoid detecting through materials that have strong absorption or reflection effects on the infrared laser, such as PMMA, laminated glass or anti-infrared glass.

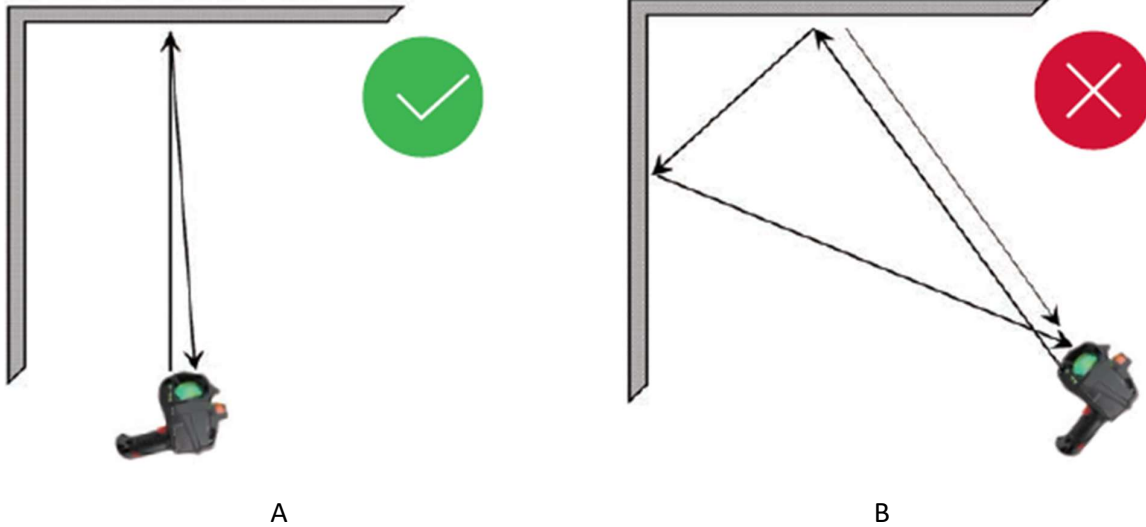
In such case, the methane concentration behind can't be detected or the measurement result may be inaccurate.



Case 2: Avoid detecting through anti-infrared or absorbing infrared material

10.3.3 Case 3 – Detection towards a corner or similar situation

When detecting towards the corner (or similar situation), as shown in Figure below, the infrared laser may reflect between walls, resulting in high measurement concentration. In such case, please point as shown in figure below to have the accurate measurement result.



Case 3: Do's and Don'ts when detecting towards a corner

11 TECHNICAL SUPPORT AND MAINTENANCE

11.1 Error messages

11.1.1 Error codes

Error Code	Description
0x01	Laser temperature control system is abnormal.
0x02/0x03	Laser intensity in the reference channel is too weak.
0x04/0x05	Circuit board temperature exceeds the range of -20°C to +80°C (-4°F to +176°F).
0x08/0x09	Laser shell temperature exceeds the range of -20°C to +60°C (-4°F to +140°F).
0x10/0x11	Unable to detect the absorption signal in the reference channel.

11.1.2 Proper handling method



When the error message appears, try restarting the device. If error code **0x01/0x04/0x05/0x08/0x09** appears, please try to restart the device after it is completely cooling down. If the error still exists, contact GAZOMAT™ service center for technical support.

NOTE: Do not try to repair the device on your own accord.

11.2 Troubleshooting

	PROBLEMS	SOLUTIONS
1.	The instrument cannot be turned on.	Remove and reinsert the battery, wait at least 10 seconds, then press the Power button. If the instrument still cannot turn on within 30s, check with a second battery.
2.	The instrument's alarm is always on or never on.	Check whether the alarm threshold value is set too high or too low.
3.	The instrument's alarm is on, but there is no sound.	Check the volume of the instrument. Make sure that the alarm is on and the volume is set properly.
4.	The screen is too dark.	Check whether the screen brightness value is set too low.
5.	The battery cannot be recharged.	Check whether all the components are connected properly. Check whether the charging base has power. Check whether the battery is plugged into the charging base.
6.	The fault indicator light of the battery charger is on.	Remove the battery and replace with a new one.
7.	The instrument is in good condition but there is no reading.	Check whether the light intensity is too strong or too low. A minimum of 4 bars (on the 1 to 11 bar scale) is required. When light intensity is too strong, avoid complete perpendicular between the detecting laser beam and the object reflective surface.

Please contact GAZOMAT™ Service Center or your local representative if the above solutions do not solve your problem.

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info@gazomat.com

12 WARRANTY

During the warranty period, GAZOMAT™ will provide free maintenance service when the device cannot operate due to a problem of software or hardware. But GAZOMAT™ will not provide the service if the problem is due to the fact that the equipment has not been used, handled or stored in accordance with the recommendations in this manual. Situations that break the warranty include but are not limited to the following:

- Missing purchase documents
- Did not use the instrument as per instructed
- Unauthorized modification, disassembly, or repair
- Intentional damages to the device
- Stolen, lost or discarded device
- Damaged device due to use with unauthorized accessories and services
- Those damages caused by natural disasters, such as fire, lightning, flood, earthquake, etc.

13 TECHNICAL SPECIFICATIONS

Target gas:	Methane (CH ₄) and methane containing gases
Working principle:	Tunable Diode Laser Absorption Spectroscopy (TDLAS)
Measurement method:	Laser reflection
Sensitivity:	5 (Actual) ppm*m
Detection range CH ₄ :	0-99,999ppm*m
Measurement accuracy:	±10% (100-50,000ppm*m)
3 measuring speeds:	Fast (F) = 0.1s; Medium (M) = 0.4s; Slow (S) = 1.6s
Measuring unit	ppm*m %vol*m %LEL*m
Detection distance:	Over 100m (328ft) if the light intensity indicator is equal or superior to 7 bars
Data transmission:	Bluetooth® communication, dedicated App for mobile devices
Display	2.8-inch color LCD
Weight:	0.76kg (1.68 lbs.) with battery
Dimensions:	160mm x 240mm x 80mm (6.3''x9.4''x3.1'') (with battery)
Operating temperature:	-20°C to +45°C (-4°F to +113°F)
Operating humidity:	<80% HR, non-condensing
Storage temperature:	-20°C to +60°C (-4°F to +140°F)
Ingress Protection:	IP54
Explosion-proof classification and certification:	Ex ib op is IIA T3 Gb
	 II 2 G Ex ib op is IIA T3 Gb
	IECEX and ATEX
Laser classes:	Infrared Laser emitter: 1651nm, <10mW, Class 1 eye safety Green indication laser: 520nm, <5mW, Class 3R
Battery:	Rechargeable Lithium battery, 7.2V
Battery operating life:	8 hours at 25°C (77°F) - Continuous
Charging time:	≈ 5 hours
Threshold alarm:	Can be set by user, buzz with LCD turning red
Self-test:	Built-in self-test while turning on the instrument, <10s (typical value)

APPENDIX 1 – FCC STATEMENT

FCC ID: 2ASO2HS4000

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

NOTE: Any changes or modifications not expressly approved by the grantee of this device could void the user's authority to operate the equipment.



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