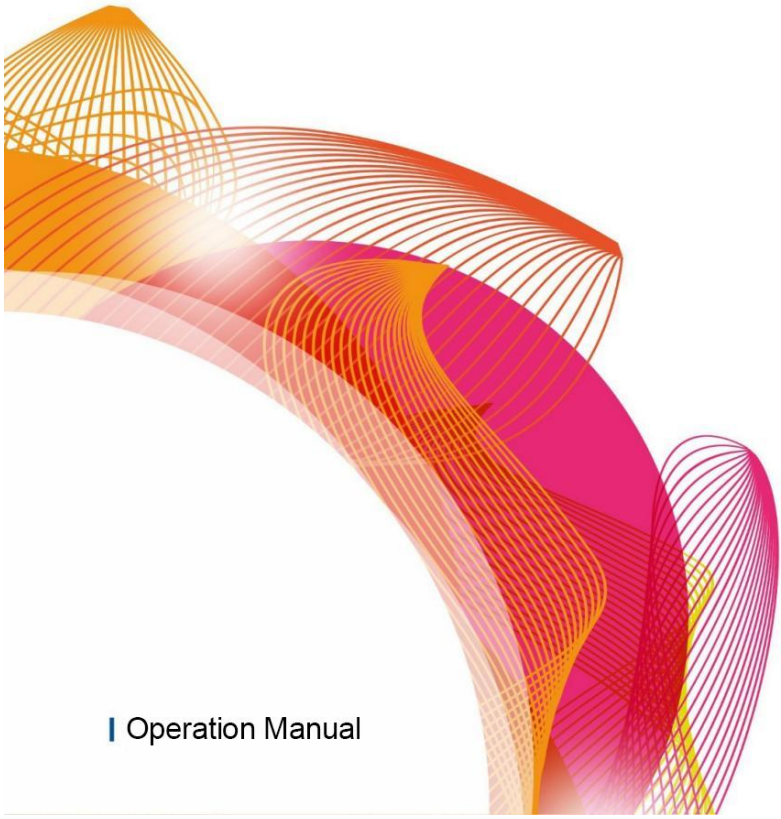
HRLD200

Handheld Laser Methane Detector



Operation Manual

Using the Manual

Thank you for choosing the products from Hanwei. To use of this instrument safely and effectively, please read the following instruction before using the device and operate according to the provided relevant operating steps. So that you can fully enjoy the services provided by Hanwei, while avoiding the misuse of your machine and the damage to the machine or other accident. Hanwei will not be responsible for the consequence, if the user does not install, operate, repair or replace components in accordance with this manual. To use of this instrument safely and effectively, please read the following instruction carefully before using the device.

Symbol Definition

Before using the detector, first know the meaning of below icons.

 **Warning**--- Cautionary statement indicates any danger or insecure hidden trouble that may result in a major accident or personal injury.

 **Notice**--- Notice states that any danger of personal injury or products, property loss and insecure hidden trouble should be noted.

 **Remark**--- Notes, use hints or additional information

User Service Guide

- Before the use of this product, please check the accessories according to the product list. If any is missing, please contact the distributor or manufacturer immediately.
- Within twelve months from the date of sale, if the user abides by the storage, transportation and use requirements, while the product quality is lower than the technical indicators, the user can enjoy free maintenance with warranty.
- The damage caused by the violation of operating regulations and the fault caused by the maintenance that is not operated by our designated special technical service department or caused by quality problems due to force majeure, our company will charge for maintenance.

Copyright Notice

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Precautions before using

It's essential for users of this device to read this manual before installation, operation and maintenance, and pay more attention to the warning and notice:

- When open the box, please check if the shell of the equipment has cracks or missing parts. If the equipment is damaged or missing parts, please do not use it and contact with Hanwei immediately.
- Before any operation, the user must abide by local regulations and on-field operation procedures.
- Please check the battery before using the instrument and make sure that the connection is correct.
- This instrument uses a visible Spotter beam as a class 3R laser product, which is prohibited from staring at laser beam or watch it with an optical instrument directly.
- No charge, tear-down or replace batteries in hazardous areas.
- Do not aim the instrument at the sun directly to avoid the damage.
- Do not expose detector to environment of electric shock, strong electromagnetic field or continuous severe vibrations.
- Charge the battery with the charger supplied by Hanwei.
- Do not charge in dangerous environment, please charge indoors in the safe and dry environment.
- If detector is left unused for long term, please take out battery, and recharge the battery to full capacity for long term storage, please pay attention to not let the battery short-circuit.
- Lithium-ion battery contained. Do not put the battery together with other household garbage. Discarded battery should be handled by qualified recyclers or processor of dangerous goods.
- Avoid from falling from a height or suffering severe vibration.
- Installation must abide by local requirements of electrical installation,

otherwise it may lead to severe personal injury.

- Use dust blower to blow away the dust on optical lens, then use medical gauze or equivalent none abrasive lens tissue with small amount of alcohol.
- Don't repair, adjust, or change components without permission.
- Only a qualified HRLD600 repair technician should attempt to repair or adjust the detector. Please carefully read and fully understand the operational manual before operation or maintenance of the detector.
- No attempt should be made to repair the detector. Should the detector not work properly, or indicate a fault or warning, refer to the trouble shooting section of this manual.

1. Overview

HRLD200 Handheld laser Methane detector adopts the most advanced TDLAS technology (Tunable Diode Laser Absorption Spectroscopic) in the world, which will realize non-contact and remote detection for the places where the inspector cannot reach. The leakage point and source can be located and found accurately and quickly, then to improve the work efficiency and reduce labor intensity.

The TDLAS sensor has high sensitivity, quick response and good selectivity, that only response to Methane only while not to other hydrocarbons gas and result in false alarm. It is widely used in the industries of municipal gas pipeline, oil refineries, chemical plants in petroleum and petrochemical industry, metallurgical industry, power industry or any place that is possible to have gas leakage.

2. Technical features

- Remote detection, maximum distance is 50 meters
- Small size and light-weight easy to carry
- Good selectivity, response to Methane only
- One-button operation
- Sensitivity of 5ppm • m
- Fast response, no alarm delay
- Color LCD display
- Optional display detector of ppm • m, LEL • m and VOL • m
- Shock proof design
- Visual, audible and vibration alarm

- Adjustable alarming level between 0-9999ppm • m
- Self -test function
- Low battery warning
- Low consumption, can be used for continuous testing
- Intrinsically safe design

3. Specification and parameters

Gas	Natural gas (CH_4)
Principle	TDLAS
Sensitivity	5ppm • m
Detection range	0～100000ppm • m
Distance	50 meters
Response time	T90 < 0.1 second
Working temperature	-20℃～50℃
Storage temperature	-20℃～60℃
Humidity	<99% RH (no condensation)
Explosion-proof grade	Ex ib IIB T4 Gb
Ingress protection	IP68
Weight	About 380g
Power supply	DC3.7V rechargeable Lithium battery
Working time	10 hours after full charging
Display	Color LCD
Lifespan	10 years
Alarming method	Visual and audible alarm
Penetrating	An object that can be penetrated by light without effecting detection, as through ordinary glasses.
Data transmission	Blue-tooth
Laser safety class	Detecting beam: Class 1 Aiming beam: Class 3R
Accessory	Battery charger, wrist band, carrying case., etc

Remark

- The sensitivity to gas concentration relies on the distance from instrument to the target, and reflection factor of target reflector.
- The detection adopts “Methane column integral concentration” as the measurement detector (ppm • m). Namely: Methane column integral concentration (ppm • m) = Methane concentration (ppm) x gas plume thickness”.

4. Product introduction

HRLD200 adopts the optical path design of transmitter-receiver integration, which is easy to use. The detector emits two beams: detecting beam and aiming beam. Detecting beam is invisible while aiming beam is visible. After double-pressing the detection button, the detector starts to detect and the aiming beam starts to light up. After double-pressing the detection button again, the detector stops detection and the aiming beam is turned off. In standby mode, the detector will automatically enter the sleeping state if it is not operated for a long time. Sleeping state can be stopped when pressing any button. Double-press the detection button to continue the detection. The start-up time will take several seconds.

Do not look directly into the green beam or shoot it into the eyes of others or cause distraction to drivers on the road.

In detection state, it displays the concentration of Methane on LCD screen and gives alarming if the concentration exceeds the preset alarming threshold.

If the operation is improper, e.g., the scanning distance is too long, or the reflection ratio of background reflector is too low, the instrument will give fault alert to remind the operator. Please move to proper distance or angle to operate detection.

HRLD200 has superior environment durability, and the reasonable dust on lens will not influence the sensitivity and detection range.

Warning

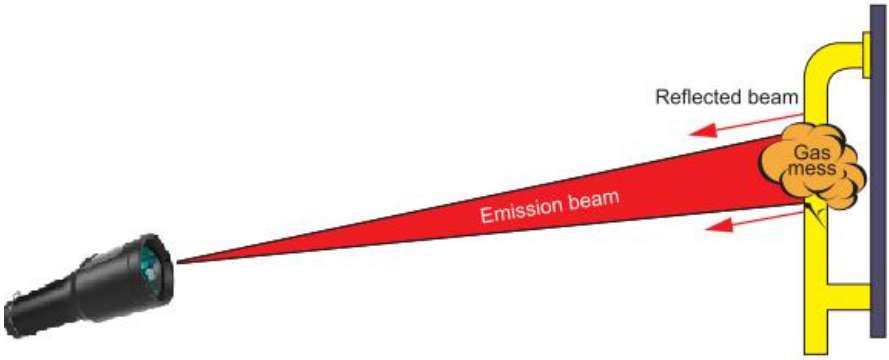
- Aiming light is 3R laser product. Do not stare into beam or view directly with optical instruments.
- Do not aim the spotter beam to the sun for avoiding damage.
- Charge the battery with the supplied charger by Hanwei.

5. Technology Introduction

5.1 Detection Principle

HRLD200 adopts advanced TDLAS technology combined with DSP digital signal processing technique. TDLAS is a technique for trace gases

detection using wavelength scanning and current tuning characteristics of semiconductor laser diodes, and select the specific absorption line of methane to realize zero cross interference.



When the laser from HRLD200 hits at the target gas pipeline, part of the beam will be absorbed if there has gas leakage. After passing through the gas mess, the beam will return after being scattered by the earth surface or the wall behind the gas. The returned beam will be collected by the optical lens, and received by highly sensitive InGaAs detector. After signal processing, we will get the gas integral concentration between the detector and background reflector.

5.2 Glossary and Definition

Detecting beam: The laser beam sent by handheld remote laser methane detector for detecting the gas leak;

Aiming beam: The visible laser beam sent by handheld remote laser methane detector for helping the operator to aim at the target;

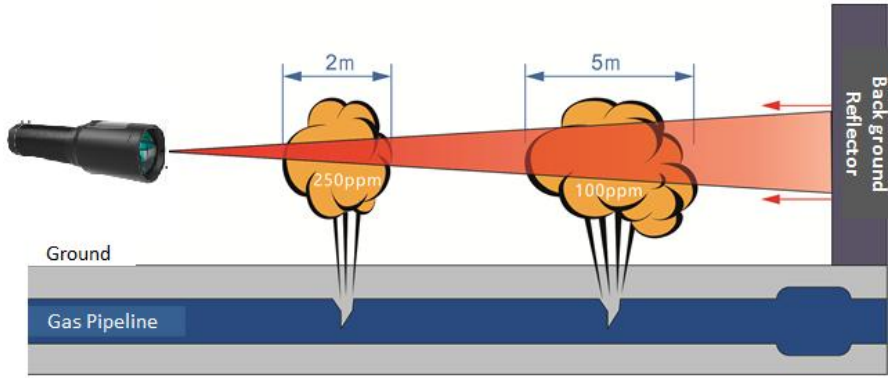
Detection distance: The longest working distance of handheld remote laser methane detector;

Reflection Light Fault: The fault caused by the situation that the remote detector cannot get enough returned light because of the reflective rate of background reflector, scanning distance and ambient environment etc.

TDLAS technology: An advanced technique for gas detection adopts laser wavelength scanning and current tuning characteristics.

Integral concentration: The traditional measurement of gas detector is the average indoor / outdoor gas concentration, the detector is ppm or %LEL. HRLD200 measures the integral gas concentration that along

the "effective path of light transmission", between the detector and the target reflector. Normally, the effect of higher concentration of gas plume in small range and lower concentration of gas cloud in a larger range is the same. The detector of handheld remote laser methane detector is different with traditional methane gas detector, the detector is gas average concentration of ppm * m or ppm.m. The following is described in the 5 m 100ppm gas plume, a gas plume of 2 m 250ppm appears in the path between the HRLD200 and the working beam of the background reflector is equal to that of 100ppm * 5m =250ppm * 2m * = 500ppm • m.



6. Operational Instruction

6.1 Detector makeup

HRLD600 handheld laser remote Methane detector consists of the detector, s battery charger, wrist band and carrying case.

6.1.1 Battery Pack

Battery pack is rechargeable Lithium-ion battery which can continuously work for 10 hours. Battery status is shown on the screen. The detector will remind to charge the battery when the battery is low.

Remark: Better to fully charge the battery pack for next day operation after one day's operation. Please use the attached charger to charge the battery pack.

Warning

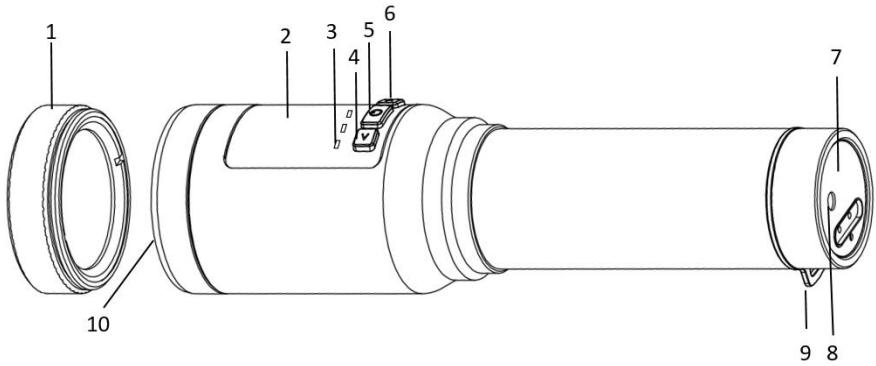
- Forbidden to charge, disassemble or replace battery in a potentially explosive atmosphere.
- Forbidden to squeeze, pierce, burn the battery and forbidden external contact to short-cut the battery.

- Replacement of battery pack should be carried out by professional personnel.

6.1.2 Charging

Charge the battery pack before the first time use of the detector. Power off the detector and start charging. **Red LED** indicates the charging is in progress. Unlit charging LED means anomaly. **Green LED** indicates the charging is complete and the charger can be disconnected. The charger is only applicable to this instrument. If the detector is charged when it is turned on, there will be a battery icon on the screen to indicate charging is in progress. If the magnetic absorption charger cannot charge the detector normally, please unplug the charger and re-start it. If it still cannot be solved, please contact the manufacturer to deal with it.

6.2 Structure drawing



1: Protective cover (Calibration gas chamber)
2: LCD screen
3: LED indicator
4: “<”button
5: Power / detection button
6: “>”button
7: Battery pack
8: Buzzer
9: Wrist band
10: Optical lens

6.3 Power on / power off

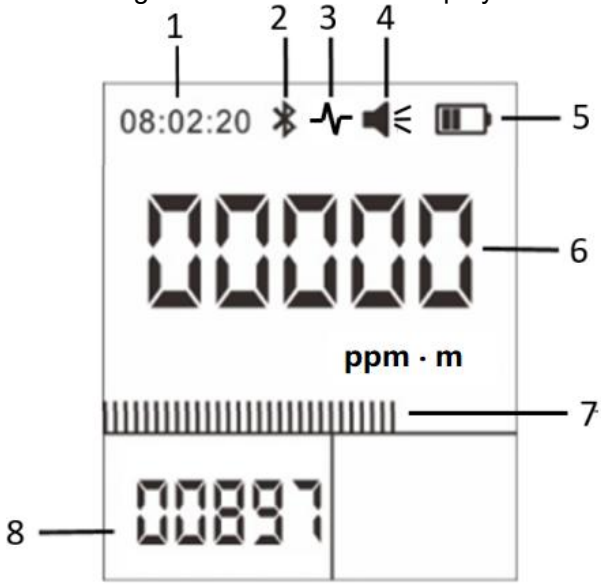
Keep holding the power button until you hear a beep, then release the power button. The detector powers on and enters the standby state. Double-pressing the power button and the detector enters the detection state for measurement.

When power-off is required, first double-press the power button to enter

the standby state, and then keep holding the power button for 3 seconds. After the shutdown progress bar is finished, release the power button and the detector is power off.

6.4 Normal display interface

Below drawing is the normal status display.

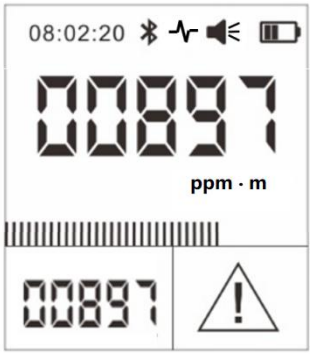


1 Time
2 Blue-tooth
3 Beam lock
4 Buzzer
5 Battery
6 Gas value
7 Reflection rate
8 Peak value

Remark: If battery is removed from the detector and then installed again, device time will be reset and the whole device needs to be re-calibrated.

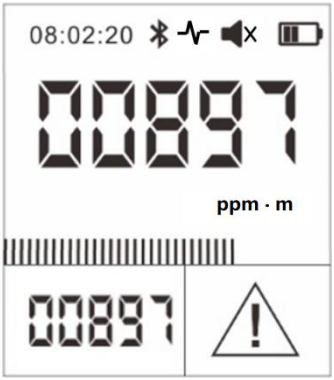
6.5 Gas alarm interface

When the gas concentration exceeds the alarm threshold, the detector will give audible and visual alarm. The display will show real-time gas concentration as illustration of following picture. In this interface, if power button is pressed, the historical alarm records will be deleted.



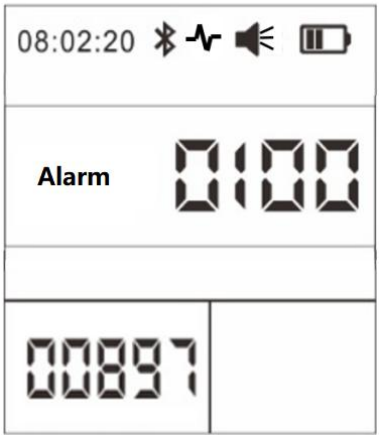
6.6 Mute

Press and hold the “<” button to switch between the mute and alarm mode. The mute mode, as illustrated in the picture below, will be switched automatically into alarm mode when the detector re-enters detection interface after standby .



6.7 Alarm threshold setting

In the detecting status (press Power/detection button twice, the detector enters into detecting status), press ">" button to pop up the alarm threshold setting sub-menu. Then press "<" button or ">" button to reduce or increase the threshold value. The default value is “100”. The setting interface is shown in the below drawing.



6.7 Aiming beam

This function is available only when the detector is in detection mode.

6.8 Record

In the standby status, press “>” button to review historical alarm value. In historical alarm value interface, press “<” button to return to standby interface. Delete a record by pressing "Power/detection" button, or page down by pressing “>” button.

< Records >		
1	2020.07.01 08:20:32	09876
2	2020.07.01 08:20:10	02595
3		
4		
5		
6		
Back	DEL	NEXT

6.9 Peak setting

When the detector is in standby interface, press and hold “>” button, the device enters into the wavelength setting interface. Then press “<” / “>” button to increase or decrease the wavelength which is defaulted at 100.

6.10 Device information

When the detector is in standby interface, double press “>” button to view device information, such as device number, Bluetooth and software version information, etc.

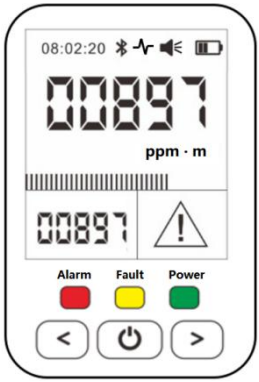
6.11 Transmit
When the detector is in standby interface, press “<” button, a transmit setting will pop up. Then “<” / “>” buttons can be used to increase or decrease the transmit which is defaulted at 20.

6.12 Display unit
When the detector is in standby interface, long-press “<” button to select the display unit of ppm • m, %LEL • m and %VOL • m. The screen will display the unit after each time of long-pressing the “<” button.

6.13 Basenoise
When the detector is in standby interface, double press “<” button to increase or decrease the basenoise value which will perform environmental interference cancellation. The default value is 10.

6.14 Detection speed
When the detector is in detection interface, press “<” button, then adjust the detect speed on a pop up. “<” / “>” buttons can be used to increase or decrease the detect speed according to actual conditions. The default value is 3 with 1 being the fastest.

6.15 Alarm LED indicator
The green power LED will flash after the detector is turned on. When the detector detects gas concentration and gives alarms, the red alarm LED will be on. When there is a beam reflection ratio fault, the yellow fault alarm LED will be on.



6.16 Charging
Charging should be in the safe and dry environment. Charging procedure is as below:

(1) Power off the detector.

(2) Aim the charger's magnetic suction plug at the tail of the machine and two electric shocks will automatically tighten the charging. The detector screen lights up and the battery icon flashes, while the red indicator flashes.

(3) Until the display screen indicates that the battery is full and the green indicator light is always on, it means that the battery pack is full. Unplug the charger outlet.

Remark

- When the charging starts, if the screen doesn't turn on or the red indicator does not flash, it means poor battery contact or charger failure.
- When the charger restarts and the above charging problem still cannot be solved, please contact the manufacturer or the seller for solution.

Warning

- Charging in dry and safe environment. Never charge or remove the battery in a hazardous location.
- Ambient temperature not exceeding 50℃.
- Remove the charger from the socket when charging is not operated.
- Use charger made supplied by Hanwei to avoid potential danger.

6.17 Beam calibration

To ensure the normal operation of the higher sensitivity of the detector, the instrument is equipped with a calibration gas chamber for laser wavelength calibration. The gas chamber is in the protective cover so that an auto calibration is carried on at startup. Calibration can also be done in the process of detection if the sensitivity is not not satisfactory.

The calibration steps are as follows:

(1) In standby mode, install the protective cover, then press "<" and ">" buttons at the same time, then release to enter calibration.

(2) Calibration will start, and for 15 seconds, "Calibration" will be shown in the display. Upon completion, "Calib Successful" will be displayed in the screen.

(3) The detector will enter standby mode.

Remark

- The wavelength shall be calibrated regularly because laser

wavelength drift is a normal characteristic. Generally, the drift will not affect the sensitivity of the measurement.

- Make sure there is enough residual power in the battery.
- Calibration over time will be displayed if the gas chamber is not installed before calibration. Contact the manufacture if the message is still there after calibration with the gas chamber installed.
- Calibration over time will be displayed if the gas chamber is damaged. Contact the manufacture.

7. Detection Method

To realize the detection purpose, 3 conditions must be met:

(1) The gas plume concentration and size must be greater than the minimum sensitivity of the HRLD200.

(2) The Detecting beam beam must pass through the pass through the gas mass.

(3) The background target (i.e., ground, building, etc.) has to reflect the laser beam back, and the reflection rate shall be not less than detector's requirement.

Press the power button to start up, double-press the detection button to target the area to be tested for detection. Note that measurements can only be made in the detection state. When measuring, the detecting beam should pass through the gas mass and shine on the ground, wall and other reflectors. Since the detecting beam is not visible, the instrument is equipped with an aiming beam. Please note that the aiming beam is parallel to the detecting beam and located at the left part of the detecting beam. During the measurement, try to keep the aiming beam at the 30mm-left of the measured object.

After double-pressing the detection button, the instrument starts to detect, when there is methane leakage, the methane concentration measured by the instrument will be displayed on the LCD liquid crystal display of the instrument. When the concentration exceeds the set alarm threshold, the instrument will send out sound and light vibration alarm, alarm sound The tone is proportional to the measured gas concentration.

Several factors may affect the concentration and size of gas mass.
(1) Windy weather or high temperature will lead to rapid diffusion of gas clouds and decrease of concentration.
(2) Since the density of methane gas is lower than that of air, it will spread upward after leakage. Therefore, the higher the distance from the ground is, the lower the concentration will be.
(3) The operator should take the above factors into account when measuring and get accurate judgment according to experience.

How to determine the gas leak happens?
Firstly, while scanning the pipeline, work the laser beam at a stable "S" pattern route to ensure the laser pass through the target area. While scan some area, if there is an alarm reminding the gas leak, the operator could scan the area to and fro. If there is an alarm every time, it is sure there is a gas leak where the sound volume is biggest. If it is still not confirmed for sure, drill a hole at that point and use other detector to detect again to make confirmation.

HRLD200 can detect leaks from up to 20 meters. Actual distance may vary due to target surface and environmental conditions. As the scanning distance is increased, the laser light level returned will decrease. As the maximum distance is approached, low laser reflection ratio sound is heard, You will need to move in closer or change the scanning angle to detect again.

Remark
- Use HRLD200 according to experience, make a better control of aiming at target position to ensure the laser beam pass through the target area.
- Windy or high temperature weather will lead to rapid diffusion of gas plume and decrease of gas concentration. Please make scanning against the wind.
- CH4's density is lighter than air, the leaked CH4 will diffuse upward, make scanning on the position over the place where the gas leak easily happens.
- Detecting beam is cone-shape beam, the spot/beam width size will become bigger with the increase of scan distance.。
- Obstruction or variations in the landscape can cause dark zones

where the laser doesn't scan, you will need to find and change to a better angle to scan again.

- Strong reflection off certain types of surfaces (e.g., stainless steel bar, glass, polished surfaces, reflectors, etc.) may give a false detection. Re-scan the area from a slightly different angle.

8. Maintenance

In order to maintain the HRLD200 in good working condition, the following maintenance should be performed as indicated:

- Put detector back into carrying case, and recharge the battery to full capacity after each use to ensure battery life. If needed, clean outer surfaces with clean rag.
- No need to clean the optical lens frequently. If needed, please use dust blower blow away the dust on optical lens, then use medical gauze or equivalent none abrasive lens tissue with small amount of alcohol. When clean the optical lens, please clean in the gentle way to avoid scratches on the optical lens.
- As needed to change accessories (e.g., battery pack) due to damage, it is better to contact local distributor for assistance or directly Contact seller for assistance.

9. Troubleshooting

Problem	Possible reason	Suggested solution
Failed to power on	Too low voltage	Check the battery connection and recharge it
Reflection fault	Target beyond range	Move closer to the target or change the measuring angle
	Low reflectivity of the background	Change reflecting background or measuring angle.
	Dirty optical lens	Clean the lens
System fault	Laser wave length drift	Reboot detector
		Calibrate the wavelength
		Contact seller

	Too low voltage	Charge the battery
Continuous gas leak alarming when scanning	Low alarming level	Reset alarming level
	Fast scanning	Slow down scanning
	Excess background reflectivity	Change reflecting background or measuring angle
No alarm when gas leaks	Laser wave length drift	Reboot detector
		Calibrate the wavelength
		Contact seller
	Laser beam doesn't pass through gas mass	Change to better position or angle. detect again
No response from gas chamber	No calibration gas in the gas chamber	Calibrate the wavelength, if there is a "calibration overtime", contact seller for processing
Charging indicator lights on	Loose charger contact	Re-install the battery
		Reboot charger
	Charger fault	Contact seller

Remark: Please contact the seller if the above troubleshooting could not solve your problems

10. User's Notes

- The visible green Spotter beam is a Class 3R laser product. Do not stare into beam or view directly with optical instruments.
- Battery is forbidden to be recharged, uninstalled and replaced in flammable or explosive atmosphere。
- Do not aim the detector to sun to avoid damage to detector!
- Do not expose detector to environment of electric shock, strong electromagnetic field or continuous severe vibrations.
- Must use customized charger provided by Hanwei to charge the

battery.

- Do not charge in dangerous environment, please charge indoors in the safe and dry environment.
- If detector is left unused for long term, please take out battery, and recharge the battery to full capacity for long term storage, please pay attention to not let the battery short-circuit.
- Lithium-ion battery contained. Do not put the battery together with other household garbage. Discarded battery should be handled by qualified recyclers or processor of dangerous goods.
- Avoid detector from falling from a height or suffering severe vibration.
- Installation of the detector must abide by local requirements of electrical installation, otherwise may lead to severe personal injury.
- Please use dust blower blow away the dust on optical lens, then use medical gauze or equivalent none abrasive lens tissue with small amount of alcohol.
- Forbidden to repair, adjust, repair or change components without permission.
- Only a qualified HRLD200 repair technician should attempt to repair or adjust the detector. Please carefully read and fully understand the operational manual before using or repair the detector.
- No attempt should be made to repair the detector. Should the detector not work properly, or indicate a fault or warning, refer to the trouble shooting section of this manual.

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