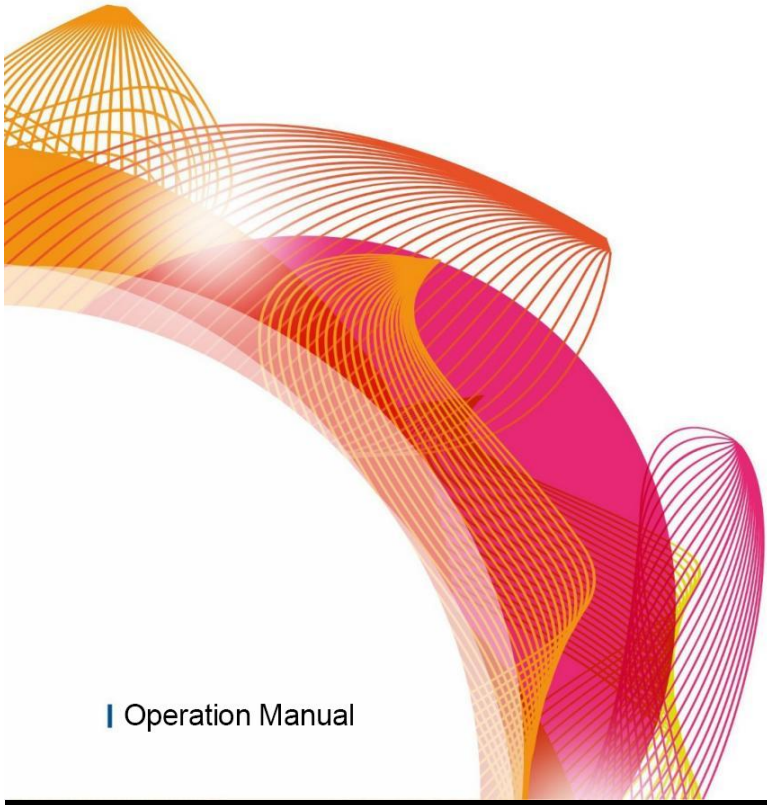
HRLD300

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 starting to use, please be familiar with the symbols that may appear in this manual:

 **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.

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 you 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.
- Do not 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
- Please charge the battery with the customized charger from Hanwei.
- Do not charge in dangerous environment, please charge indoors in the safe and dry environment.

- 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.
- Protect the detector from falling from a height or suffering severe vibration.
- Installation of the detector must abide by local requirements of electrical installation, otherwise it may lead to severe personal injury.
- Please 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.
- Forbidden to repair, adjust, repair or change components without permission.
- Only a qualified HRLD300 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.
- Do not attempt to repair the instrument, if the instrument is not working correctly. This is just an error or an alarm, please refer to the Servicing section of this instruction manual.
- The product must use the standard anti-static leather case.

1. OVERVIEW

HRLD300 Handheld laser remote methane detector is an advanced gas inspection device developed by Hanwei. It adopts the most advanced laser gas detection technology 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. This device will improve the work efficiency and reduce labor intensity.

HRLD300 adopts Tunable Diode Laser Absorption Spectroscopic (TDLAS) technology, which 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 powered by lithium battery with low consumption and long life. The software operation manual is intuitive and friendly with visual and audible alarm. It can be applied to the 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

- Remotely measure gas leakage without contact
- Detection distance can be maximum 100 meters
- Small size and lightweight design, easy to carry
- Good selectivity, response only to Methane
- One-button simple operation
- Sensitivity of 5 ppm • m
- Fast response, no alarm delay
- Color LCD display with adjustable brightness
- Selective display units among ppm • M, LEL • M and VOL • M
- Through calibration, the air background can be eliminated, and the data is more accurate

- Professional seismic design to ensure not easy to damage
- It can continuously monitor objects that can be penetrated by light for a long time, such as ordinary glass
- Aiming beam with green light to improve long-distance visibility
- Sound and light vibration alarm function at the same time
- Alarm point can be set in the range of 0 ~ 9999ppm • m
- Self -Test function
- Low battery voltage warning
- Low consumption, can be used for continuous testing
- Intrinsically safe design

3. Specification

Gas	CH_4
Principle	TDLAS
Sensitivity	5ppm • m
Detection range	0～100000ppm • m
Distance	100 meters
Response time	T90 < 0.05S
Working temperature	-30℃～50℃
Storage temperature	-30℃～60℃
Humidity	0 ~ 99% RH (no condensation)
Explosion-proof grade:	Intrinsically safe
Ingress protection	IP66
Weight	About 600g
Voltage	DC3.7V
Working time	8 hours continuously
Display	Color LCD screen
Lifespan	10 years
Alarming method	Visual &audible alarm
Penetrating	An object that can be penetrated by light

Data transmission	Blue-tooth
Accessory	Battery Charger, wrist band

Remark: The sensitivity to gas concentration relies on the distance from instrument to target, and reflection factor of target reflector.

4. Product introduction

HRLD300 adopts the optical path design of transmitter-receiver integration, which is easy to use. The detector emits two lasers of detecting light and aiming light. Detecting light is invisible while aiming light is visible. After double-clicking the detection button, the detector starts to detect and the aiming lights starts to light up. After double-clicking the detection button again, the detector stops detection and the aiming light is turned off. When in standby mode, the detector will automatically enter the sleep state if it is not operated for a long time. When the operator clicks any button, the detector will start by itself. Double-clicking the detection button to continue the detection.

When using the device, do not look directly into the green Spotter beam or shoot it into the eyes of others or cause distraction to drivers on the road.

When in detection status, it will display the concentration of Methane on LCD screen if there has methane leak and give alarm if the concentration exceeds 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 alarm reminding the reflection fault. Please move to proper

distance or angle to operate detection.

HRLD300 has superior environment durability, and the reasonable dust on lens will not influence the sensitivity and detection range.

HRLD300 is powered by lithium battery and it can work for 8 hours normally.

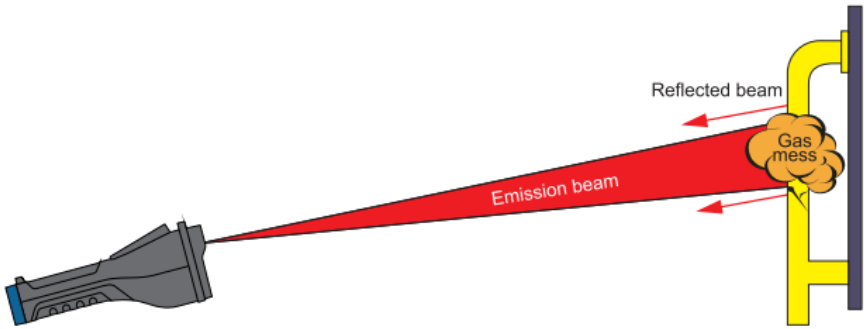
Warning

- 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.
- Please charge the battery with the customized charger from Hanwei.

5. Principle introduction

5.1 Detection principle

HRLD300 adopts advanced tunable diode laser absorption spectroscopy (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. Adopted DSP digital signal processing technique allows digital circuit for signal generation, analysis and processing, it will improve the anti-interference ability, stability and repeatability of the system.



When the laser from HRLD300 hits at the target gas pipeline, part of the laser beam will be absorbed if there has gas leak. After passing through the gas mess, the laser beam will return after being scattered by the earth surface or the wall behind the gas. The returned scattered light will be collected by 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;

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

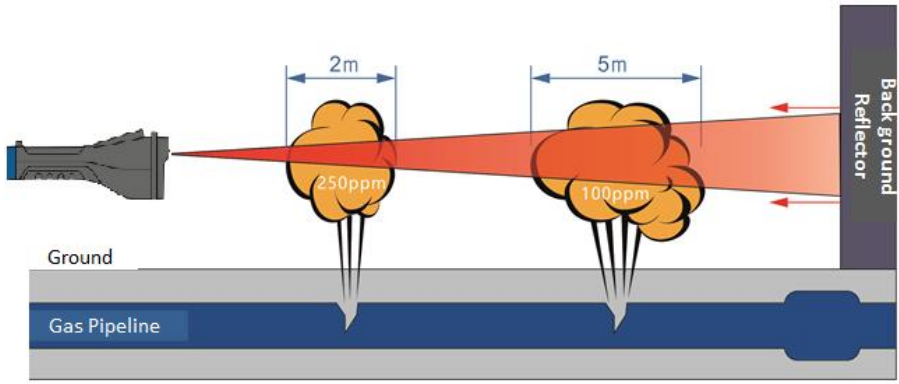
Scanning Distance: The longest working distance of handheld remote laser methane detector;

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 unit is ppm

or %LEL. HRLD300 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 unit of handheld remote laser methane detector is different with traditional methane gas detector, the unit is gas average concentration of 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 HRLD300 and the working beam of the background reflector is equal to that of 100ppm * 5m =250ppm * 2m * =500ppm • m.



6. Operational instruction

6.1 System Makeup

HRLD300 handheld laser remote Methane detector consists of the detector, sight, battery, charger, wrist band and carrying case.

6.1.1 Battery Pack

Battery pack is rechargeable Lithium-ion battery which can continuously work for 8 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 operation of

next day after one full working day. 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 Charger

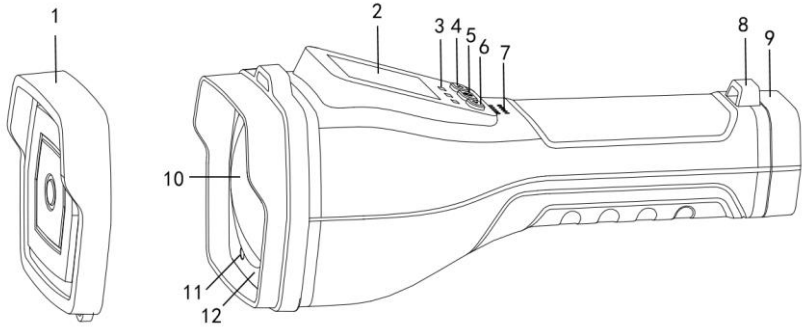
Charge the battery pack for the first time to use of the detector. When charging starts, the screen battery symbol and red indicator light will flash to indicate that the charging is in progress. If the charging fails or is not charged, the screen and indicator light will not come on. During the charging process, there will be no operation for 20 seconds, and the system will enter the sleep state. The screen will be off. Holding the button "<" or ">" for 3 seconds, the system will be awakened, and the current charging power can be checked on the screen. When the screen power symbol is full and the green indicator lights up, the battery is full. You can unplug the charger. The charger is only applicable to this instrument.

Remark: 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.

6.1.3 Sight

A sight is provided to help indicate the position of the spotter beam. After installation of the sight, please adjust the spotter beam parallel to the red or green dot in the sight.

6.2 Operation Instruction



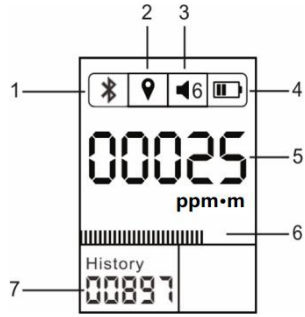
No.	Function	No.	Function
1	Protective Cover	7	Buzzer
2	LCD screen	8	Wrist band
3	Indication LED	9	Battery pack
4	“>” button	10	Optical lens
5	Power/detection button	11	Detecting beam
6	“<” button	12	Spotter beam

6.2.1 Power On/Off

Keep holding the power button until you feel the vibration, then release the power button. The detector powers on and enters the standby state. Double-clicking the power button and the detector enters the detection state for measurement. When power-off is required, first double-click 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.

6.2.2 Normal display interface

Below drawing is the normal status display:



1-Bule-tooth icon 2-Reserved function

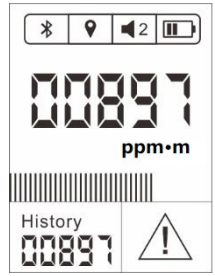
3-The volume level 4-Battery Indication

5-Gas Concentration 6-Laser Reflection Rate

7-Peak value of historical record

6.2.3 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.



6.2.4 Volume Setting

In the standby status, click ">" button to pop up the volume setting sub-menu. Then click "<" button or ">" button to reduce or increase the volume. The setting interface is shown in below diagram:

6.2.5 Alarm Threshold Setting

In the detecting state, press ">" button to pop up the alarm threshold setting sub-menu. Then click "<" button or ">" button to reduce or increase the threshold value. The initial value is “100”. The setting interface is shown in the below diagram:

6.2.6 Aiming the laser

The aiming laser will only work in the detection state.

6.2.7 Records

During the detection status, long press the ">" button to save the historical alarm value to historical data, and clear the historical alarm value on the display interface. Click the power button / detect button to clear the historical alarm value, but it will not be saved in the historical data. After entering the main menu, select Records, click the

power/detection button to enter to view historical data.

- Click the "<" button to return to the main menu,
- Click the power/detection button to delete all historical records.
- Click the ">" button to the next page to view more historical data.

Record		
1	2020.07.01 08:20:32	98765
2	2020.08.03 13:40:59	25955
3		
4		
5		
6		
7		
8		
9		
10		
Back	Delete	Next

6.2.8 Concentration unit switching

In the standby interface, after long pressing the "<" key, the concentration unit can be switched to ppm • m, %LEL • m, %VOL • m in turn. The default concentration unit is ppm • m.

6.2.9 Background threshold

In the standby interface, after double-clicking the "<" key, the background threshold can be increased or decreased to cancel the environmental interference. The default value is 0, and an appropriate background threshold can be selected according to the actual application.

6.2.10 Response rate

In the detection interface, click the "<" button, the rate setting option will pop up, click the "<" or ">" button to decrease or increase the rate, the default value is 3. Rate 1 is the fastest, and an appropriate rate can be selected according to the actual application

6.2.11 Device Information

In the standby interface, after double-clicking the ">" key, the device

number, Bluetooth and software version information will appear.

6.2.12 Alarm LED indication

There are 3 alarm indicators:

Alarm: in red color. When the detector detects gas concentration and gives alarms, this indicator will be on.

Fault: in yellow color. When there is a laser reflection ratio fault, this indicator will be on.

Power: in green color. When the detector is power on, this indicator flashes.

6.3 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 charging, if no operation within 20 seconds, the detector will enter the sleep state and the screen will be off. Keep holding the "<" button or ">" button for 3 seconds, the detector will be awakened. The charging process can be checked on the screen.
- 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.
- Ambient temperature not exceeding 50℃.
- Plug out the charger plug from power socket when charging is not operated.
- Make sure to use charger made by Hanwei to avoid potential danger.

6.4 Wavelength calibration

In order to ensure the normal operation of the telemeter with higher sensitivity, the instrument has its own calibration gas chamber, which is used to calibrate the laser wavelength. The calibration steps are as follows:

(1) Take the instrument out of the instrument case.
(2) In the standby state, press the "<" and ">" keys at the same time, and release them at the same time to enter the calibration state.
(3) You will see that the number will increase from 0 to 500, and then decrease from 500 to 0. This process takes about 2 minutes.
(4) After entering the standby interface, please press the power button to shut down.
(5) After restarting, the normal detection can be started.
(6) If the operator feels that the sensitivity is reduced, the laser wavelength can be calibrated through this calibration process. To ensure maximum measurement sensitivity, we recommend that operators perform a calibration every three months.

Remark:

- The drift of the laser wavelength is a normal characteristic. Regular calibration will not affect the sensitivity of the

measurement.

- After the wavelength calibration is completed, please restart the instrument.
- When performing wavelength calibration, please ensure that the battery of the instrument is fully charged.

7. Detection Method

7.1 To realize the detection aim, 3 conditions must be met:

(1) The gas plume concentration and size must be greater than the minimum sensitivity of the HRLD300.

(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.

7.2 Press the power button to start up, double-click 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.

7.3 Double-click the detection button to start the detection. When there is a methane leakage, the detected methane concentration will be displayed on the LCD screen of the instrument.

7.4 Several factors may affect the concentration and size of gas mass.

7.4.1 Windy weather or high temperature will lead to rapid diffusion of gas clouds and decrease of concentration.
7.4.2 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.
7.4.3 The operator should take the above factors into account when measuring and get accurate judgment according to experience.

7.5 How to determine the gas leak happens?
Firstly, while scanning the pipe, 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.

7.6 HRL300 can detect leaks from up to 50 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 HRLD300 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. The spot/beam width size is around 50 cm at 30 meters 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 HRLD300 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 Hanwei for assistance.

9. Trouble shooting

Problem	Likely Cause	Solutions

Failed to power	Low battery	Check the battery and
Reflection fault	Target beyond range	Move closer to the target or change the
	Low reflectivity of the background	Change reflecting background or
	Dirty optical lens	Clean the lens
System fault	Laser wave length drift	Reboot detector
		Calibrate the
		Contact Hanwei
	Low battery	Charge the battery
Continuous gas leak alarming when scanning	Low alarming level	Reset alarming level
	Fast scanning	Slow down scanning
	Target beyond range	Mover closer to the
	Excess background reflectivity	Change reflecting background or
No alarm when gas leaks	Laser wave length drift	Reboot detector
		Calibrate the
		Contact Hanwei
	Laser beam doesn't pass through gas	Change to better position or angle.
Charging indicator light	Loose Charger Contact	Re-install the battery
		Reboot charger
	Charger fault	Contact Hanwei

Remarks: Please contact the manufacture 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.
- Protect the 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 HRLD300 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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