

PQWT

WATER LEAKS DETECTOR

PQ125 SERIES

USER MANUAL



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The Company reserves the right to upgrade and improve its products at any time without prior notice. The actual product specifications shall prevail. The final right of interpretation is vested in the Company.

First Edition, 2025

Please read the user manual carefully before using this product.

PRODUCT INTRODUCTION

The PQ125 series water leak detector is a new generation of intelligent detection equipment independently developed by our institute, specifically designed for pressure pipeline leak detection scenarios in municipal, firefighting, and thermal energy applications. Equipped with a multi-sensor configuration, including the dual-membrane resonance sensors DMR-V59 and DMR-H40, the acoustic resonance sensors RCS-L6 and RCS-S3, and the trace leak detection sensor TLS-H8, it offers flexible adaptation to various detection needs such as external main pipelines and indoor branch lines.

Leveraging its core technology of precise acoustic signal acquisition and intelligent analysis algorithms, the instrument enables centimeter-level accuracy in locating leak points. It effectively addresses industry challenges in detecting leaks in both outdoor and indoor pressure pipelines, providing an efficient and intelligent technical solution for municipal maintenance, fire safety, and household pipeline management.

PRODUCT FEATURES

[HIGH-FREQUENCY PRECISION LEAK POINT DETECTION]

Utilizing a highly sensitive piezoelectric design, it quickly identifies high-frequency leak signals generated by pipe cracks. With fast response, high positioning accuracy, and strong anti-interference capabilities, it is suitable for use in urban water supply mains, high-pressure water supply pipelines, and other applications, accurately capturing subtle leaks.

[LOW-FREQUENCY DEEP PENETRATION DETECTION]

Through an optimized low-frequency resonance design, it easily penetrates thick-walled pipes and deep buried layers, maintaining a high signal-to-noise ratio even in noisy environments. It is suitable for deep detection in applications such as external network pipelines, industrial water pipes, and deep underground water supply systems.

[SMART HOME LEAK PREVENTION]

Equipped with lightweight acoustic acquisition technology, it can detect micro-leaks in household pipes in real time. Compact, stable, and easy to install, it is an ideal choice for home leak prevention, suitable for detecting tap water pipes, floor heating pipes, and internal water use.

[TIME DOMAIN WAVEFORM VISUALIZATION ANALYSIS]

This feature provides active analysis that dynamically displays the strength of key leakage signals. It supports active gain compensation to enhance leakage signals, extracts leakage signal characteristics, tracks signal changes, and locks onto them, enabling visual and interactive exploration of leakage conditions.

[INTELLIGENT LEAKAGE SIGNAL PROCESSING]

This feature leverages intelligent algorithms for software-level control, seamlessly integrating with sensors. It can filter leakage signals at specific frequencies and effectively suppress interference. It also supports adaptive filtering for on-demand filtering, adapting to specific frequency bands with real-time adaptation to environmental changes.

[DUAL MEMBRANE RESONANCE SENSOR]

The double-layer piezoelectric ceramic membrane undergoes mechanical vibration when receiving sound waves. When the frequency matches the natural frequency of the ceramic membrane, resonance occurs, resulting in vibrational amplitude and synergistic resonance. When the target measurement acts on the dual membrane, the sensor detects changes in the resonance amplitude to capture the intensity of the target quantity.

[ACOUSTIC CHAMBER RESONANCE SENSOR]

This type of sensor operates based on the reverberation and resonance characteristics of sound waves within an acoustic chamber. By monitoring changes in the reflection and superposition (reverberation) patterns of sound waves inside the chamber, it captures sound wave signals conducted through the ground. Such sensors leverage the "constraint and amplification" effect of the acoustic chamber on sound waves, offering high sensitivity to minor vibrations.

[TRACER LEAK DETECTION SENSOR]

This sensor is used to detect leakage points in closed systems such as pipelines, containers, and equipment. Its core principle involves tracking the diffusion trajectory of a pre-introduced "tracer substance," such as a specific gas, to accurately locate leakage points and assess the extent of leakage. Combining the targeting capability of tracer technology with the sensitivity of detection technology, this type of sensor is indispensable in applications such as pipeline leak detection, industrial sealing tests, and equipment maintenance.

MAIN PARAMETERS

MODEL	PQ125A	PQ125B	PQ125C	PQ125D	PQ125E
MEASUREMENT DEPTH	0.5m	3m	3m	6m	8m
DETECTION FUNCTION	Indoor	Outdoor	Indoor/outdoor	Indoor/outdoor	Indoor/outdoor /Gas
DETECTION MODE	General Detection ,Location				
GAIN	Default 3 levels, 10 levels adjustable				
VOLUME	Default 5 levels, 10 levels adjustable				
CONNECT TO COMPUTER	Transmit data				
FREQUENCY ACQUISITION/ ADJUSTMENT RANGE	Indoor:600Hz-15kHz Outdoor: 20Hz-5kHz				
SIGNAL-TO-NOISE RATIO	100dB				
THD+N	-93dB				



SAMPLING RATE	96kHz
ADC	24-bit
MICRO SD	8GB
AI	Intelligent Time Domain Waveform
DIRECTIONAL PATTERN	Ground-Receiving
SENSITIVITY	93±3dB SPL (1kHz)
CORE PROCESSOR	PNEAUD H5 32-bit Processor
SENSOR RANGE	20dB~80dB SPL
MONITOR HEADPHONES	Closed-Back Noise Cancelling (Stereo)32Ω±15%
TRANSDUCER SPECIFICATIONS	φ50mm
POSITIONING RANGE	Indoor:±0.25m Outdoor:±1m
SENSOR DETECTION	Identify the type of inserted sensor
RECORD	Can record audio
BRIGHTNESS ADJUSTMENT	Default 50%, infinitely adjustable
SLEEP	Default not sleep, Can be set to 10 minutes, 15 minutes, 30 minutes automatic sleep
DISPLAY SCREEN	7-inch LCD screen resolution 1024*600
WORKING TEMPERATURE	-20°C~50°C
POWER CONSUMPTION	≈3W
WORKING TIME	≤8 Hours
CHARGING TIME	6-8 Hours
CHARGER	5V2A USB charging
BATTERY	3.7V 7000mAh
PRODUCT WEIGHT	Host 0.6kg
PRODUCT SIZE	Host size: 221x149x43mm

PRODUCT COMPOSITION

1.ACCESSORIES DESCRIPTION



Host Machine

PQ125A PARTS LIST



PQ125B PARTS LIST



PQ125C PARTS LIST



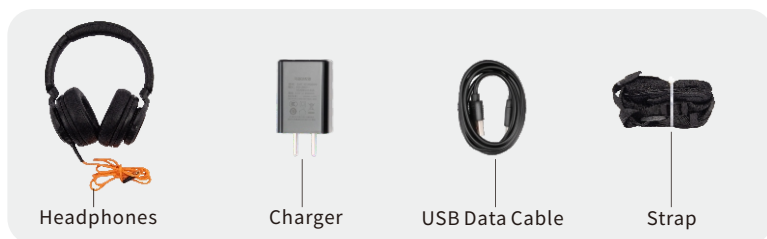
PQ125D PARTS LIST



PQ125E PARTS LIST



OTHERS



HOST: collect and process data.

CONTROL HANDLE: connect acoustic sensor and host.

DMR-V59: Used for routine indoor ground detection, convenient for handheld operation and mobility.

DMR-H40: Used for detecting narrow indoor spaces, such as gaps between objects and walls, offering more contact area and higher accuracy.

RCS-S3: Used for outdoor hard and soft ground, detecting pipeline networks with metal or plastic pipe diameters ≤ 100 mm and burial depths up to 3 meters.

RCS-L6: Used for outdoor hard and soft ground, detecting pipeline networks with metal or plastic pipe diameters ≥ 100 mm and burial depths up to 6 meters.

Listening Rod: Used to connect RCS-S3 or RCS-L6 sensors when detecting soft muddy ground.

TLS-H8: It is used for tracer gas detection. A hydrogen-nitrogen mixture (95% nitrogen, 5% hydrogen) is injected into the pipeline, which can also be produced on-site using a hydrogen generator to ensure flexible and convenient gas supply. The gas diffuses inside the pipeline. If there is a leakage point, the gas will escape from it. The sensor detects the concentration of the escaping gas signal to locate the leakage area and position, with a detection depth of up to 8 meters.

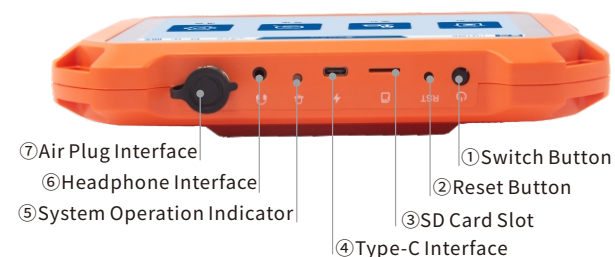
STRAP: connect to the host strap slot.

USB DATA CABLE: connect to the computer and transmit host data.

CHARGER: used to charge the device.

2.EQUIPMENT INTERFACE DESCRIPTION

HOST MACHINE



①**Switch Button:** press to turn on/off;

②**Reset Button:** force shutdown;

③**SD Card Slot:** SD storage card;

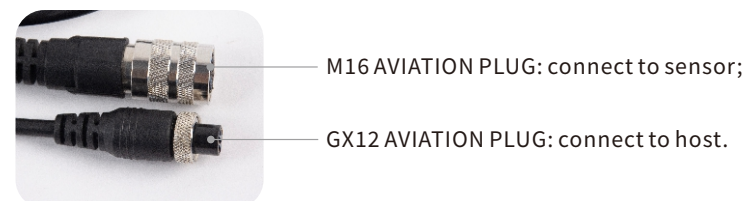
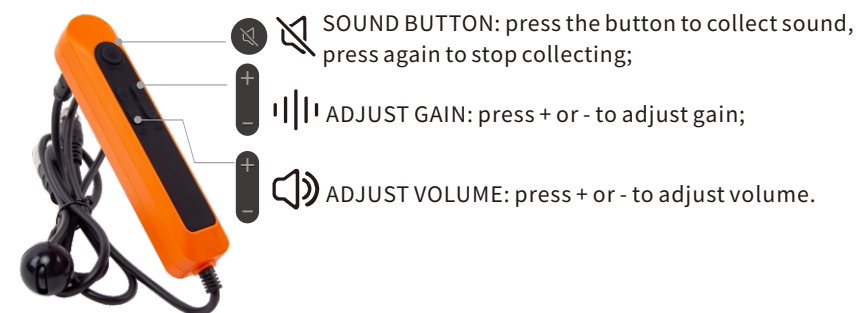
④**Type-C Interface:** charging and connecting data;

⑤**System Operation Indicator:** display the operating status of the system;

⑥**Headphone Interface:** connect headphones;

⑦**Air Plug Interface:** connect the control handle.

CONTROL HANDLE

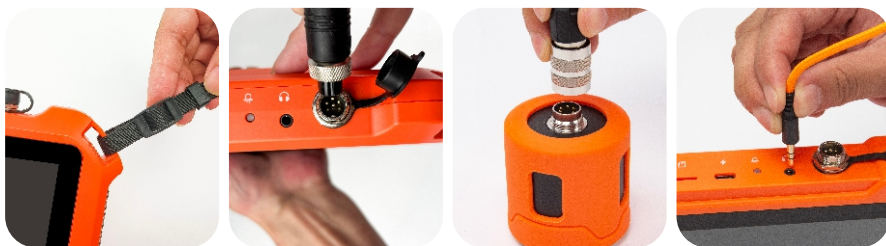


OPERATION INSTRUCTIONS

(Take PQ125E as an example)

1. INDOOR DETECTION

- 1 Select "DMR-V59" or "DMR-H40" sensor according to the indoor use environment, connect the GX12 aviation plug of the control handle to the host, connect the M16 aviation plug of the control handle to the sensor, insert the earphone into the earphone jack of the host, and connect the host to the shoulder strap. As shown below:



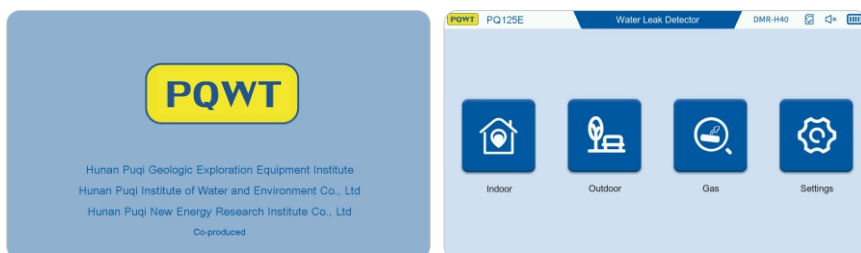
STEP 1:
Connect the host and the shoulder strap;

STEP 2:
Open the black cover of the host's aviation socket, align the groove of the GX12 aviation plug with the convex position of the host's aviation socket, and tighten the nut on the aviation plug;

STEP 3:
Open the black cover of the sensor's aviation socket, align the groove of the M16 aviation plug with the convex position of the sensor, and tighten the nut on the aviation plug;

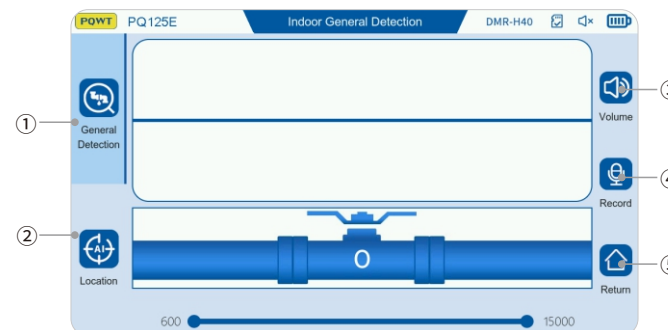
STEP 4:
Align the earphone plug with the host's earphone jack and insert it.

- 2 Press and hold the host's power button for 3-5 seconds to turn on the machine, enter the power-on interface, and then enter the main interface. As shown below:



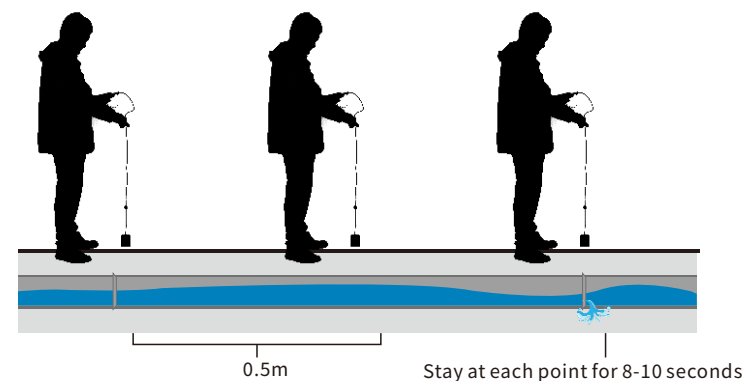
GENERAL DETECTION MODE

- 1 After entering the main interface, click the "Indoor" button to enter the indoor General Detection mode. As shown below:

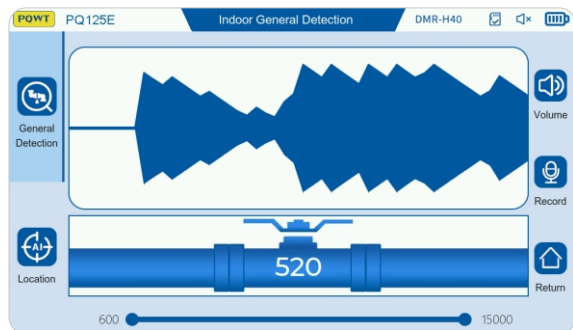


- 1 **General Detection:** Click to enter the General Detection mode;
- 3 **Volume:** Volume adjustment;
- 2 **Location:** Click to enter the Location mode;
- 4 **Record:** Click to record in real time;
- 5 **Return:** Click to return to the main interface.

- 2 Place the sensor on the ground above the pipe, adjust the volume to 5, and the gain to 3. Press the control handle switch to monitor the water leakage, and press the control handle switch again to stop the water leakage monitoring. The sensor moves along the ground above the tested pipe for detection, each moving distance is 0.5 meters, and the stay time at one point is about 8-10 seconds. As shown below:



- During the detection process, when the sensor moves from one point to the next, the operator should keep the sound signal memory of the previous point to facilitate signal comparison between points. When the sound is found to be different from other places or becomes larger, the time domain dynamic waveform is continuous and the amplitude is stable, there may be a suspicion of water leakage here. With this point as the center, compare the signal strength from front to back and left to right to determine the suspected water leakage location. As shown below:

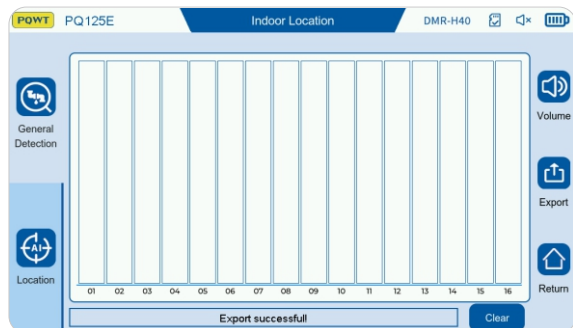


⚠ TIPS

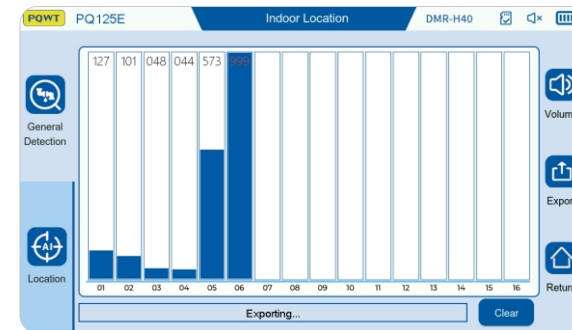
- If this happens, it is initially judged that the leak is a suspected leak. The sound caused by the vibration of the tee and elbow should be excluded. In addition, during the peak water usage, the water flow is fast, and the sound of the faucet will also produce continuous sound. This method is suitable for detection at night when the water usage is low;
- The recording function is mainly used to record the sound at the leak point on site. Click the recording button to start recording, and click the stop button to stop recording. After the recording is completed, the audio file is saved in the record data folder of the memory card.

LOCATION MODE

- Click the "Location" button to enter the "positioning" mode. The screen displays the information collection box of 16 points, that is, the signals of 16 points are collected and retained on the screen, which is convenient for comparing the signal strength of each point, so as to determine the leak location. As shown below:



- Place the acoustic sensor on the ground above the detection pipeline, and "click" any position in the 01 box from 01 in sequence, and a blue column will appear. The signal value will appear above the column. When the signal value is red, the instrument starts to collect valid signals. After the thick column is completely stable, click anywhere in the column frame, and the blue signal column will lock and stop. At this time, the signal value color is displayed in black, which means it is locked. As shown in the figure below:



After the detection of point 1 is completed, move the sensor to the next point position, repeat the previous operation, and so on. The signal collection of 16 points can be completed for signal comparison.

⚠ TIPS

- This mode is generally suitable for areas where the leakage range has been roughly determined or where the signal crosstalk occurs. While positioning and detecting, you can also use headphones to listen to the sound wave signal of each point for comparison;
- Click the "Clear" button to clear all positioning data:
- Click the "Export" button to capture the positioning interface picture and save it to the SD storage card.

2. OUTDOOR DETECTION

- Choose a "RCS-L6" or "RCS-S3" sensor according to the use environment, connect the GX12 aviation plug of the control handle to the host, connect the M16 aviation plug of the control handle to the sensor, insert the earphone into the headphone jack of the host, and connect the host strap. As shown below:



STEP 1:
Connect the host and the shoulder strap;

STEP 2:
Open the black cover of the host's aviation socket, align the groove of the GX12 aviation plug with the convex position of the host's aviation socket, and tighten the nut on the aviation plug;

STEP 3:
Open the black cover of the sensor's aviation socket, align the groove of the M16 aviation plug with the convex position of the sensor, and tighten the nut on the aviation plug;

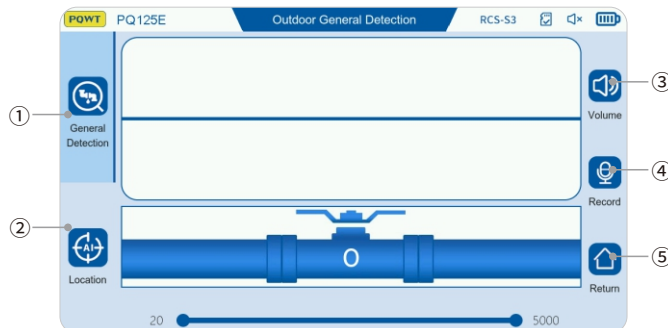
STEP 4:
Align the earphone plug with the host's earphone jack and insert it.

- ② Press and hold the host's power button for 3-5 seconds to turn on the machine, enter the power-on interface, and then enter the main interface. As shown below:



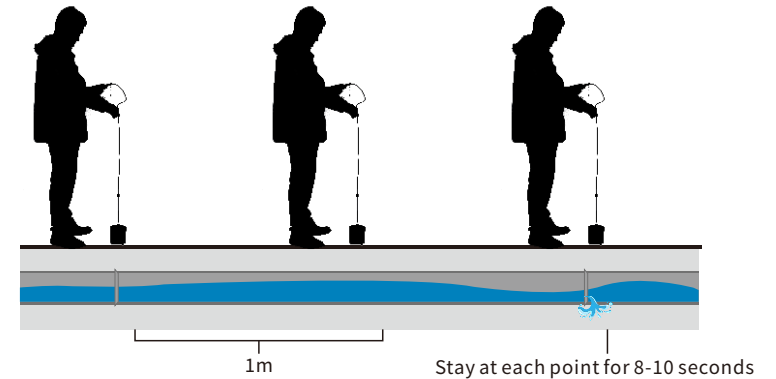
GENERAL DETECTION MODE

- ① After entering the main interface, click the "Indoor" button to enter the indoor General Detection mode. As shown below:

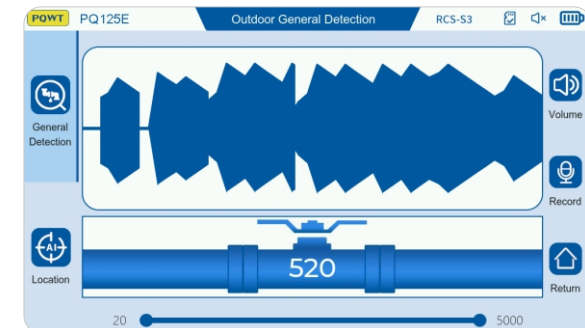


- ① **General Detection:** Click to enter the General Detection mode;
- ② **Location:** Click to enter the positioning mode;
- ③ **Volume:** Volume adjustment;
- ④ **Record:** Click to record in real time;
- ⑤ **Return:** Click to return to the main interface.

- ② Place the sensor on the ground above the pipe, adjust the volume to 5, and the gain to 3. Press the control handle switch to monitor the water leakage, and press the control handle switch again to stop the water leakage monitoring. The sensor moves along the ground above the tested pipe for detection, each moving distance is 1 meters, and the stay time at one point is about 8-10 seconds. As shown below:



- ③ During the detection process, when the sensor moves from one point to the next, the operator should keep the sound signal memory of the previous point to facilitate signal comparison between points. When the sound is found to be different from other places or becomes larger, the time domain dynamic waveform is continuous and the amplitude is stable, there may be a suspicion of water leakage here. With this point as the center, compare the signal strength from front to back and left to right to determine the suspected water leakage location. As shown below:



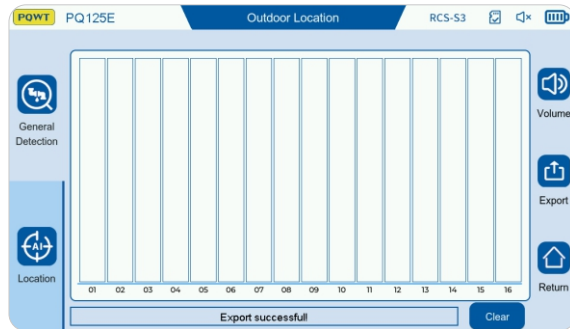
TIPS

1.If this happens, it is initially judged that the leak is a suspected leak. The sound caused by the vibration of the tee and elbow should be excluded. In addition, during the peak water usage, the water flow is fast, and the sound of the faucet will also produce continuous sound. This method is suitable for detection at night when the water usage is low;

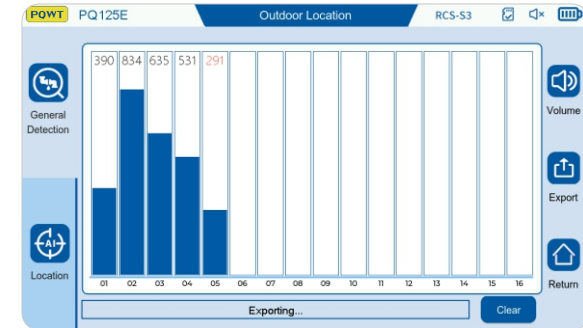
2.The recording function is mainly used to record the sound at the leak point on site. Click the recording button to start recording, and click the stop button to stop recording. After the recording is completed, the audio file is saved in the record data folder of the memory card.

LOCATION MODE

- 1 Click the "Location" button to enter the "positioning" mode. The screen displays the information collection box of 16 points, that is, the signals of 16 points are collected and retained on the screen, which is convenient for comparing the signal strength of each point, so as to determine the leak location. As shown below:



- 2 Place the acoustic sensor on the ground above the detection pipeline, and "click" any position in the 01 box from 01 in sequence, and a blue column will appear. The signal value will appear above the column. When the signal value is red, the instrument starts to collect valid signals. After the thick column is completely stable, click anywhere in the column frame, and the blue signal column will lock and stop. At this time, the signal value color is displayed in black, which means it is locked. As shown in the figure below:



After the detection of point 1 is completed, move the sensor to the next point position, repeat the previous operation, and so on. The signal collection of 16 points can be completed for signal comparison.

TIPS

- 1.This mode is generally suitable for areas where the leakage range has been roughly determined or where the signal crosstalk occurs. While positioning and detecting, you can also use headphones to listen to the sound wave signal of each point for comparison;
2. Click the "Clear" button to clear all positioning data;
3. Click the "Export" button to capture the positioning interface picture and save it to the SD storage card.

3. GAS TRACER DETECTION

- 1 Inject hydrogen-nitrogen mixed gas (nitrogen 95%, hydrogen 5%) into the pipeline to be tested.
- 2 Install the TLS-H8 sensor, align the aviation plug on the sensor connection line with the main engine aviation socket, and connect the main engine to the strap. As shown below:



STEP 1:

Connect the main engine and the strap;

STEP 2:

Open the black cover of the main engine aviation socket, align the groove position of the GX12 aviation plug with the convex position of the main engine aviation socket, and tighten the nut on the aviation plug;

STEP 3:

Align the metal head of the telescopic rod with the TLS-H8 sensor socket, insert it and tighten it.

- ③ Click "Gas" to enter the gas detection mode. As shown below:



- ④ Wait for the sensor to preheat for 3 minutes according to the prompt. After preheating, click Confirm. As shown below:



- ① **Reset**: Clear the current value; ② **Return**: Return to the main interface.

- ⑤ If there is a value on the signal column and the numerical display, you need to click the reset button to clear the value to 0, and then perform gas detection. If there is no value, you can directly detect it after preheating. As shown below:



- ⑥ Put the sensor close to the ground for sector scanning detection. As shown in the following figure, when the sensor detects gas leakage, the signal column and value will change. The closer to the gas leakage location, the larger the signal column and value will be, and vice versa.

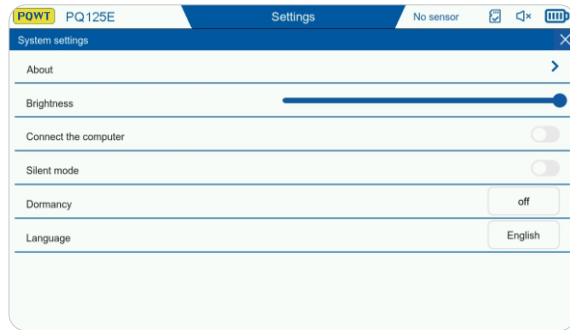


⚠ TIPS

1. Since gas can only penetrate into the ground from the penetrable medium, the position with the maximum detection value is not necessarily the position of the pipeline leakage;
2. The gas detection mode is only applicable to determining the approximate range of the pipeline leakage position. If you need to improve the positioning accuracy of the pipeline leakage, please combine the external network detection function for judgment.

3.SETTINGS

- 1 Click the "Settings" button to enter the settings interface, where you can adjust the screen brightness. The default screen brightness is 50%. The interface has the following functions: connect to the computer, silent mode, sleep, and language selection. Click "About" to enter the about interface to view the host information. As shown in the figure below:



In the illustration above, Silent Mode can be turned on or off according to user preference. The function of the handle switch will change accordingly:
When Silent Mode is on, press and hold the handle switch to enable sound, and release it to turn off the sound. When Silent Mode is off, a short press turns the sound on, and pressing again turns the sound off.

BATTERY MANAGEMENT

- 1 When placing the battery, the positive and negative poles of the battery plug must correspond to the socket. Please use the original charger for charging;
- 2 The battery must not be close to open flames and high temperature sources, must not be exposed to the sun, must not be burned, and must not be collided. The charger and battery should be kept away from the bedroom and away from flammable materials, and the charger should be placed in a place where heat can be easily dissipated and kept dry;
- 3 The continuous charging time should not exceed 8 hours. After full charging, the charging power supply must be disconnected in time to prevent overcharging from causing the diaphragm to break and short-circuit and explosion.
- 4 For long-term storage without use, it is recommended to perform a charging maintenance every 3 months to prevent battery damage caused by over-discharge.

NOTES

- 1 When using the instrument, please pay attention to the correct operation method. Correct usage habits will extend the life of the instrument;
- 2 The instrument is not waterproof, please pay attention to waterproofing;
- 3 Pay attention to protecting the LCD screen, do not expose the screen to direct sunlight for a long time, if there is a freeze or touch failure, please shut down and restart;
- 4 Please store the instrument in a cool and dry place;
- 5 It is forbidden to disassemble and repair the instrument without authorization, otherwise it may cause instrument data errors or system crashes.