USER MANUAL

CE

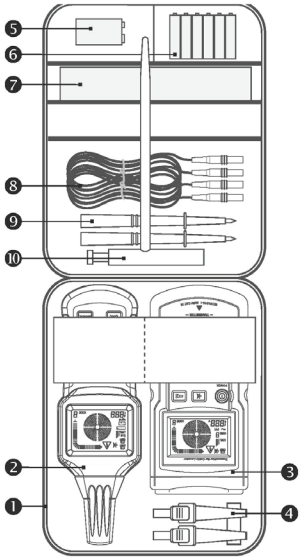
Cable locator

OPENING THE BOX

When you receive this cable locator, please inspect it carefully to ensure that it has not been damaged in transit. Normally accessories, control switches and connectors need to be checked. If there is obvious damage or functional failure, please contact the supplier.

Main parts

1. Bag
2. Receiver: 1 pc.
3. Emitter: 1 pc.
4. Accessories:
5. Crocodiles (red and black respectively)
6. Battery: 1 pc.
(9V alkaline battery, GL6F22A 1604)
7. Battery: 6 pcs.
(1.5V alkaline battery, LR03 SIZE)
8. User manual: 1 pc.
9. Test leads: 2 pcs.
10.Test probe: 2 pcs.
(red and black respectively)
10.Earth spike



SAFETY INFORMATION

⚠WARNING

This cable locator is produced in accordance with the safety specifications for electronic meters and test instruments and has been tested prior to packaging and transportation. Before using this product, please read this manual carefully and follow the instructions. Failures resulting from not following these instructions or ignoring the warnings and cautions can result in personal injury, danger to life, or equipment damage.

Definition of safety symbols

This manual includes the basic elements for the safe operation and maintenance of the cable locator. Before using this product, please read the following safety instructions carefully.

Table 1: Safety instructions

	Important information that users should read before using the product.
	Indicates that the terminal may be dangerous.
	Conformity symbol.

Table 2: Warning instructions

	Improper use can cause serious injury or death.
	Improper use or carelessness can lead to personal injury, cable locator damage, or error in measurement results.
	Recommendations or tips for operation.

Attention!

Please follow the instructions below to ensure safe operation and optimal performance.

1) Preliminary inspection

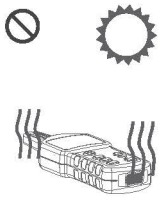
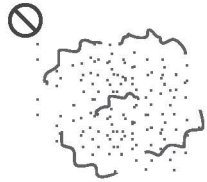
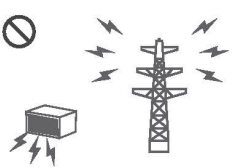
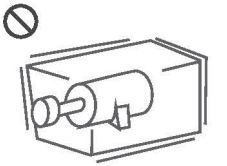
Before the first use, check if the cable locator works normally and make sure that it has not been damaged during storage and transportation. If there is any damage, contact the supplier.

	When using the Cable Locator, you must follow the safety specifications of the electronics industry.

2) Location

Temperature range for use 0-40º (32-104º), <80% RH (non-condensing) Temperature range for storage -20ºC + 60ºC (-6º140ºCF), <80% RH (non-condensing)

• To avoid failures or incidents please do not place the cable locator in the following environments:

		
Direct exposure to sunlight or high temperatures	Dust	High electromagnetic radiation
		
Water spray High humidity condensation	Corrosive gas or explosive	Mechanical vibration

3) Use

The following instructions must be followed to avoid electric shock, short circuit, or explosion:

- This cable locator can be used in live parts, but measures must be taken according to industrial safety codes to avoid electric shock and damage.
- To avoid electric shocks, you must pay special attention to the VDE and safety regulations in force regarding excessive contact voltages, when working with voltages that exceed 120V (60V) DC or 50V (25V) rms AC. Values in parentheses are valid for limited scopes (such as medicine and agriculture).
- Never try to put both battery poles in contact, for example by connecting a cable. Never throw the battery into a fire, or it could cause an explosion.
- When replacing or changing the battery, be sure to use the correct polarity. Batteries with reversed polarity may destroy the instrument. They could also explode or catch fire.

Attention!

- Measurements near electrical installations that may pose a hazard should only be carried out under the supervision of the responsible electrician.
- When the product is used to test a live line, make sure that the test connectors are disconnected from the object under test before connecting or disconnecting the test lead from the emitter, and remember that people around must be well protected.
- Never try to remove the battery posts! The battery contains very strong chemical agents. Danger of corrosion! If the contents of the battery come into contact with the eyes, rinse immediately with plenty of water and consult a doctor.
- Since the connection of the emitter with the mains can generate current in the circuit at milliamp level, in the case of alignment to the emitter ground, only the neutral conductor can be connected. If the emitter connection is made between phase and the protective conductor, the functional safety of the production conductor must first be tested, in compliance with DIN VDE 0100. The reason is that when connecting the -Continues-

emitter from between phase and earth, all parts that are connected to earth could be live generating a fault (if the earth resistance does not comply with the prescriptions).

- If user protection is not ensured, the instrument must be taken out of service and its use avoided. Safety is not guaranteed if the instrument:
  - shows obvious damage
  - does not carry out the desired measurements.
  - has been stored for a long time under unfavorable conditions.
  - has been subjected to mechanical action during transport.
- The instrument will only be used under these conditions and for the purpose for which it was designed. When the instrument is modified or changed, operational safety is not guaranteed.

Caution!

- The operating temperature of this cable locator is 0-40º C (32-140ºF)
- To avoid damage, this device must be protected from excessive mechanical vibrations during transport or use, especially from drops.
- Only professionals are authorized to calibrate and repair this instrument.
- Before use, inspect the instrument and the test lead in use for external damage. Please make sure the instrument and the test lead are intact. The instrument must not be used unless all the functions of the apparatus are well prepared for operation.
- When using the instrument, the nominal voltage of the circuit to be tested must not exceed the voltage indicated in the technical specifications of this cable locator.
- Keep the instrument away from sun exposure to ensure its perfect performance and a long life.
- If the instrument is subjected to a high electromagnetic field, its functional ability may be affected.
- Use only batteries as indicated in the technical data section.
- Try to keep the battery away from moisture. If the display shows a flashing battery sign, the batteries should be changed.

Recommendations

- Before using a locator that has been located or transported under extreme weather conditions, please place it in a favorable environment for a period of time.
- When the emitter is connected to the network, if the emitter earth is connected to the protective earth, the leakage current (if any) in the power supply can add to the current of the emitter circuit, leading to dispersion to the circuit breaker, eg FI / RCD trip.
- Please keep the original packaging for later shipments (eg for calibration of the device).

1 DESCRIPTION

1.1 Product introduction

When drilling a hole in the wall to install an air conditioner or in the ground for installing a machine, or when digging in a road, you need to know the routing of the cables, water or gas pipes in the wall or the ground to avoid unnecessary damage and even dangerous situations.

In the past there was only one solution to this situation, which was to find the construction plans for these installed services. However, in the majority of cases, these plans were not accessible and the risk of interruption of cables or pipes had to be run, carrying the consequent danger or failure of supply, electric shock, explosion, or danger of death.

Now with this cable locator developed by our company to effectively help users locate or detect cables, you don't need to take any more risks.

This cable locator is a portable instrument consisting of a transmitter, a receiver and various accessories. With advanced integrated parts and digital technology circuits, it is characterized by its reliable and safe electrical performance. The emitter sends AC voltage modulated by digital signals to the target wire (or metal pipes), which generates an alternating electric field; -Continues-

place the receiver sensor head close to this electric field and the sensor will generate induced voltage. This instrument can magnify a weak voltage signal hundreds of times and then display it on the monitor after decoding the audio frequency, demodulating and performing digital processing, so that the position of buried cables or pipes, as well as their faults, can be detected based on signal change.

This cable locator is easy to use and provides comfortable operation by means of buttons, which indicate a correct press by emitting buzzes. In addition, the screen allows visualization and the transmitter and receiver are equipped with LED lights.

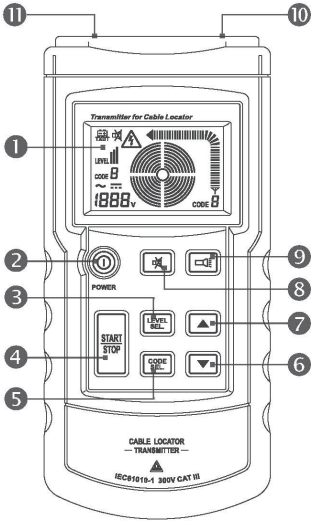
The emitter not only emits signals but also acts as a voltmeter, in this way the instrument can display the voltage of the tested line, including the AC / DC differentiation, apart from showing a warning symbol when checking an active line. The sender is also provided with a self-inspection function, which notifies on the screen if the sender is transmitting signals, making the users more confident in the checks.

The receiver display is backlit, so users can see test results even in the dark. To improve the efficiency of the test, the receiver is equipped with a loudspeaker, which will emit changing tones as the signal strength changes, in this way users can judge the effects of the test simply by the sounds, to your greatest comfort. To adapt the instrument to a noisy environment, the speaker emits a loud sound. Of course, both the transmitter and the receiver have a mute mode to avoid discomfort during use.

The cable locator is applied in construction involving telecommunication cables, power cables and pipeline construction, as well as the maintenance of such cables and pipes.

1.2 Features of the cable locator

• Detection of cables, power lines, water / gas supply pipes buried in the wall or ground.
• Detection of interruptions and short-circuits in cables and electric lines buried in the wall or the ground;
• Detection of fuses and assignment of current circuits;
• Trace of distribution sockets and plugs that have been accidentally covered by plastering;
• Detection of interruptions and short circuits in underfloor heating;
• The emitter has a built-in AC / DC voltmeter function, which can measure 12 to 400 V AC / DC voltage on a linear basis:
• AC: 12 to 400V (50 to 60 Hz) ± 2.5%
• DC: 12 to 400V ± 2.5%
• The emitter display can show a preset transmit power, transmitted codes, its own battery power, the detected mains voltage, the status of the detected AC / DC voltage from the mains and the symbol warning for mains voltage.
• The emitter has the self-inspection function to detect its own working status and display it on the LCD screen for user reference.
• The receiver's display can show the transmitter's transmit power, transmitted codes, energy from its own batteries and those of the AC transmitter induced in the detected signal, and a warning symbol for mains voltage.
• The receiver sensitivity can be adjusted manually or automatically.
• The receiver can perform frequency sweep automatically.
• Both transmitter and receiver can work in mute mode.
• The receiver is available in automatic power-off mode (it turns off automatically after 10 minutes of pressing any button)
• The receiver's LCD screen is provided with a backlight for application in low light.
• Both emitter and receiver are provided with flash light function to work in the dark.
• Additional emitters are available to amplify or distinguish various signals.
• Compact, resistant and portable.



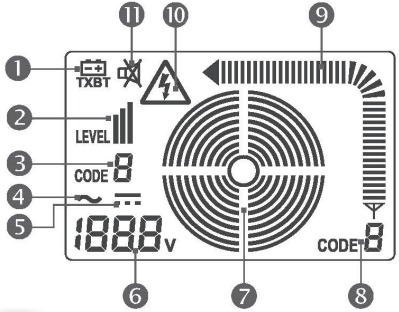
1.3 Names and functions of the parties.

1.3.1 Scheme of the issuer

1. LCD screen
2. On / off switch
3. Button to adjust / confirm power level transmission (Level I, II or III)
4. Button to transmit or stop the transmission of encoded information.
5. Button to adjust / confirm the encoded information to be transmitted. Press this button for 1 second to enter the code and press it briefly to exit (Code F, E, H, D, L, C, O or A can be selected, default would be F).
6. Down key. When setting the power level or code, press to scroll down.
7. Up key. When setting the power level or code, press to go up.

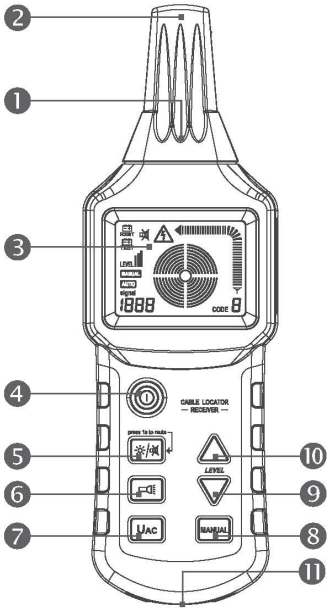
8. Key to enable or disable mute mode (there will be no key tone in this mode)
9. Key to turn on / off the flash light.
10.Terminal +, input / output of the emitter. The emitter is connected to external cables with the test connectors through this terminal to send signals and receive the detected voltage signals.
11. Ground yourself. The emitter is in contact with the earth through this terminal.

1.3.2 Emisor screen



1. Symbol to indicate the voltage / energy of the transmitter battery.
2. Transmit power level (level I, II or III)
3. Transmitted code (by default F)
4. AC mains voltage
5. DC voltage of the electrical network
6. Mains voltage value (can be used as an ordinary voltmeter; range: 12 to 400V DC / AC)
7. Transmission status.
8. Code being transmitted
9. Intensity of the signal being transmitted.
10. Symbol indicating the voltage in the network.
11. Symbol indicating the mute mode.

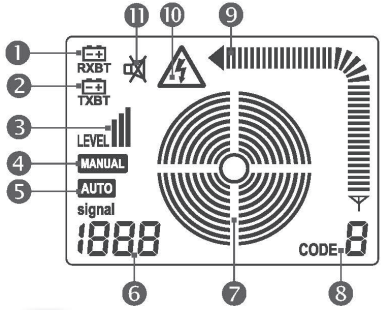
1.3.3 Receiver diagram



1. Flash.
2. Test head.
3. LCD screen.
4. On / off button.
5. Composite key for backlight and mute mode. Press lightly to enable / disable mute mode (under mute mode, both key tone and speaker are muted).
6. Key to turn on / off the flash.

7. UAC key to switch between cable locator mode and mains voltage.
8. Manual key to switch between manual or automatic cable locator.
9. Key to adjust the sensitivity down in manual mode.
10. Key to adjust the sensitivity upwards in manual mode.
11. Speaker.

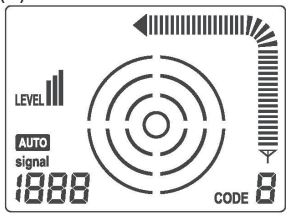
1.3.4 Receiver display



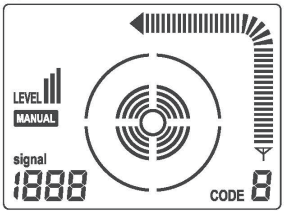
1. Symbol to indicate the voltage / power of the receiver battery.
2. Symbol to indicate the voltage / energy of the emitter battery.
3. Transmit power level (level I, II or III).
4. Manual mode symbol.
5. Automatic mode symbol.
6. In automatic mode, this number indicates the signal strength, in manual mode it shows SEL to indicate no signal or shows a number that indicates signal strength, in UAC mode, UAC is displayed .
7. Concentric circles indicate preset sensitivity in graphics. More circles indicate higher sensitivity, fewer circles indicate lower sensitivity.
8. Code received
9. Intensity of the signals.
10. Symbol indicating the voltage in the network.
11. Symbol indicating the mute mode.

1.3.5 Receiver display in cable locator mode

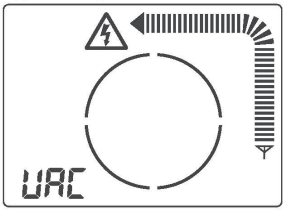
(1) Automatic mode



(2) Manual mode



(3) Mains voltage identification mode



2. METHOD OF MEASUREMENT

2.1 Measurement precautions

Attention!

1. Since the connection of the emitter with the network can generate current in the circuit at milliamp level, under live conditions the earth connection of the emitter can only be connected with a neutral conductor. If the connection of the emitter is made with the phase towards the protective conductor, the functional safety of the production conductor must be tested first, in compliance with DIN VDE 0100. The reason is that when connecting the emitter from the phase towards the earth all the parts that are connected to earth could generate an error (if the earth resistance does not comply with the prescriptions).
2. When the emitter is connected to the active network, if the earth of the emitter is connected with the protective phase of earth, the current leakage (if

exists) of the power supply may find the emitter current circuit, causing the current switch to trip. E.g. FI / RCD trips

Recommendations

1. When using the emitter as a voltage tester to check the mains voltage, a small spark will be produced when the probe touches the mains voltage, this is normal.
2. If any of the on / off, code, and level keys are active, the other two are disabled.
3. If the receiver is in automatic mode, it can switch to manual mode or mains voltage identification mode at any time; If the receiver is in manual mode, both the UAC key and the Manual key will be enabled when exiting manual mode.

2.2 Principle of operation

The cable locator includes an emitter, a receiver and accessories. The emitter sends to the target cable (or metallic pipes) an AC voltage modulated by digital signals, which generates an alternating electric field (see Fig. 2-1); place the tip of the receiver close to this field, and the sensor will generate induced voltage. This instrument can amplify this weak signal hundreds of times and display it on the LCD screen after digital processing, in this way the position of buried cables or pipes, as well as their faults, can be detected based on the change of the signal.

Caution!

1. For any application, the emitter connections must ensure a closed circuit.
2. This cable locator can only detect or locate correctly connected lines according to the described physical principle.

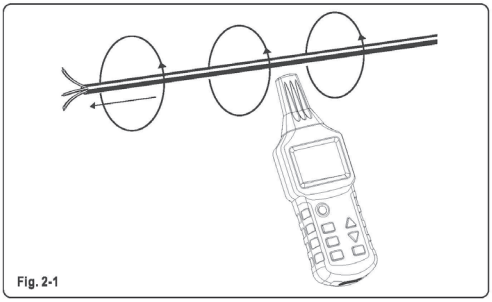


Fig. 2-1

Optional connections for this cable locator

1. Single pole application: Connect the emitter to one conductor only. Due to the high frequency of the signal generated by the emitter, only a single conductor can be located and traced. The second conductor is the ground. This arrangement causes the high-frequency current to flow through the conductor and be transmitted to the ground, similar to the operation of a radio receiver.
2. Double pole application: The emitter is connected to the conductor by two test leads. This application includes working and unused electrical networks.

The transmitter is connected to the working network:

Connect the "+" connector of the emitter to the line phase of the network and the earth connection of the emitter to the neutral line of the network. In these circumstances, if there is no load on the network, the modulated current from the emitter will go to the neutral line via connection through the capacitance distributed in the network and then return to the emitter.

The sender is connected to an unused network:

Connect the "+" connector of the emitter to a terminal of a line on the network, connect the ground to the terminal of another parallel line on the network, and then connect the other two terminals of the network to each other. In these circumstances, the modulated current will return directly to the terminal through the network. Optionally, the two test leads of the emitter can be

connected respectively to the two end ends of the conductor. In addition, the "+" conductor of the emitter can be connected to the network terminal while the earth terminal of the emitter can be connected to the earth protection terminal of the network.

2.3 Typical application examples

In this example, please take a shielded length of cable with a cross section of 1.5mm. Temporarily install 5m of this cable along the wall with surface mount clips. Make sure the wall is accessible from both sides. Create an artificial interruption at a distance of 1.5m before one end of the line. The ends of the line must be open. Select the interrupted wire at the beginning of the shielded cable and connect it using the test leads (provided) with connector 10 of the emitter. Connect the emitter connector 11 to a suitable ground. The remaining wires must also be connected to the emitter and to the same ground (See Fig.2.2).

Turn on the transmitter by pressing key 2 and the LCD screen of the transmitter will show the initial screen and the instrument will emit a sound. Press the 3 key on the transmitter to access the screen and adjust the transmission level and then press the up key 7 or the down key 6 to select the transmit power level (level I, II or III).
After this level is adjusted, press the 3 key to exit.
If you want to change the reporting code, please press the transmitter key 5 for 1 second and then press the up key 7 or the down key 6 to select the reporting code (F, E, H, D, L, C, O or A, with defect F). Press the 5 key to exit. Then press the 4 key to send the signal. At this time, the concentric circles 7 will gradually expand on the LCD screen, and the symbol 8 will show the transmission code received by the sender, and the symbol 9 will show the signal strength. Press the 4 key on the receiver to turn on and the receiver's LCD screen will show the initial screen, the instrument will beep, and the receiver will default to "auto mode".
Move the tip of the receiver slowly along the cable towards the interruption position, the symbol 3 on the receiver will show the transmit power level, 8 will show the code transmitted by the emitter, 9 will show the dynamic intensity

of the signal, and the speaker will change the pitch with the change in signal strength.
When the tip of the receiver reaches the break position, the signal strength shown by 9 and 6 will have an obvious drop until they finally disappear.
At this time, press the receiver's MANUAL key 8 to engage manual mode and then use the 9 and 10 keys to reduce the sensitivity as much as possible while ensuring that the receiver's display 8 can show the code transmitted by the transmitter. This zone will be where the interruption is located.

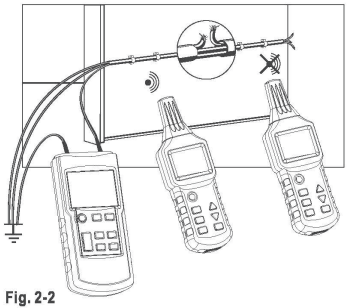


Fig. 2-2

SUGGESTIONS

1. Full contact with the earth must be assured.
2. Adjust the transmitter transmit power level to suit different detection radii. The best way is to mark the break position on the other side of the wall. Press the MANUAL key on the receiver to turn on manual mode. Press keys 9 and 10 to reduce the sensitivity and ensure that the signal can be received. Trace the signal in front of the wall with the receiver until it is no longer indicated. The position of the interrupt can be located by this setting.

3 APPLICATION DETAILS 3.1

Application of a pole

3.1.1 In open circuit

- Detect line interruptions in the wall or under the floor;
- Find and trace lines, sockets, junction boxes, switches, etc. in home facilities;
- Find bottlenecks, bends, buckles and obstructions in installation pipes using metal cables.
- Caution!
- When using this application, please make sure that the earth protection cable is working properly.

Recommendations

1. Open circuit application is suitable for finding outlets and switches in unused equipment.
2. The depth of scan depends on the medium and application. A typical depth is between 0 and 2m. The protective terminal of an electrical outlet can be used as the grounding connection for the emitter.

3.1.2 Location and tracking of lines and intakes

Preconditions:

- The circuit must be unused.
- The neutral line and the earth wire must be connected and fully operational.
- Connect the emitter to the line and to earth, following Fig. 3-1-2.

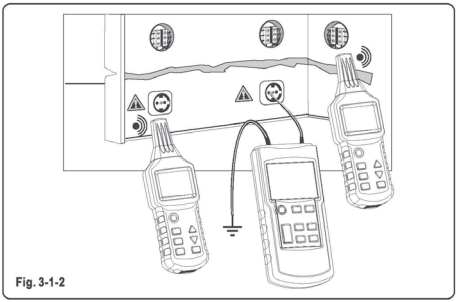


Fig. 3-1-2

Recommendations

1. Full contact with the ground must be assured.
2. With the indication of a pole, the lateral branches of the circuit can also be located (the fuse must be removed in this example)
3. If the cable that feeds the signals via the transmitter is located, p. For example, directly in parallel with other conductors (eg cable gap or conduit), or if these conductors are crossed, the signals also serve as input for the other conductors.
4. During locating and tracking, the larger the signal displayed, the closer the locator will be to the lines being drawn.
5. Adjust the transmit power level of the emitter to suit the different detection radii.
6. The position of the target can be precisely located by setting the manual mode on the receiver and selecting a suitable sensitivity.

3.1.3 Location of line interruptions

Preconditions:

* The circuit must be unused
* All lines not required must be connected to auxiliary ground according to Fig. 3-1-3.
* Connect the terminal to a wire and auxiliary ground according to Fig. 3-1-3.

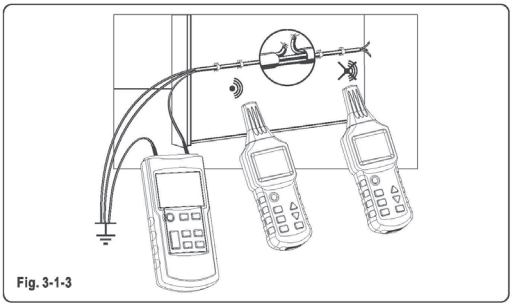


Fig. 3-1-3

Caution!

1. Full contact with the ground must be assured.
2. The transition resistance of a line break must be greater than 100kOhm.
3. When tracing the line break in multi-conductor cables, pay attention that all cables remaining in the insulated cable or conductor must be grounded in accordance with regulations. This is required to avoid cross coupling of the applied signals (by a capacitive effect of the source terminals). The tracing depth for the shielded cables and connectors is different, since the individual wires of the conductors in the shielded cables are twisted together.

Recommendations

1. The ground connected to the emitter can be an auxiliary ground, an outlet ground, or a pipe that is properly grounded.
2. During tracing along the line, the position where the signal received by the receiver drops sharply is the location of the break.
3. Adjust the power level of the emitter to suit different detection radious.

4. The position of the target can be precisely located by setting the manual mode on the receiver and selecting a suitable sensitivity.

3.1.4 Location of interruptions in the line using two emitters

When locating a interruption in the line using an emitter that feeds the end of a conductor, the location of the interruptions may not be carried out accurately in case bad conditions occur due to interference in the field.

The drawbacks described above can be easily avoided by using two emitters (one at each end) for the detection of the interruption in the line.

In this example, a different line code is set for each transmitter, eg F code in one and C code in the other. (The second issuer is not included and must be purchased separately.)

Preconditions:

* The circuit current must not be active.
* All lines that are not being used must be connected to auxiliary ground as shown in Fig. 3-1-4.
* Proceed as described in the sample application.

If the emitters are connected according to Fig. 3-1-4, the receiver will indicate C on the left side of the line break. If the receiver goes beyond the position of the break to the right, it will show F. If you are directly above the break, no line of code is displayed, due to the overlap of both emitter signals.

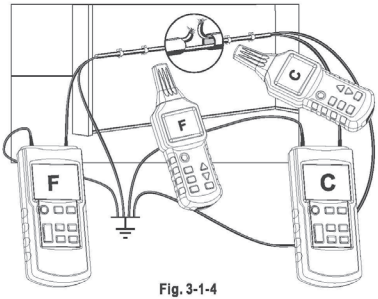


Fig. 3-1-4

Suggestions

1. Adjust the transmit power level to suit different detection radious.
2. The position of the target can be precisely located by setting the receiver's manual mode and selecting the appropriate sensitivity.

Caution!

1. Contact with the ground must be assured.

2. The transition resistance of a line break must be greater than 100kOhm.

3. The ground connected to the emitter can be an auxiliary ground, ground from a grounded outlet, or a pipe that is properly grounded.

4. When tracing the line break in multi-conductor cables, pay attention that all cables remaining in the insulated cable or conductor must be grounded in accordance with regulations. This is required to avoid cross coupling of the applied signals (by a capacitive effect of the source terminals). The tracing depth for the shielded cables and connectors is different, since the individual wires of the conductors in the shielded cables are twisted together.

3.1.5 Error detection in underfloor heating.

Preconditions:

* The circuit current must not be active.
* All lines not being used must be connected to the auxiliary ground as shown in Fig. 3-1-5a.
* Connect both emitters (if two emitters are used) as shown in Fig. 3-1-5b.
* Proceed as described in the sample application.

Precautions

1. If there is protective material on top of the heating cables, there must be no ground connection. If required, separate the shield from the ground connection.
2. Full contact with the ground must be ensured, and there must be a considerable distance between the emitter ground and the target line. If this distance is too short, the signal and the line cannot be located properly.

SUGGESTIONS

1. During tracing along the line, the position where the signal received by the receiver drops sharply is the location of the break.
2. Adjust the emitter power level to suit different detection radii.
3. The position of the target can be precisely located by setting the receiver's manual mode and selecting the appropriate sensitivity.

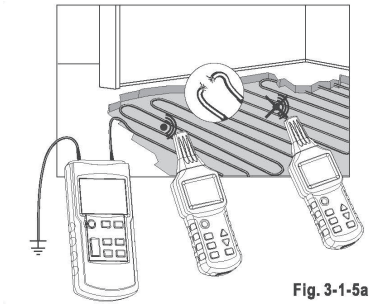


Fig. 3-1-5a

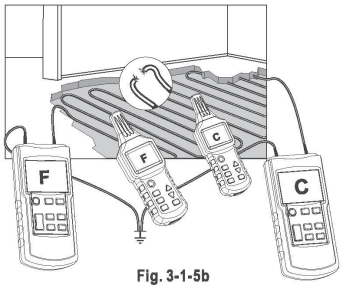


Fig. 3-1-5b

3.1.6 Detection of the narrow (blocked) part of an installed non-metallic pipe

Preconditions:

* The pipe must be made of non-conductive materials (such as plastic).
* The pipe should not be loaded.
* The emitter is connected to a metal helical tube (metal tube or flexible conductor) and an auxiliary ground, as shown in Fig. 3-1-6.
* The measurement method is the same as that used in the example.

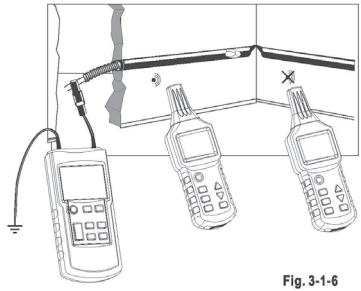


Fig. 3-1-6

1. If there is current in the pipeline, cut off the power, and connect the ground correctly when the pipeline is not loaded.
2. The end of the ground must be perfectly anchored, and the end of the ground of the emitter must be at a certain distance from the pipe to be measured. If this distance is too short, the signal and the circuit cannot be precisely located. If you only have a helical tube that is made of non-conductive material (such as fiberglass), we suggest you insert a metal wire with a section area of about 1.5mm2 into the non-metallic helical tube, and then push it towards the part narrow.

Precautions

1. If you only have a helical tube that is made of non-conductive material (such as fiberglass), we suggest that you insert a metal wire with a section area of about 1.5mm2 into the non-metallic helical tube, and then push it towards the narrow part.

2. In the pipeline detection process, the stronger the signal displayed on the Nixie tube of the detector, the closer the pipeline will be detected by the instrument.
3. In the detection process along the pipeline, if the signals received by the receiver suddenly attenuate, the localized position is where the blocking takes place.
4. Adjust the transmitting power of the emitter to suit different detection radii. Select manual mode on the receiver and the appropriate sensitivity to precisely locate the narrow part.

3.1.7 Detection of the metallic water pipe and the metallic heating pipe.
Preconditions:

* The pipe must be made of metallic material (such as galvanized steel).
* The pipe to be detected must not be on the ground. There should be a high resistance between the pipe and the ground (otherwise the sensing distance will be very short).
* Use a connecting cable to connect the grounding of the emitter to the ground, and properly anchor the end of the ground.
* Use a connection cable to connect the “+” socket of the emitter to the pipe to be detected.

The detection of the key of the metal pipe and the heating pipe. Preconditions are shown in Fig. 3-1-7a and Fig. 3.1.7b respectively:

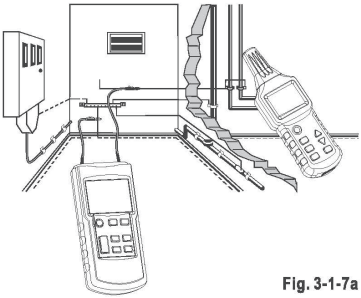


Fig. 3-1-7a

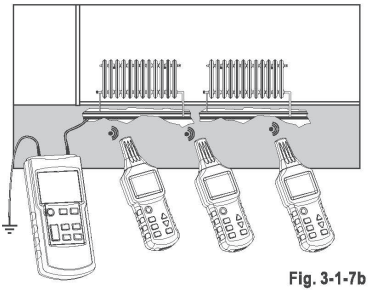


Fig. 3-1-7b

Precautions

For the sake of safety, the power supply of electrical equipment must be turned off.

SUGGESTIONS

1. The ground end of the emitter must be some distance away from the pipe to be detected. If the distance is too short, the signals and the circuit cannot be precisely located.
2. In the pipeline detection process, the stronger the signals displayed on the Nixie tube of the detector, the closer the pipe is to be detected.
3. Select the receiver's manual mode and an appropriate sensitivity to precisely locate the pipe.
4. To detect a pipe made of non-conductive materials, we suggest inserting a helical metal tube first into the pipe, as described in Section 3.1.6.

3.1.8 Detection of the supply circuit on the same floor

To detect the power circuit in the same plant please follow the following steps:

1) Turn off the main switch of the distribution board of this plant,
2) Disconnect the neutral wire of the distribution board of this plant, from the neutrals of other plants.
3) Connect the emitter as shown in Fig. 3-1-8.

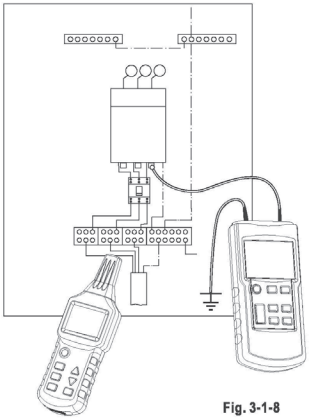


Fig. 3-1-8

WARNING

For safety, please cut off the supply to the entire building.

Suggestions

1. The emitter ground must be properly grounded and must be at a certain distance from the pipe to be detected. If the distance is too small, the signals and the circuit cannot be precisely located.
2. Adjust the transmitting power of the emitter to suit different detection radii.
3. In the process of detecting the circuit, the stronger the signal displayed on the Nixie tube of the detector, the closer the circuit would be detected by the instrument.
4. Select manual mode on the receiver and the appropriate receive sensitivity to locate the circuit precisely.

3.1.9 Tracing a buried circuit.

Preconditions:

* The circuit must not be active.

* Connect the emitter as shown in Fig. 3-1-9.
* The grounding of the emitter must be properly grounded.
* Select the automatic mode of the receiver.
* Based on the displayed signal strength, find or trace the circuit.

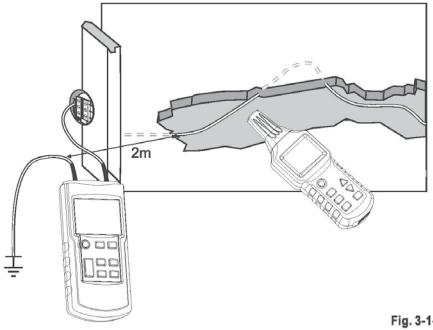


Fig. 3-1-9

Caution!

1. The distance between the earth wire and the circuit to be located should be as wide as possible. If the distance is too small, the signals and the circuit cannot be precisely located.
2. The depth of detection is highly influenced by ground conditions. Select the appropriate receive sensitivity to precisely locate the circuit.
3. As you slowly move the receiver along the circuit to be located, you will see that the display changes greatly. The strongest signals represent the precise location of the circuit.
4. The greater the distance between the emitter and receiver signals, the lower their power d, and the detection will be more superficial.

3.2 Double polarity applications.

3.2.1 Applications in closed circuits

It can be applied to circuits with current and circuits without current:
In circuits without current, the emitter only sends coded signals to the circuit

to detect.
In live circuits, the emitter only sends coded signals, but it also measures and displays the voltage of the active circuit.
As shown in Fig. 3-2-1:

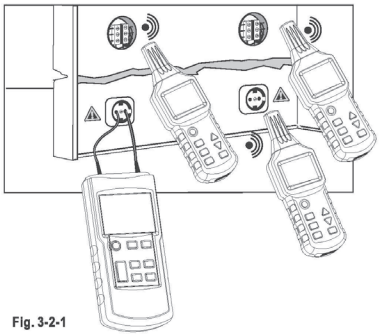


Fig. 3-2-1

Caution!

When connecting active circuits to the emitter, please comply with the safety instructions.

recommendations

1. The dielectric power of the emitter is 400v AC / DC.
2. The closed-circuit application is suitable for searching outlets, plugs and fuses, etc., in electrical installations on floors with current or without current.
3. The detection depth is related to the measurement of the laid cable and the way of use, the common detection depth is less than 0.5m
4. Adjust the transmitting power of the emitter to suit different detection radii.

3.2.2 Finding fuses

In a multi-dwelling building, use the L and N terminals of a household outlet to send the emitter signals (as shown in Fig. 3-2-2) and set the transmit power of the unit to a appropriate level.

Preconditions:

* Disconnect all air switches from the distribution box.
* Connect the emitter according to Fig. 3-2-2.

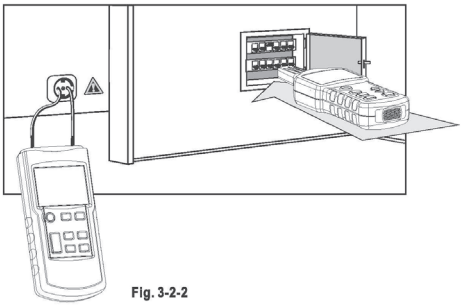


Fig. 3-2-2

Caution!

1. Identification and positioning of fuses are highly influenced by the wiring situation in the distribution panel. To search for fuses as precisely as possible, you must open or remove the switch panel cover, and search for the fuse feeder.
2. In the search process, the fuse with the strongest and most stable signals will be the target to be searched for. Due to signal coupling, the detector can detect signals from other fuses, but the strength of those signals will be relatively weak.

Recommendations

1. For detection, it is better to put the detector tip at the inlet of the fuse box to get the best detection result.
2. Adjust the transmitting power of the emitter to suit different detection radii. Select manual mode on the receiver to set a suitable receive sensitivity to precisely locate the circuit.

3.2.3 Search for a short circuit.

Preconditions:

* The circuit must be de-energized.
* Connect the emitter according to Fig. 3-2-3.
* The measurement method is the same as the example.

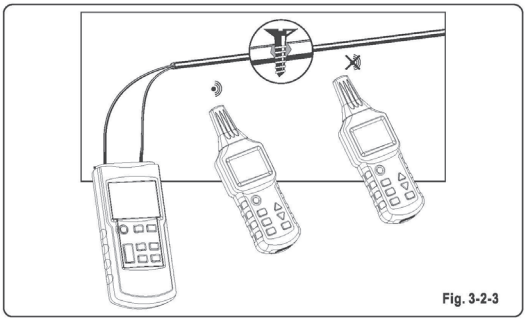


Fig. 3-2-3

Caution!

1. If there is current in the cable, cut off the power first.
2. To search for short circuits of insulated wires and cables, the depth of detection will vary depending on the cables that are twisted together in the socket. In our experience, only short circuits with impedance less than 20 ohms can be detected correctly. The short circuit impedance can be measured with a multimeter.

Recommendations

1. If the impedance of a short circuit is greater than 20 ohms, try using the Find Circuit Break method to find the short circuit. To do this, use a relatively high current to temporarily connect the fault part (low resistance) or interrupt it.
2. In the detection process along the tube, if the signal received by the receiver suddenly attenuates, the detected position is where the short circuit is located.
3. Adjust the transmit power to suit different sensing radios.

4. Select the manual mode of the receiver and select a suitable receive sensitivity to precisely locate the circuit.

3.2.4 Detect circuits installed with a certain depth.
In dual polarity applications, if the circuit is made up of multi-conductor cables (such as NYM 3x1.5mm2), the depth of detection will be significantly limited. The reason is that the short distance between the power line and the circuit causes strong distortion in the magnetic field.

A magnetic field with sufficient power cannot be built with narrow parts. If a separate circuit is used, this problem is easily solved, since the insulated conductor can cause the magnetic field to diffuse with more power.

The circuit can be made up of any type of conductive cables or wires. The important point is that the distance between the power line and the circuit is not greater than the depth, and in practice this distance is normally 2m or greater.

Preconditions:
* The circuit must be de-energized.
* Connect the emitter as shown in Fig. 3-2-4.
The distance between the power line and the circuit should be at least 2-2.5m.
* The measurement method is shown in the example.

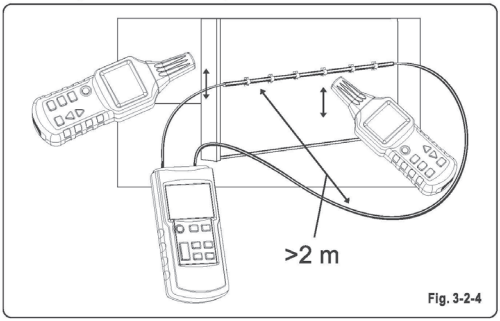


Fig. 3-2-4

Recommendations

1. In this application, the influence of moisture or mortar on the wall at the depth of the location is significant.
2. During the circuit detection process, the stronger the signal displayed on the detector's Nixie tube, the closer the detected wire will be.
3. Adjust the transmit power on the emitter to suit different detection radii.
4. Select manual mode on the receiver and adequate sensitivity on the reception to locate the circuit precisely.

3.2.5 Classify or determine the installed circuit

Preconditions:

* The circuit must be de-energized.
* The ends of the core cables must be twisted and connected together.
* Connect the emitter as shown in Fig. 3-2-5.
* The measurement method is the same as shown in the example.

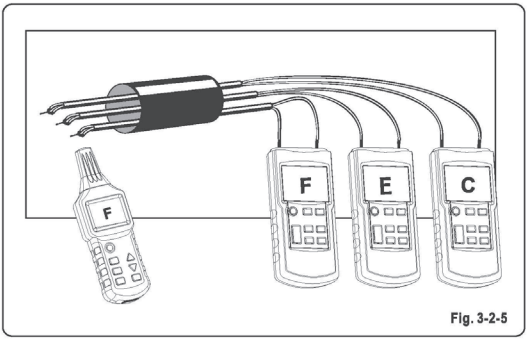


Fig. 3-2-5

Caution!

1. If there is electrical current in the cable, cut off the power first.
2. The ends of the unshielded cables must lead together, and must be twisted.
3. If only one emitter is available, take multiple measurements by changing the connection between the emitter and the cable.

Recommendations

1. When you change the connection between the emitter and the core wire, different circuits can be distinguished if we change the transmission encoding.
2. Adjust the transmitting power of the emitter to suit different detection radii.
3. Acquire a transmitter with different transmission signals when necessary.

3.3 Method to increase the effective radius to detect circuits in load.
When the emitter is directly connected to the phase line and to the neutral wire line the signals are conducted through two parallel circuits (as shown in Fig. 3-3-1), thus twisted circuits can sometimes emit signals that counteract each other, leading to an effective radius of 0.5, at most. To eliminate this effect, the connection should be as shown in Fig. 3-3-2, where the line uses separate cables to increase the effective radius up to 2.5m, lines with greater distances can be provided by the cable reel (see Fig. 3-3-2).

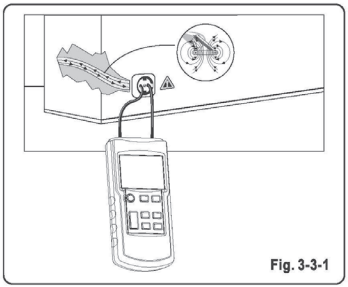


Fig. 3-3-1

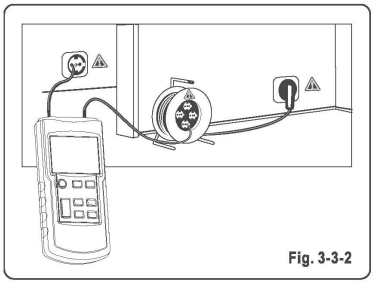


Fig. 3-3-2

WARNING
When connecting live circuits to the emitter, please observe the safety instructions.
PRECAUTIONS
Pay attention to the distance between the emitter and the circuit to be detected, to be able to clearly determine the circuit through the signals.
SUGGESTIONS
1. In the process of detecting the circuit, the stronger the signal indicated on the digital tube of the detector, the closer the detected wire is.
2. Adjust the transmit power to accommodate different detection radii.
3. Select the manual mode of the receiver and an adequate sensitivity in the reception to locate the circuit precisely.

3.4 Identify the network voltage and look for breaks in the circuit.

Preconditions:

* The circuit must be active and with AC voltage.
* Measurements should be made according to Fig. 3-4.
* Set the emitter to the "Mains voltage identification" mode (UAC mode).

Caution!

1. The AC signals detected by the emitter in UAC mode show whether the circuit is live, and accurate measurement of voltage must be done through the emitter's voltmeter function.
2. When searching for the ends of multiple lines, it is necessary to connect each line separately.

Recommendations

1. This app does not need an emitter (Unless you want to use the emitter's voltmeter function to accurately measure circuit voltage).

2. The columns that indicate the signal strength on the emitter screen and the frequency of the signal tone are related to the power of the circuit to be detected and the distance of the circuit. The higher the power and the shorter the distance to the circuit, the more columns will be displayed and the higher the frequency of the signal tone.

4 OTHER FUNCTIONS

4.1 Emitter voltmeter function

If the emitter is connected to a circuit under load and the external voltage is greater than 12V, the lower left part of the emitter screen shows the current voltage value, and the standard symbols are used to distinguish between circuits. AC and DC (see 4, 5, 6 on the interface displayed on the emitter), and an illuminated symbol with a triangular frame is displayed at the top of the monitor (see 10 on the interface displayed on the emitter. The identification scale it is 12-400V DC / AC (AC: 50-60Hz).

4.2 Work light function.

Press flash button 9 on the emitter or flash button 6 on the receiver to turn on the work light, press the same buttons again to turn it off.

4.3 Backlight function
Press the backlight button 5 on the receiver to turn on the backlight, and press it again to turn it off. The emitter has no backlight function.
4.4 Mute function
Press the mute button 8 on the transmitter to turn off the sound, this way it will no longer emit any sound when pressing any button; press the mute button again to turn off the transmitter's mute function, and the buzzer function will return. Press the transmitter's backlight / mute button 5 for 1 second to turn off the sound, and the receiver's buzzer or speaker will not make any sound; press and hold the backlight / mute button 5 on the receiver for 1 second to deactivate the mute function, and the ringer and speaker functions will be active again.
4.5 Auto power off function
The emitter does not have an automatic shutdown function. If any button on the receiver is not pressed for a long period of time, the receiver will automatically turn off after 10 minutes. Please press the on / off button 2 to turn on the transmitter.

5 TECHNICAL PARAMETERS
5.1 Technical parameters of the issuer

1. Output signal -125 kHz
2. External voltage identification scale DC 12-400V + -2.5%; AC 12-400V (50-60Hz) + x2.5%
3. LCD screen with display function and bar graph.
4. Dielectric strength against external voltage-400V AC / DC Max.
5. Overvoltage category: CAT III 300V
6. Pollution degree- 2
7. 1x 9V power supply, IEC 6lR61
8. Minimum power current-Around 31mA
9. Maximum power current-About 115mA
10. Fuse-F 0.5A 500B, 6.3x32mm

Temperature scale

11. During use- 0º to 40ºC, with a maximum relative humidity of 80% (without condensation)
12. Storage -20º to 60º, with a maximum relative humidity of 80% (without condensation)
13. Altitude - 2000m Max.
14. Dimensions (height x width x depth) 190mmx89mmx42.5mm
15. Weight:
    - No battery-about 360g,
    - With battery: about 420g

5.2 Technical parameters of the receiver

1. Scribing Depth - Scribing depth depends on material and specific applications.
Cable locate mode
2. Application of a pole- Around 0-2m.
3. Application two poles-Around 0-0.5m.
4. Single loop circuit - about 2.5m.
5. Identification of the voltage in the network-Over 0-0.4m.
6. LCD-screen with display and bar graph function.
7. Power supply - AAA 6x1.5V, IEC Lr03

Power consumption:

8. Minimum current-Around 32 mA.
9. Peak Current-Around 89mA.

Temperature scale

10. During use - 0º to 40ºC, with a maximum relative humidity of 80% (without condensation).
11. Storage -20º to 60º, with a maximum relative humidity of 80% (without condensation).
12. Altitude - 2000m max.
13. Dimensions (HxWxD) -241.5mmx78mmx38.5mm Weight:
    - No battery- about 280g
    - With battery-about 350g

6 REPAIR AND MAINTENANCE

1. If you suspect a faulty detector malfunction, please confirm that the battery power is sufficient and the test lead is not broken.
2. Before returning the detector for repair, please disassemble the battery and describe the malfunction, and then properly package the device to avoid damage during shipping. Regarding the damages produced in the transport, the company would assume the responsibility.
3. There is a fuse inside the emitter. If the fuse is damaged after the warranty period, please replace it yourself with a fuse of the same model. This fuse is a fast melt single wire type, so do not replace it with a helical wire type, or the transmitting power and safety of the instrument will not be guaranteed.

6.1 Troubleshooting

If the detector does not work properly, please check the points in the attached table:

Malfunction	Puntos a comprobar	Measures to be applied
I can't turn on the appliance	Have you installed the battery? Is the battery power too low? Is the battery polarity correct?	Install new batteries Check polarity

Emitter cannot identify external voltage	¿hay sonido de contacto? ¿El conductor está roto? ¿el conductor se ha insertado del todo? ¿el cable de prueba está roto? ¿se ha insertado el cable de prueba del todo?	Vuelva a conectar la línea Cambie el conductor Inserte correctamente el conductor Cambie el cable de prueba Inserte correctamente el cable de prueba
Power supply turns off during measurement	Is the battery power sufficient? Does the instrument turn itself off?	Change the battery Switch the appliance back on
The emisor cannot receive the signal	¿Ha presionado el botón de transmisión? ¿El fusible del emisor está roto?	Have you pressed the transmit button? Is the emitter fuse broken?

6.2 Checking the emitter fuse

Emitter fuse can prevent emitter damage from overload or malfunction. If the emitter fuse has blown, the emitter can only emit weak signals. If the self-test mode of the emitter is correct but the transmitted signal is weak, it means that the transmission has been made but the fuse has blown. If no signal is found during the transmission self-test state, and the battery power is normal, it means that the emitter is broken and needs to be repaired by specialized technicians.

Specific methods and steps to check the emitter fuse:

1. Cut off all measured emitter circuits.
2. Turn on the emitter and put it in the transmit state.
3. Set the transmitter's transmit power to level I.

4. Connect one end of the test lead to the 10 junction on the emitter.
5. Insert the other end of the test lead into the emitter connection socket.
6. Turn on the emitter to search for signals from the test lead, and move the receiver probe toward the test lead.
7. If the fuse is not broken, the value displayed on the receiver is double.

6.3 Cleaning

Use a cloth dampened with clean water or neutral detergent to clean the emitter, and then use a dry cloth to clean it again.
1. Before cleaning, please make sure that the equipment is turned off, and all circuits are interrupted.
2. During the cleaning task, please do not use benzene, alcohol, acetone, ether, ketone, thinner or gasoline, which may deform or discolor the equipment.
3. After cleaning, use the equipment again when it is completely dry.

Changing the battery

If the battery symbol on the display flashes (1 from the sender or 1, 2 from the receiver), and the buzzer sounds an alert, the battery must be changed. The steps to replace the battery (emitter or receiver) are as follows:
1) Turn off the equipment and cut off the measurement circuits.
2) Unscrew the back of the equipment, and remove the battery cover
3) Remove the old battery
4) Install a new battery according to proper polarity
5) Put the battery cover on and tighten the screws.

WARNINGS
1. When inserting or replacing the battery, please pay attention to the correct polarity of the battery. If the polarity of the battery is incorrect, the equipment will be damaged. Also, it may cause explosion or fire.
2. Do not connect the two poles of the battery with a lead wire, and do not throw the battery into fire, otherwise there may be a risk of explosion.

3. Please do not try to disassemble the battery! The electrolyte it contains shows high basicity, which can cause corrosion! If the electrolyte comes into contact with skin or clothing, use fresh water to clean the important parts. If electrolyte gets into your eyes, use cool water to wash your eyes immediately, and visit a doctor as soon as possible.

Caution!
1. Before changing the battery, the equipment must be switched off, all connected measuring circuits must be interrupted, and all lead wires must be removed.
2. Only the battery specified in the technical parameters can be used.
3. If the equipment is not going to be used for a long time, remove the battery. If the detector is contaminated due to a battery leak, send the device to the factory for cleaning and testing.
4. For the disposal of the used battery, please observe the existing regulations for the recovery, reuse and disposal of batteries.

6.5 Calibration interval

To ensure the accuracy of the measurement made by the equipment, it must be regularly calibrated by the company's adjustment personnel. The recommended calibration frequency is annual. If the equipment is used frequently or the conditions of use are very poor, the calibration interval will be shorter. If the equipment is rarely used, the calibration frequency can be extended to three years.