

MPL element

Pipe Locator MPL-21-E

Operation manual

TAKACHIHO

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1. SAFETY

Always locate with proper respect and caution. Equipment misuse or carelessness can result in serious injury or damage to property. Always follow safety rules.

HAZARD ALERT INFORMATION

BE AWARE OF SAFETY INFORMATION

This is a safety-alert sign. This is placed in the manual and on your equipment to alert you to the potential for bodily injury or death.



SIGNAL WORDS

The safety-alert icon is used with the following signal words :

DANGER, **WARNING**, and **CAUTION**. When you see these words in the manual or on decals on your equipment, carefully read and follow all instructions. Watch for these words and learn their meanings.

DANGER – Imminent hazards which, if not avoided, will result in death or serious injury.



WARNING – Potentially hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION – Potentially hazardous situation which, if not avoided, may result in minor personal injury or property damage.



OPERATOR PREPARATIONS

Important : Read and understand this manual before using **cable locator MPL element**.

Successful use of **MPL element** depends on good locating skills and correct understanding of receiver response.

GENERAL SAFETY



DANGER

Do not attempt to connect to live power without proper protective equipment and training.



DANGER ELECTRIC SHOCK

Death or serious injury will result

NOTICE: Do not apply more than 250 volts across clips. More than 250 volts will damage transmitter.



DANGER

High Voltage. Cutting high voltage cable can cause DEATH or ELECTROCUTION. Expose lines by non-destructive means before excavating.



DANGER

Traffic hazards can result in death or serious injury. Avoid moving vehicles. Wear high-visibility clothing.



WARNING

Buried lines. Always confirm your depth estimate by exposing target line by non-destructive means.



WARNING

Jobsite hazards can cause DEATH or SERIOUS INJURY. Wear proper safety equipment.

NOTICE : Remember this before searching and attempting any excavation activity.

NOTICE: Use only alkaline batteries in **MPL element** receiver and transmitter.

Batteries contain acid, which may leak if the batteries are allowed to remain in the equipment when low or completely discharged. This acid can cause equipment damage.

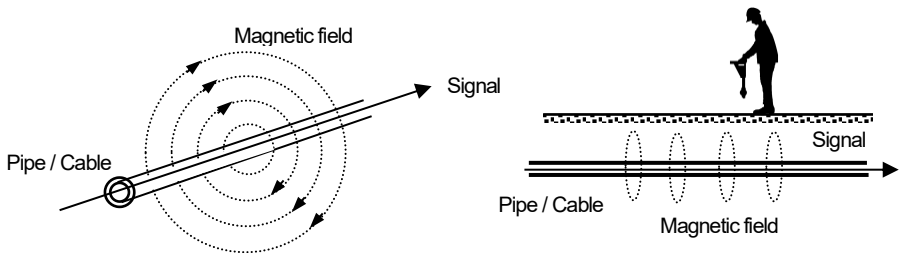
2.Introduction

This product is a high-performance digital measurement tool used to measure the location and the depth of buried cables / metal pipes from the ground. By adopting a Digital Signal Processor (DSP), the digital correction of the measured data provides measurements with high precision and stability.

- Principle of measurement method -

When current flows through a buried cable/pipe, an alternating magnetic field is generated around it.

Location, depth, and current value of the buried pipe can be measured using the Receiver at the surface.



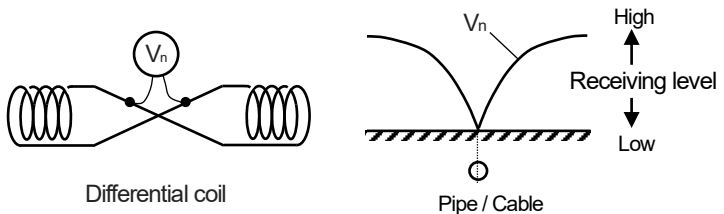
- Features -

- There are two modes of location measurement (with error detection / protection function)

Null mode: This method detects the point of minimum sensitivity indicated with an arrow.

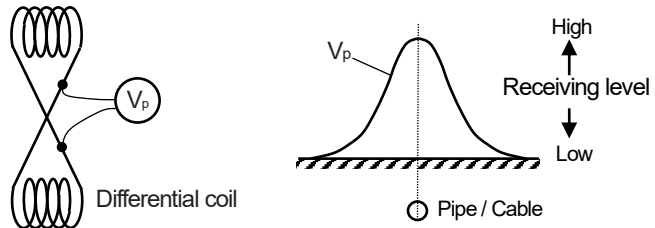
Two horizontal coils connected differentially allow you to locate the position of the buried object without error.

Button input from operator is not necessary



Peak mode: This method detects the point of maximum sensitivity.

Two horizontal coils connected differentially allow you to locate the position of the buried object without error.



- Two depth measurement modes

A) Standard Depth Measurement: Method of calculating depth from sensitivity received by upper and lower coils

Measure the depth in real time by pressing the Depth key above the buried object.

This method also measures the strength of the current of the signal.

B) Triangulation method: Method to measure using received sensitivity at Peak mode

Differential coils allow low-error depth measurements in noisy locations or using indirect methods.

- The frequency of the signal used is 82kHz, as this frequency can transmit a signal efficiently and can be received with good sensitivity.

- When using this locator for non-metallic pipes, please use the Locating rod (optional accessory).

3. Composition

3.1 Main equipment & standard accessories

Description	Q'ty	Remark
Transmitter Unit	1pc	Used as a signal generator.
Receiver Unit	1pc	Digital locator
Connecting cable	1pc	Used for Direct connection mode
Ground rod	1pc	Used for Direct connection mode
Operating manual	1pc	English version
Carrying bag	1pc	

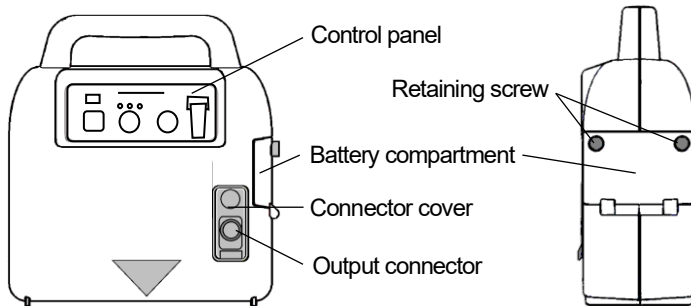
3.2 Optional equipment

Description	Q'ty	Remark
External coil	1pc	Used for External coil mode
Locating Directional Rod (LDR)	1pc	Used for non-conductive pipes such as PVC, HDPE or fiberoptic ducts

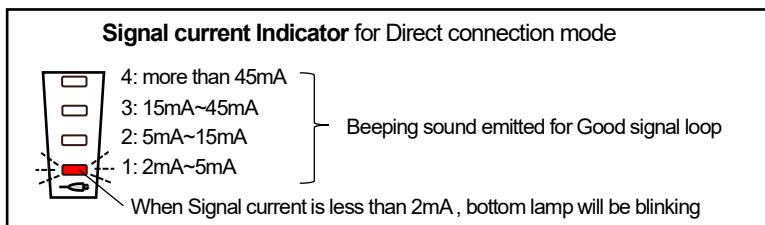
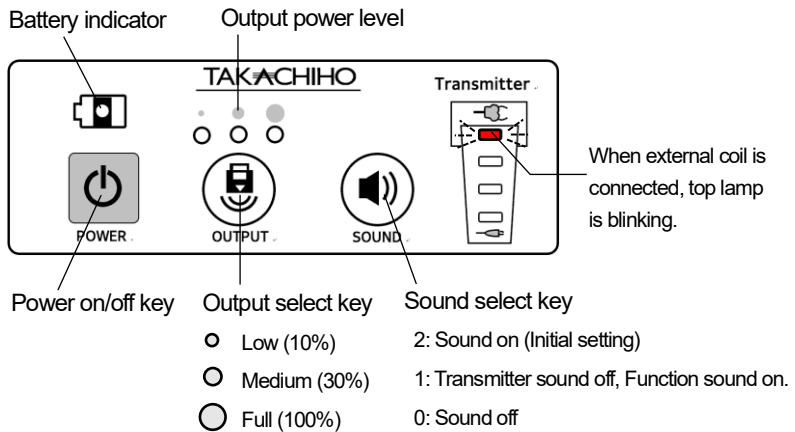
4. Description of parts & basic operation

4.1 Transmitter

1) Appearance

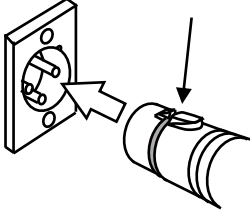


2) Key function & Indicator lamp

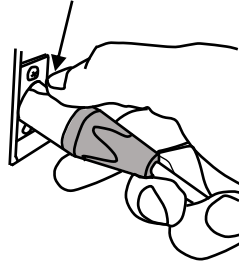


3) Connector

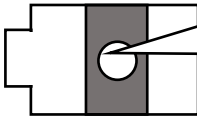
Connect the plug with the lock button facing upwards



While pressing the lock button, pull out the plug to remove



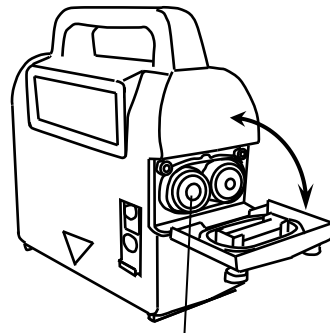
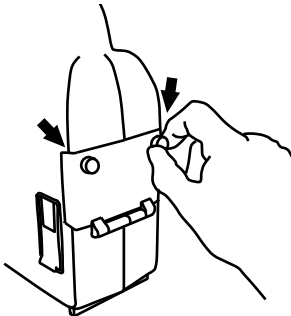
4) Battery indicator & Battery replacement



Green Lamp indicates the battery status.
Continuous lighting : Battery condition is good.
Slow blink : Remaining battery life is low.
Fast blink : Batteries can no longer be used.

Replace all batteries when the remaining life is low.

Unscrew to open the cover of battery compartment and replace all batteries.
Use six D (LR20 / 13A) Alkaline batteries.

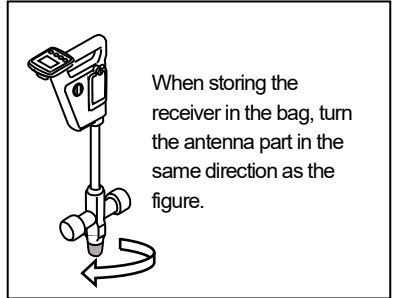
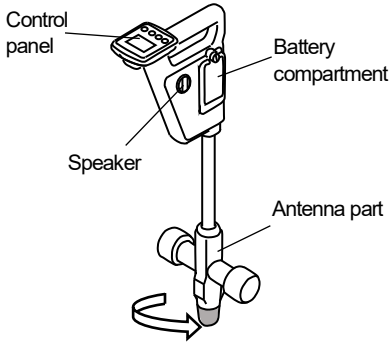


Always ensure that the batteries are inserted correctly before closing the compartment

4.2 Receiver

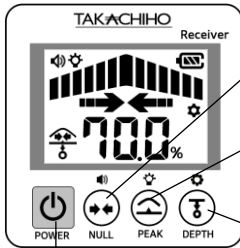
1) Appearance

When in use, set the antenna part as shown in the figure below



When storing the receiver in the bag, turn the antenna part in the same direction as the figure.

2) Control panel & Display



Null Null mode

Left / Right position locating mode

Peak Peak mode

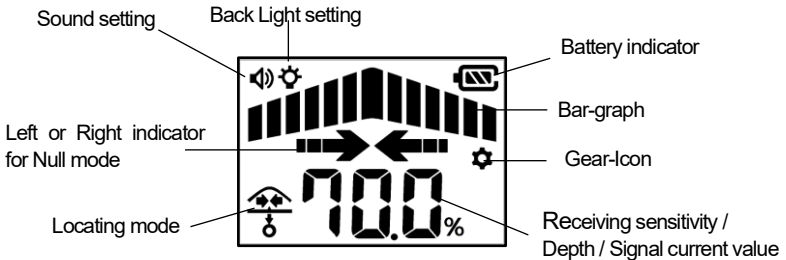
Signal peak position locating mode.

Press "PEAK" key to set signal level to 70.0%.

Depth Depth measurement mode

Single press measures depth. Holding down depth button measures the signal current.

Power on / off



3) Sound & Backlight setting


a) Press **DEPTH** key when Gear-Icon appears just after start-up to enter sound settings menu.

b) Select Sound options by pressing **NULL** key.

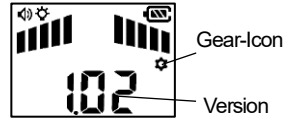
S-0: sound off S-1: low volume S-2: high volume



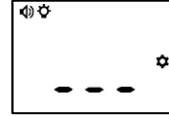
c) Select Backlight options by pressing **PEAK** key.

L-0: Light off L-1: Light on 

d) Press **DEPTH** key to start locating



Power on screen

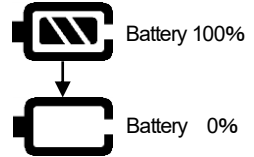


Setting screen

4) Battery indicator & Battery replacement

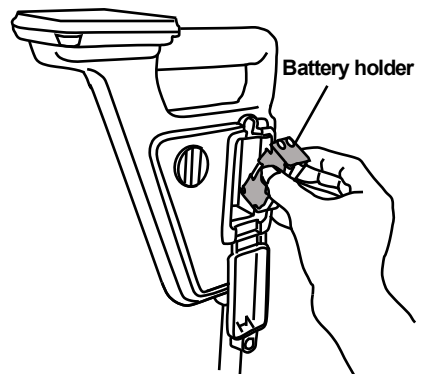
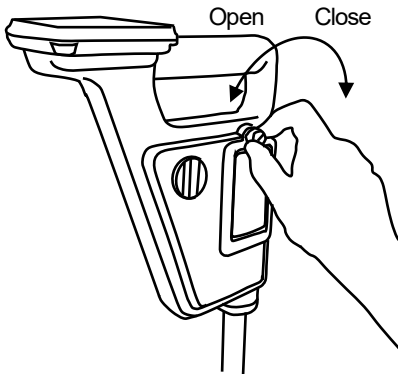
Replace all batteries when the battery life is low.

Use four AA (LR6 / 15A) Alkaline batteries.



Unscrew to open the cover of battery compartment.

Take out the battery holder and replace the batteries with new ones.



Always ensure that the batteries are inserted correctly before closing the compartment

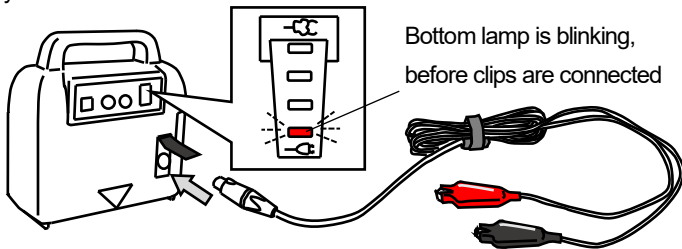
5. Operation of Transmitter

5.1 Direct connection mode

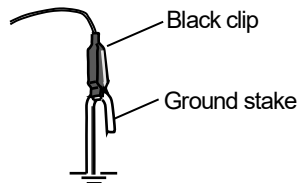
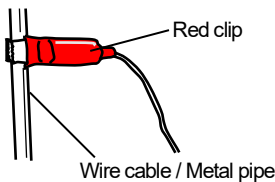
A specific route can be detected in Direct Connection mode. Use the two pronged connecting cables (3 m/10 ft.) which are included in the carrying case as a standard accessory.

Attach the Direct connecting cable

When the connecting cable is connected to the Transmitter, Direct Connection mode is automatically selected.

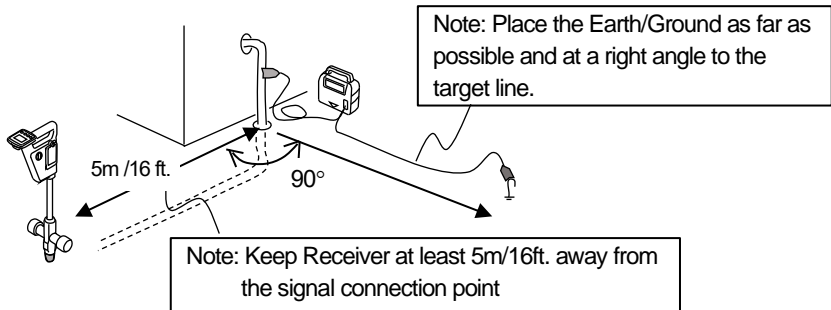


Connect the cable clips to the target line and ground stake.



Clean connection area if rusted or painted to ensure a good electrical connection.

Check the grounded point. Find the best place to ground to have a good signal loop indication.



5.2 External coil mode

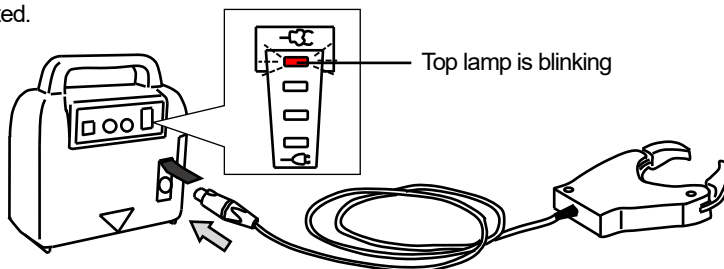
External coil supplied as an optional component. Use this mode if object is accessible but a direct connection is impossible.

An induced current, generated by the coil in the External coil attachment, is applied directly to the exposed part of the cable / pipe to be located.

Applicable to: Live Telecom cable or Live Power cable. Armored Fiber optic cable with an aluminum-sheath.

Set the external coil

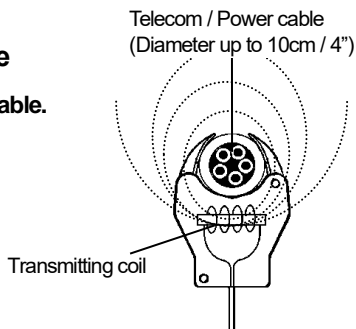
When the external coil is connected to the Transmitter, External coil mode is automatically selected.



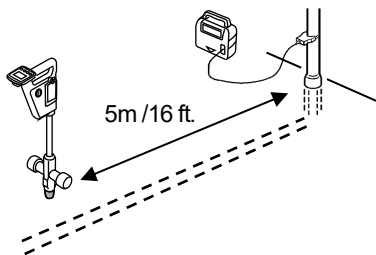
Connect the External coil to the target line

***The jaws do not have to be closed around the cable.**

(This coil method is different from the conventional clamp that must have jaws perfectly closed. Different size clamps are not needed. This coil method uses Indirect / Inductive principle.)



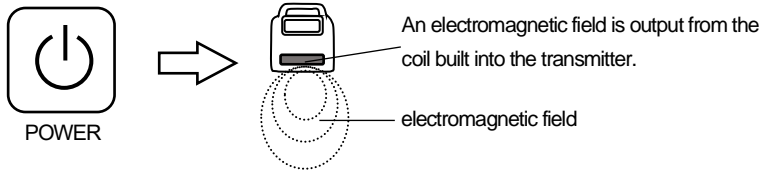
Note: Keep the Receiver at least 5 m/16 ft away from the coil clamp when starting the locating work.



5.3 Indirect (Inductive) mode

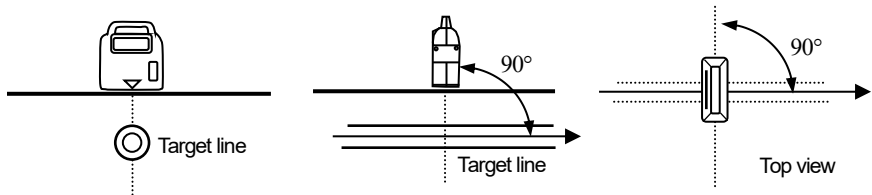
If there is not direct access to the target line, the transmitter can generate signal current into the object by an electromagnetic field output from the bottom of the transmitter

When nothing is connected to the transmitter, Indirect mode is automatically selected.

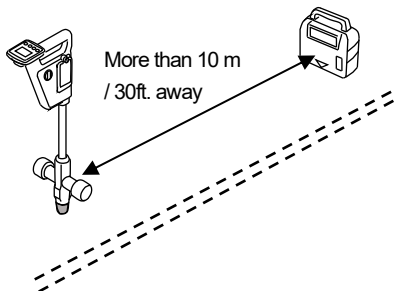


Place the Transmitter over or near the area of the target object.

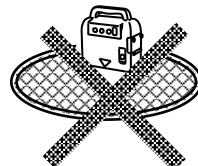
*Place the Transmitter in an upright position at a 90° angle to the target line as shown in the figure below.



Note: Keep Receiver more than 10m / 30ft. away from transmitter when starting the locating work. An "Air coupling" between Receiver and Transmitter adversely affects the measurement.



Note: Do not place Transmitter on a manhole cover or other steel covering.



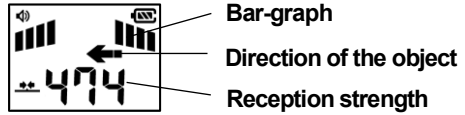
6. Operation of Receiver

6.1 Null mode

Starting Null mode

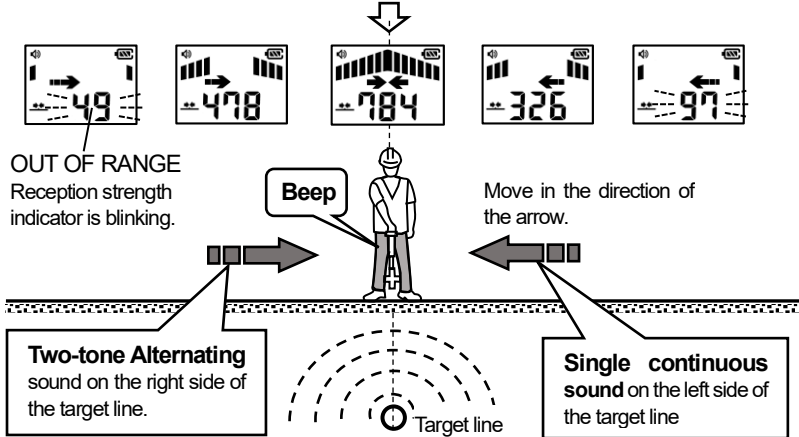


Null mode screen description

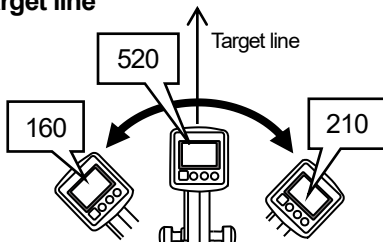


Locating method in NULL mode

When directly above the target line, both arrows appear indicating the center, the bar-graph indicates maximum, and **BEEP** sound is emitted.



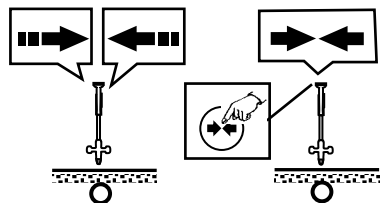
Determining the direction of the target line



Locate the point with strongest reception by turning the receiver to left and right as shown in the figure above.

When buried object is shallower than 30cm/1ft.

Locating may be difficult because the display changes too quickly. In such a case, operate the receiver while holding down **NULL** key.

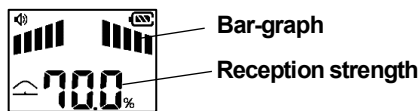


6.2 Peak mode

Starting PEAK Mode



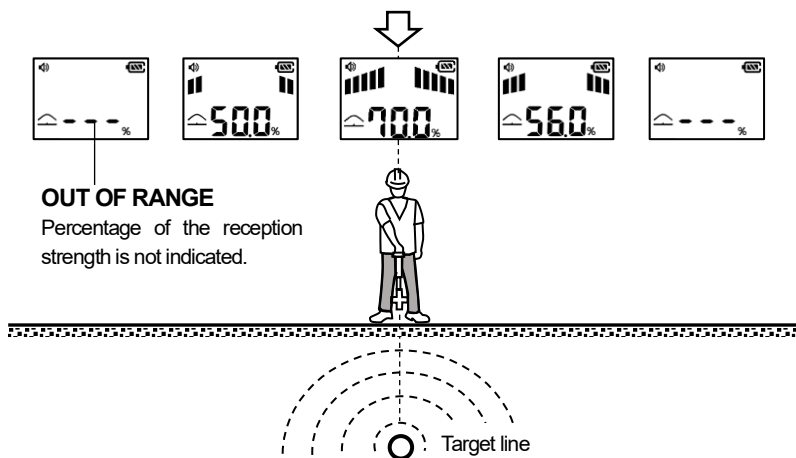
Peak mode screen description



*The reception strength is automatically adjusted to 70.0% after pressing PEAK key,

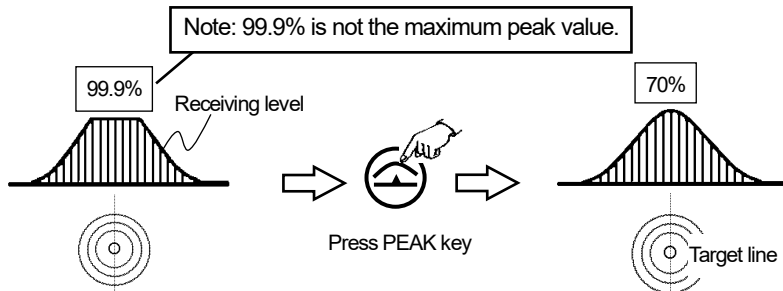
Locating method in PEAK mode

Maximum (peak) value, the precise position and direction, are obtained when the receiver is located on the top of the target line



To adjust the sensitivity of the reception strength.

When 99.9% is displayed, press the PEAK key to adjust the sensitivity



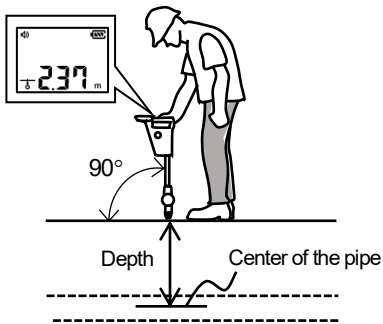
6.3 Depth measurement

Once the precise location of the target line has been determined, press the Depth key to display the distance from the bottom of the Receiver to the target line.

Note: Depth reading is a calculation of received signal strength.

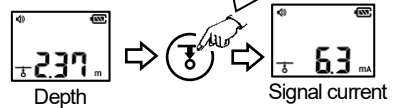
Hold the Receiver vertically, place the receiver on the ground.

Press the Depth key, depth is measured continuously for 10 seconds.



Measuring the signal current

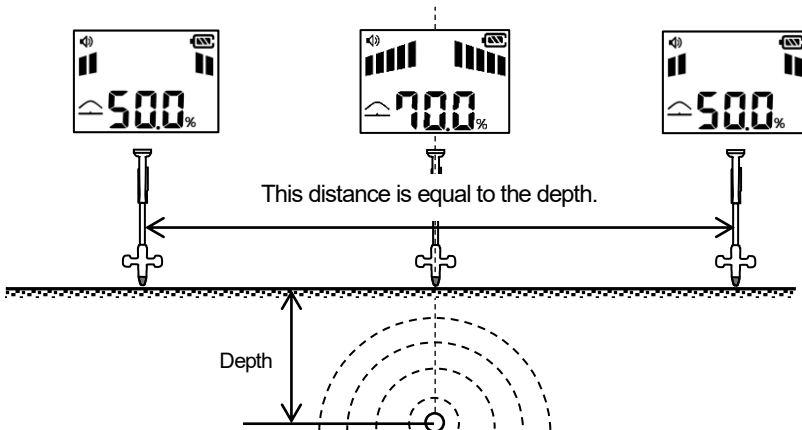
While holding down the Depth key, the signal current value is displayed.



6.4 Depth measurement using Triangulation

This measurement method uses Peak mode.

Set the signal level to 70% directly above the line. While holding the locator vertically, move it to the left and right until the meter drops to 50%. Mark these points and measure the distance between them. The distance between the two points is equal to the depth.

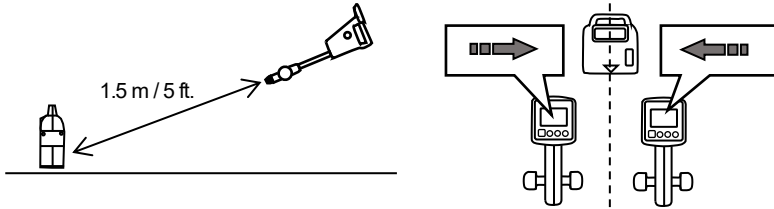


7. Inspecting equipment

Receiver: Null mode

Transmitter: Indirect mode. Set the output power to LOW.

Set the distance between transmitter and receiver to 1.5m / 5ft.



What to check for:

A) Null mode: Arrows indicate the direction of the center line.

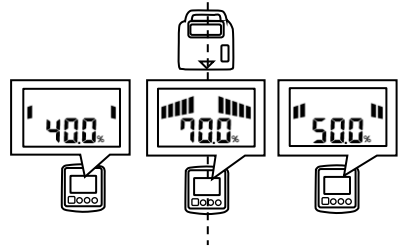
Receiver: Peak mode

Transmitter: Indirect mode. Set output power set to LOW

Set the distance between transmitter and receiver to 1.5m / 5ft.

What to check for:

B) Peak mode: Bar-graph indicates maximum value above center line.

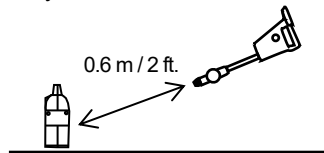


Set the distance between transmitter and receiver to 0.6m / 2ft

If 99.9% is displayed, press PEAK key to adjust sensitivity

What to check for:

C) Peak mode: "HI " is displayed when the receiver is too close to the transmitter.



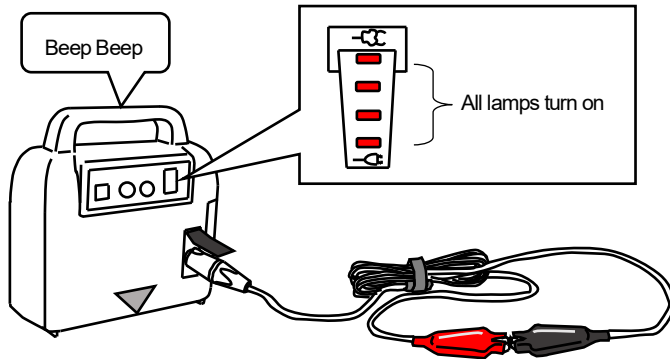
Transmitter: Direct connection mode

Connect the connecting cable to the transmitter.

Turn on the transmitter.

Set the output power to FULL.

Connect the red and black clips of the connecting cable to each other.



What to check for:

- D) Beep sounds to indicate the connection status of "Good SIGNAL LOOP".
- E) All lamps on the Signal current indicator turn on.

NOTE)

This inspection method is intended to check if there is a failure in the equipment.

This inspection method does not guarantee the accuracy of the equipment.

8. Specification

8.1 General specification

Transmitter (TX)

Output frequency	82.175 kHz±0.02%
Output power	1 watt maximum
Operating Modes	Direct connection mode, Inductive mode External coil mode (optional)
Battery type	Six Alkaline LR20 "D"
Battery Life	Direct mode : 50 hours (Output 4 mA , 20°C / 68°F) Full Power(1W) : 20 hours (20°C / 68°F)
Battery Status	Low battery indication
Audio Indication	Internal Speaker : Alarm, Beeping sounds
Output protection	AC 250V
Operating Temperature	-20°C to 50°C / -4°F to 122°F
Dimensions	(H)244 mm x (W)220 mm x (D)92 mm / 9.61" x 8.66" x 3.62"
Weight	2.6 kg / 5.8 lbs. approx. Including eight batteries
Protection grade	IP54 (Protection from splashed water)

Receiver (RX)

Locating frequency	82.175 kHz±20Hz
Battery type	Four Alkaline LR6 "AA"
Battery Life	30 hours (20°C / 68°F, speaker sound off, backlight off)
Battery Status	Continuous indication
Power save function	Automatically power off after 30minutes of inactivity
Visual Indication	LCD : Bar graph , digital number & character, include backlight
Depth Display Range	0 to 5 m /16 ft. Depth readout unit: meter / feet & inch
Current value	Current value flowing on the conductor is displayed for line identification in milliamps.
Audio output	Internal Speaker with volume adjustment.
Operating Temperature	-20°C to 50°C / -4°F to 122°F
Dimensions	(H)661 x (W)228 x 195 mm (26.0" x 8.98" x 7.68")
Weight	1.1 kg/ 2.4 lbs. approx. including four batteries
Protection grade	IP54 (Protection from splashed water)

8.2 Accuracy specification

Locating accuracy

2.0 m \pm 4 cm / 6.5 ft. \pm 1.6 in.

3.0 m \pm 9 cm / 10 ft. \pm 3.5 in.

Depth accuracy

2.0m \pm 5 % / 6.5 ft. \pm 5%

3.0m \pm 10 % / 10ft. \pm 10%

NOTE)

Locators are tested in test field conditions with no adjacent signals.

Always excavate the line with non-destructive means before digging.