

# WATER LEAK DETECTOR

## LDR-20

### INSTRUCTION MANUAL



Instruments for the location of underground utilities and water leaks.

**FUJI TECOM INC.**

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## **Preface**

Thank you very much for your recent selection of our Water Leak Detector LDR-20.

This Operation Manual describes handling of the Water Leak Detector LDR-20. This Operation Manual mainly describes how to use the equipment, how to detect water leaks and other information relating to the equipment. Be sure to read these instructions before using the equipment to ensure that you understand how to use it correctly. If you are unclear of anything regarding operation and handling of the equipment, please contact our official distributors in your country.

Store this Operation Manual in a safe place where the equipment operator can retrieve it whenever needed.

If this Operation Manual is lost, please contact our official distributors in your country.

## Precautions



**Caution** While detecting water leaks, pay attention to surrounding traffic.



**Caution** Do not use this equipment for any purpose other than water leak detection.



**Caution** Connect the batteries correctly.

## Handling Precautions



**Caution** The pick-up has been designed with precision to capture even very slight vibrations. For this reason, handle the pick-up with care to prevent it from impact.



**Caution** Never swing the pick-up.

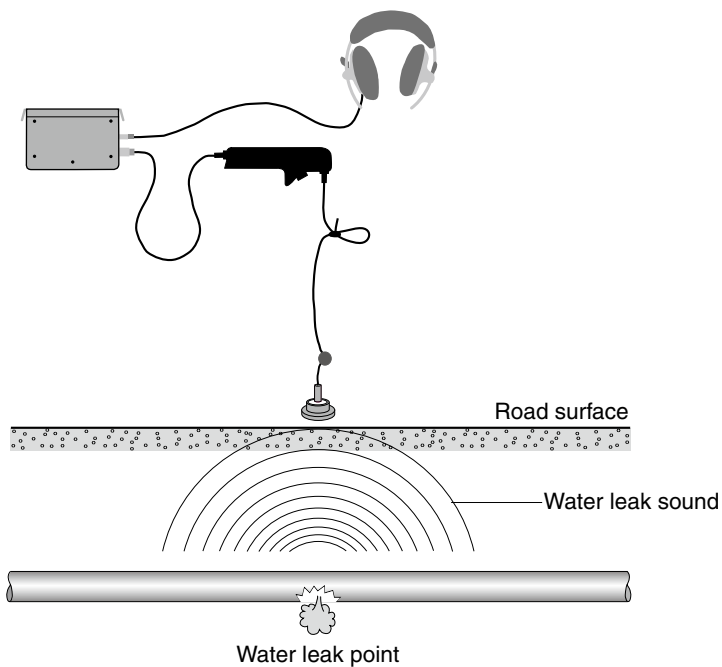


**Caution** The main unit (amplifier) cannot be used in water.

\*If you think there is damage elsewhere, please contact our official distributors in your country.

## Application

This equipment is used for discovering water leaks in underground water pipes.

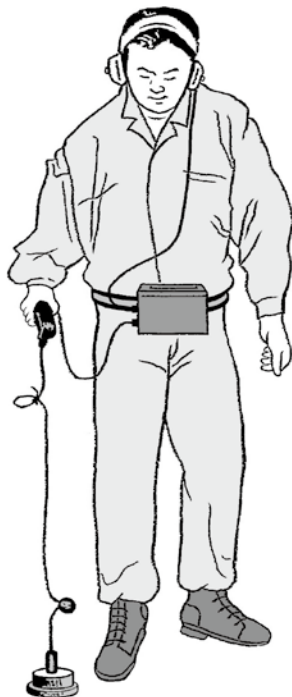


## Equipment Overview

Water Leak Detector LDR-20 listens on the road surface for leak noise from the buried water pipe and identifies water leak points without excavating the road surface. By selecting the optimum filter from the 55 types of filters available on the equipment, water leak sounds over a wide acoustic range can be detected more flexibly compared with conventional water leak detectors. Water leak points can be visually judged by the level indicated on the LCD display.

Accordingly, to find a water leak point, the water leak sound is captured above ground by the water leak detector, and detection is performed by overall judgment combining human acoustic perception and on-site conditions.

In addition, a trace of the survey can be displayed and a report can be output by connecting a smartphone to the equipment and using a dedicated app.



# 1. Components



Main unit (amplifier)



Pick-up sensor with hand-switch set



Headphones



Soft case for main unit



Waist belt

\*Adjustment range: 75 to 135 cm



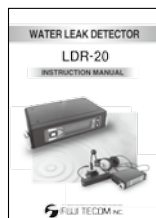
Shoulder strap



Connecting cable for mobile phone and main unit x 2



Storage case



Instruction Manual (1 copy)

Android Smartphone app LDR-App

## 2. Names of Parts

### OK/ESC button

During setting, a short press applies a setting, and a long press returns the display to the top menu.

### Top of main unit



### Display screen (with backlight)

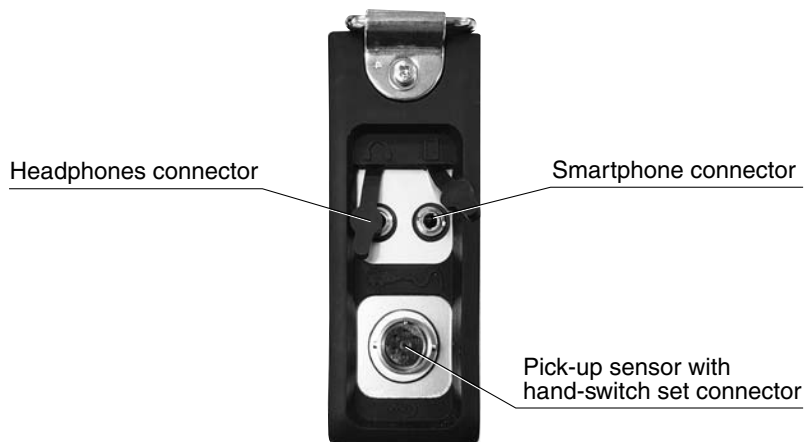
This screen displays filter settings, the detected sound level bar graph, remaining battery level, volume level, and limit levels. During setting, this screen displays the various settings.

### Up/Down buttons

These buttons are used to adjust the volume in the top menu and make selections in setting menus.

## 2. Names of Parts

Side of main unit  
(connector side)

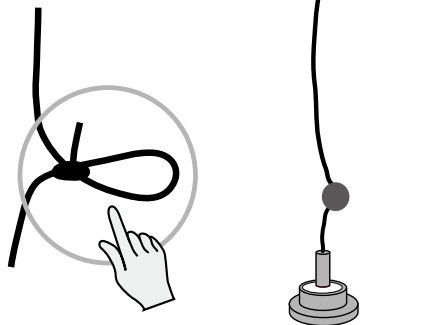


Side of main unit  
(power supply side)

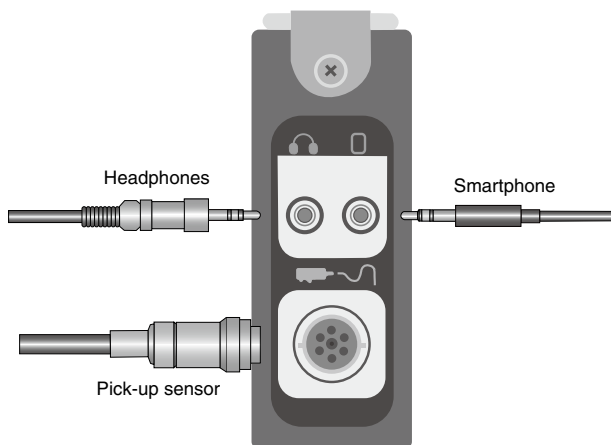


### 3. Setting Up the Equipment

1. After taking out the pick-up of the storage case, remove any kinks or twisting from the pick-up cable.
2. Adjust the pick-up cable to an easy-to-use length.



3. Insert the pick-up sensor, headphone and smartphone plugs into the jacks on the side of the main unit (amplifier).

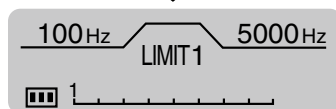


## 4. Checking Operation

[A] Turn the power switch on the side of the main unit (amplifier) ON.

[B] When the startup screen changes to the top menu, hold the headphones against your ear, place the pick-up on the ground, and press the hand-switch.

You should be able to hear a vibration sound when you lightly tap the ground with the tip of one foot.



[C] Set the appropriate volume with   buttons.



## 5. Replacing the Batteries

Replace the batteries when the battery power indicator displayed at the bottom left of the top menu blinks.

- (1) Pull the metal fitting at the bottom of the main unit, and draw out the battery case.
- (2) The battery case contains four AA alkaline batteries. When replacing the batteries, replace all four batteries.
- (3) Return the battery case to the main unit to complete battery replacement.



### **Caution**

When replacing the batteries, ensure that the batteries are inserted with the correct polarity (i.e. correctly oriented).

If the equipment is not to be used for a long period of time, remove the batteries.

## 6. How to Detect Leaks

1. Attach the main unit (amplifier) with the waste belt or shoulder strap as shown in the figure.

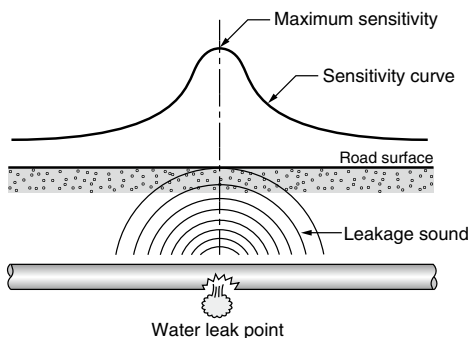


Waist belt



Shoulder strap

2. Press the hand-switch when you put the pick-up along the route of the buried pipe to search for water leak sound. Carefully determine the point at which the level bar on the LCD display becomes the maximum, and mark a <maximum point>.



### Caution

The point of the maximum level sometimes is not directly above the point of the water leak depending on conditions in the ground and road surface.

## 6. How to Detect Leaks

3. Adjust and set the volume to the appropriate level according to on-site conditions before using the equipment.  
Listening for water leaks with the volume set as low as possible lessens operator fatigue and makes it easier to discern water leak sound.



### Caution

Take care not to excessively raise the volume of the headphones. Doing so might make it more difficult to pick up the sound of vehicles passing by and alarms, for example, which is dangerous. Your ears also might be damaged.

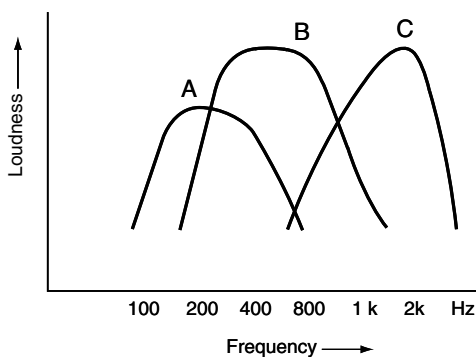
After placing and leaving the pick-up in a stationary state on the road surface, press the hand-switch. Pressing the hand-switch while the pick-up is moving generates a considerable amount of noise which may damage the ears.

4. Minute differences in water leak sound due to the pipe material grade can be captured by switching the 55 types of filters.

## 6. How to Detect Leaks

5. Lower figure shows the characteristics of water leak sound depending on the material grade of the buried pipe.

When the material of the buried pipe is already known before detection, use the filter values in the table on P.18 as a reference for selecting the filter value.



A: PVC pipe

B: Ductile iron pipe, asbestos pipe

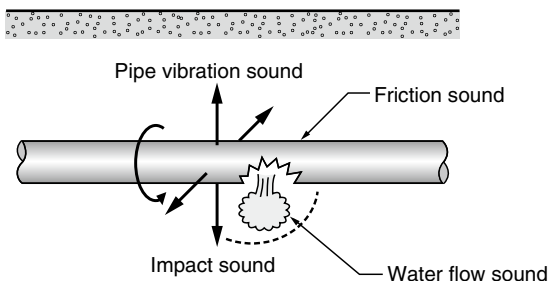
C: Shallow depth metal pipe

## 7. Overview of Water Leak Sound

When water leaks occur from a water pipe buried under the ground, the water jets out with force because of the water pressure in the pipe. Such water leaks are accompanied by a compound sound comprising four elements, namely, (1) water flow sound, (2) impact sound, (3) to-pipe friction sound, and (4) pipe vibration sound. This compound sound is generally referred to as "water leak sound."

The acoustic quality of the water leak sound that passes on to the ground varies according to conditions such as the situation in which the water leak is occurring, soil quality, pipe type, water pressure, and depth. In other words, the acoustic quality varies because the four elements of compound sound are combined with various conditions. There is no case where the frequency distribution of the water leak sound shows a constant value.

How water leak sound is generated

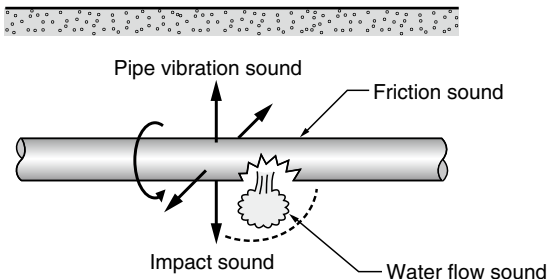


## 8. Conditions That Affect Water Leak Detection

1. Scale of water leak (size of water leak hole in pipe)
2. Water pressure
3. Soil quality
4. Pipe material grade
5. Pavement type
6. Soil moisture content
7. Sound of water consumption
8. Waste water flow sound, dropping sound
9. Sound of air-conditioners.
10. Vehicles traveling sound (friction sound)
11. Wind noise
12. Sound from transformers and automatic vending machines
13. Sound from electricity, telephone cables, motors, and pumps
14. Pool type water leaks

\*Detection of water leaks is sometimes difficult depending on the above conditions.

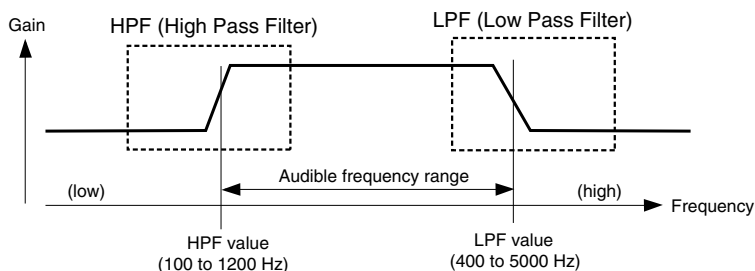
How water leak sound is generated



## 9. Filters

Two filters, high pass filter (HPF) and low pass filter (LPF) can be set on this equipment. This enables the audio frequency to be selected.

It is also possible to set without using filter (Through function).



Note, however, that the HPF value must be less than the LPF value.

## 9. Filters

### Example of Filter Selection

| <div>Hz</div> <div>Pipe Type</div> | 100                                                                               | 200                                                                               | 400                                                                               | 600                                                                               | 800                                                                               | 1200                                                                              |
|------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Distribution pipe<br>CIP           |                                                                                   |  | ←-----→                                                                           |                                                                                   |  |                                                                                   |
| Distribution pipe<br>VP            |  | ←-----→                                                                           |                                                                                   |  |                                                                                   |                                                                                   |
| Service pipe<br>VP                 |                                                                                   |  | ←-----→                                                                           |                                                                                   |  |                                                                                   |
| Service pipe<br>GP                 |                                                                                   |                                                                                   |  | ←-----→                                                                           |                                                                                   |  |

## 10. Functions-Switching Screens and Selecting Functions

To switch to the function selection menus, press the  button in the top menu.

To switch between selection menus, use the   buttons, and to make a selection, use the  button.

Change function settings by the   buttons, and apply a setting by quickly pressing the  button.

press and hold the  button.



## 11. Functions-Filter Settings

### 11-1 LPF (Low Pass Filter) setting

Set the LPF frequency. Set so that only sound lower than the preset frequency can be heard.

Press the  button at “LPF” in the top menu.

Change the frequency by the   buttons, and apply the setting by pressing the  button.

The LPF can be selected from among 5000, 2500, 2000, 1600, 1200, 800, 600, and 400. (Note, however, that only an LPF value higher than the HPF value is allowed.)



**Tip:** Frequencies higher than the value set at LPF are cut.

## 11. Functions-Filter Settings

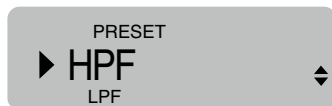
### 11-2 HPF (High Pass Filter) setting

Set the HPF frequency. Set so that only sound higher than the preset frequency can be heard.

Press the  button at “HPF” in the top menu.

Change the frequency by the   buttons, and apply the setting by pressing the  button.

The HPF can be selected from among 100, 150, 200, 300, 400, 600, 800, and 1200. (Note, however, that only an HPF value lower than the LPF value is allowed.)



**Tip:** Frequencies lower than the value set at HPF are cut.

## 11. Functions-Filter Settings

### 11-3 Filter Through Setting

Set whether use or not use of the filters.

Press the ☐ button at "THRU" in the top menu.

Toggle the TRHU ON and OFF settings by the ☐ ☐ buttons, and apply the setting by pressing the ☐ button.



**Tip:** When the filter through setting is set to ON, the filter setting of both the low and high pass filters is disabled. To enable filter settings, set THRU to OFF.

## 12. Functions-Backlight Setting

Set the brightness of the backlight.

Press the  button at "B.LIGHT" in the top menu.

Press the   buttons to change to the desired brightness in the range 0 to 3, and apply the setting by pressing the  button.

The larger the number, the brighter the backlight becomes. However, note, that setting a bright setting results in the battery running down faster.



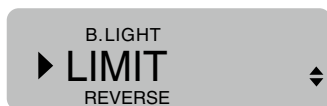
## 13. Functions-Limiter Setting

Excessive impact sound can be suppressed by setting the limiter.

Press the  button at "LIMIT" in the top menu.

Press the   buttons to change to the desired setting in the range 0 to 3, and apply the setting by pressing the  button.

The larger the number, the more impact sound can be suppressed.



## 14. Functions-Reverse Setting

The LCD display and buttons can be reversed or set upside down by setting Reverse.

Press the  button at "REVERSE" in the top menu.

Press the   buttons reverse the LCD display. Apply the setting by pressing the  button.



## 15. Functions-Preset (Save Settings) Setting

Your preferred settings can be saved on the equipment. When the equipment next starts up, it starts up at the previously saved settings.

Press the  button at "PRESET" in the top menu.

Press the   buttons to toggle the setting to YES, and apply the setting by pressing the  button.

The following settings can be saved by PRESET: sound level, reverse display, filter settings, and limiter setting.



## 16. Specifications

### ● Amplifier

|                              |                                                                                                                                                                |
|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Display                      | Graphic LCD display (with backlight)                                                                                                                           |
| Filter                       | BPF(Band Pass Filter) can be set by the following combinations:<br>HPF(High Pass Filter) 8stages(100 to 1200Hz)<br>LPF(Low Pass Filter) 8stages(400 to 5000Hz) |
| Frequency range              | 100 to 5000Hz                                                                                                                                                  |
| External connection (input)  | Sensor connector                                                                                                                                               |
| External connection (output) | φ3.5mm stereo                                                                                                                                                  |
| Power supply                 | 4×AAalkaline batteries (4×Ni-MH rechargeable batteries)                                                                                                        |
| Continuous operating time    | 40hours or longer (when backlight is OFF and no signal is present)                                                                                             |
| Operating temperature range  | -20°C to +55°C                                                                                                                                                 |
| External dimensions          | 160 mm(W)×40 mm(D)×105 mm(H) (excluding protective case and protrusions)                                                                                       |
| Weight                       | 600g (excluding batteries)                                                                                                                                     |
| Dust-proof/drip-proof        | IP54 or equivalent                                                                                                                                             |

### ● Sensor

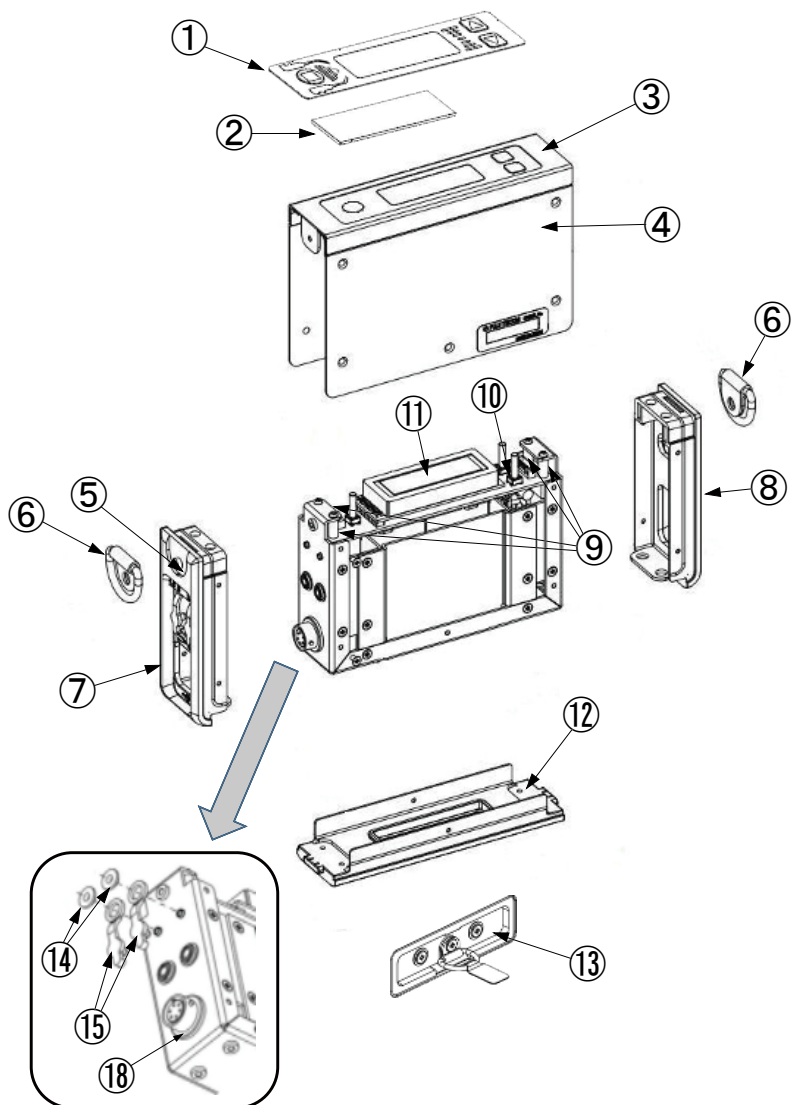
|                       |                                        |
|-----------------------|----------------------------------------|
| Model                 | Piezoelectric type acceleration sensor |
| Dust-proof/drip-proof | IP67 or equivalent                     |
| Power supply voltage  | DC3.3V                                 |
| External dimensions   | φ78mm×50mm (excluding cable section)   |
| Weight                | 580g                                   |

### ● Headphones

|                   |                       |
|-------------------|-----------------------|
| Method            | Stereo, enclosed type |
| Impedance         | 8Ω                    |
| Terminal diameter | φ3.5mm                |

## 17. Parts list and illustrations (Main unit)

### 17-1 Main unit (1)



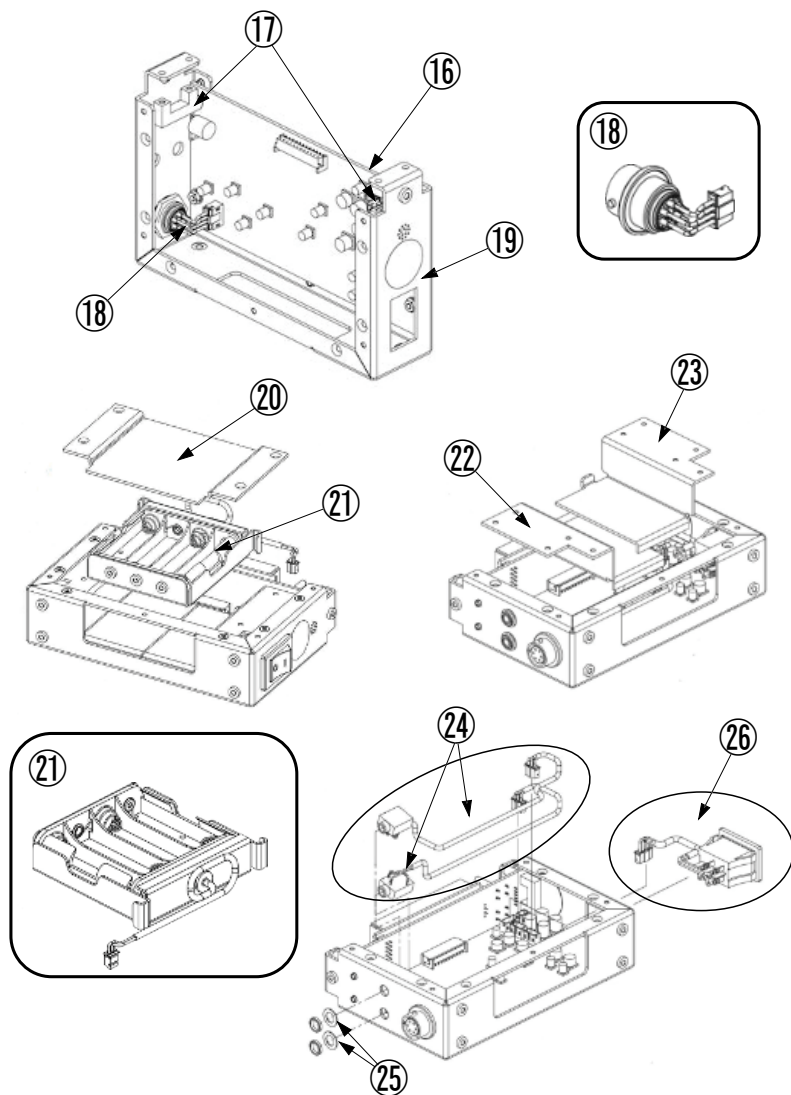
## 17. Parts list and illustrations (Main unit)

### Main unit

- ① Membrane switch(350119)
- ② LCD protect plate(350125)
- ③ Housing case (Panel)(350117)
- ④ Housing case (Main body)(350116)
- ⑤ Spacer(350126)
- ⑥ D-ring(350128)
- ⑦ Housing case (Left)(350123)
- ⑧ Housing case (Right)(350124)
- ⑨ Spacer(350127)
- ⑩ Digital PCB assembly(350152)
- ⑪ LCD(350154)
- ⑫ Rubber cover(350122)
- ⑬ Battery cover assembly(350191)
- ⑭ Bush(350129)
- ⑮ Water proof cap(054144)
- ⑯ Analogue PCB assembly(350151)
- ⑰ Connecting bracket(350120)
- ⑱ Harness assembly of sensor input(350163)

## 17. Parts list and illustrations (Main unit)

### Main unit (2)



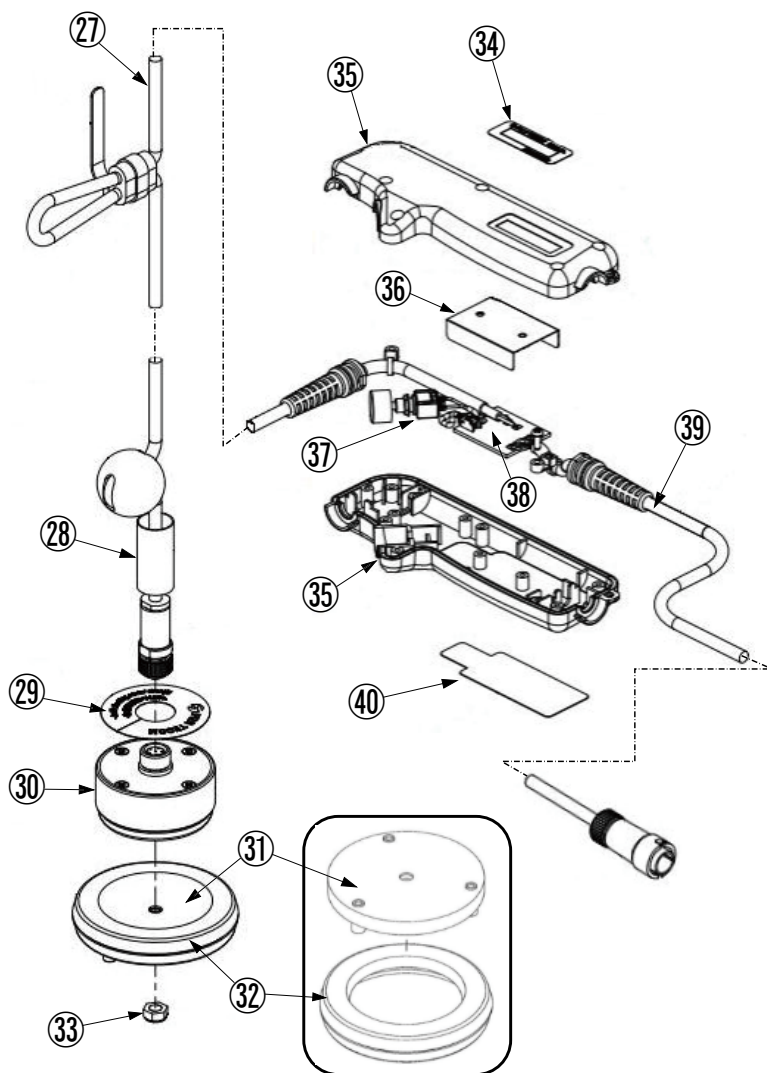
## 17. Parts list and illustrations (Main unit)

### Main unit

- ⑩ Analogue PCB assembly(350151)
- ⑪ Connecting bracket(350120)
- ⑫ Harness assembly of sensor input(350163)
- ⑬ Housing frame(350111)
- ⑭ Frame reinforcement(350112)
- ⑮ Battery case assembly(350192)
- ⑯ Reinforcing plate (Left)(350113)
- ⑰ Reinforcing plate (Right)(350114)
- ⑱ Headphone harness assembly(350161)
- ⑲ Rubber washer(350130)
- ⑳ Power harness assembly(350162)

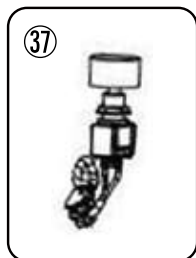
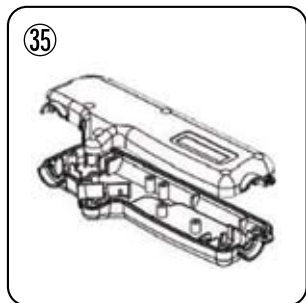
## 17. Parts list and illustrations (Pick-up sensor with hand-switch set)

### 17-2 Pick-up sensor with hand-switch set (1)



## 17. Parts list and illustrations (Pick-up sensor with hand-switch set)

### Pick-up sensor with hand-switch set (2)



②⑦ Cable assembly for P.U. side(350234)

②⑧ Heat contraction tube(234207)

②⑨ P.U. caution sticker(350213)

③⑩ P.U. element assembly(234309)

③① Disc plate(234306)

③② Disc plate cover(007138)

③③ Hexagon lock nut(007141)

③④ Serial number plate(234219)

③⑤ Hand-set case (Right and Left)(350231)

③⑥ PCB cover(350212)

③⑦ Switch harness assembly with button(234216)

③⑧ PCB assembly for hand-switch(350221)

③⑨ Cable assembly for main unit side(350232)

④⑩ Product name sticker(350213)



Instruments for the location of underground utilities and water leaks.

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