Boring Head Locating System

# GUIDER 6 Plus

## Operation Manual


TAKACHIHO SANGYO CO., LTD

# For your safety

■Please read manual carefully before attempting to operate and use only as directed.

■After reading, please keep manual where it is easy to find.

■For the purposes of quality control and product improvement,
we have placed control numbers on some units. We appreciate your understanding.

## ⚠ Danger

- Do not place batteries near an open flame or attempt to take apart or modify them.
- Take care not short circuit the batteries, or place them in the wrong direction.
- Do not expose the internal components to water or foreign objects.
- Do not attempt to take apart or modify the unit.
- Do not sit, stand or place heavy objects on top of the unit.

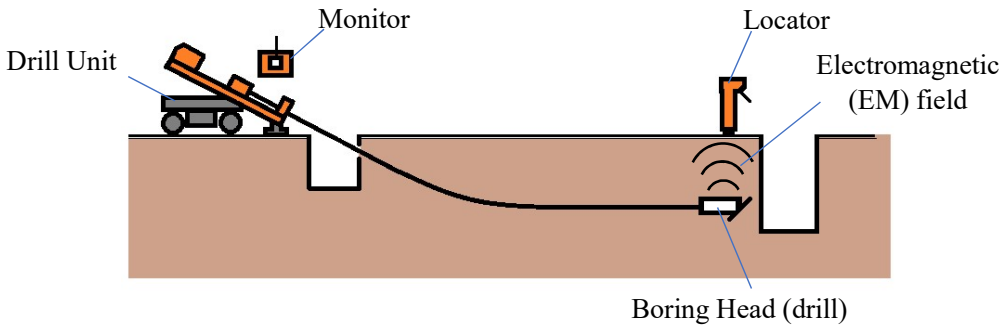
## ⚠ Caution

- The locator and monitor are not 100% waterproof. Please do not submerge in water.
  If the inside components become wet, please dry thoroughly before use.
  Using before it is completely dry may result in operating errors.
- Please avoid dropping, strongly bumping or shaking the unit.
- Please remove batteries when not in use for long periods of time.
- Please replace batteries immediately when battery power is too low.
  Using the unit with low battery power may result in inaccurate scan results.
- Please do not mix old and new batteries, or batteries of different types.
- Please remove batteries after they have died.
- Please do not leave unit in areas with excess dust, steam, extreme temperatures, or near an open flame.
- If unit is malfunctioning, please do not continue using it.
- If unit is dirty, please do not wash with water or other cleaning agents.
  Furthermore, please refrain from using solvents as they may damage the machine.
  To remove dirt, please wipe with a damp cloth or towel.

# Table of Contents

# 1. Product Summary

This product measures the position, angle and depth of the drill head for Horizontal Directional Drilling.
The product is composed of a locator, a monitor and a probe (transmitter).




| Component | Explanation |
|---|---|
| Locator | This part measures the position, depth and angle of the boring head. |
| Monitor | This part receives and displays the transmitted data from the locator.<br>It uses in a place to operate drill unit. |
| Probe | Placed inside the boring head, the probe transmits an electromagnetic signal that informs the locator of the depth and location of the boring head, as well as information about the angle of the drill. There are several probes available to suit the various environmental conditions. |

## Product Exterior

# 2. Product Specifications

## 1) Locator

| Item | | Standard | |
|---|---|---|---|
| Receiving frequency | | 38 kHz, 14.4 kHz, 9.5 kHz | |
| Power source | | 6 Alkaline “C” batteries | |
| Battery life | | 12 hours (at 25°C, using alkaline batteries) | |
| Power saving function | | Power turns off after no signal for 10 minutes or more | |
| Operating temp. range | | -20 ~ 60°C | |
| Signal reception range | | 0 ~ 39.9m | |
| Display screen | | Color LCD (with backlight) | |
| Wireless transmission | Channel | 1ch ~ 4ch | |
| | Frequency | CH. 1 469.500 MHz<br>CH. 2 469.550 MHz<br>CH. 3 464.500 MHz<br>CH. 4 464.550 MHz<br>※ Error within 3 ppm (1.4 kHz) | |
| | Output | 70 mW (standard value), BNC connector 50 Ω | |
| | Wireless range | 500 m or more<br>(with no interference between locator and monitor) | |
| Probe information | Pitch angle | Displayed in degrees<br>Displayed as % | ：↑50.0°~ ↓50.0°<br>：↑119.0% ~↓119.0% |
| | Roll angle | 360° (divided into 24ths) | |
| | Temperature | -20°C ~ 90°C | |
| | Remaining Battery life | 0% ~ 100%（displayed in 20% increments） | |
| Digital level | | 4 levels（approx. 4 degrees per level） | |
| Dimensions | | (H)660 mm × (W)150 mm × (D)270 mm | |
| Weight | | 2.3 kg (including batteries) | |
| Material | | ABS (Waterproof, impact resistant) | |
| Dust - proof・Waterproof | | Conforms to IP65 standards | |

**2) Monitor**

| Item | | Standard |
|---|---|---|
| Power source | | 4 Alkaline “C” batteries |
| Battery life | | 12 hours (at 20ºC using alkaline batteries) |
| Power saving function | | Power turns off after no signal for 5 minutes or more |
| Operating temp. range | | -20 ~ 60°C |
| Display screen | | Color LCD (with backlight) |
| Display data | | Probe information, lateral position (right and left),<br>linear position (front and back), yaw angle, depth |
| RF specs | Antenna | Collapsible, BNC connector (50 Ω) |
| | Channel | 1ch ~ 4ch |
| | Wireless freq. | CH. 1 469.500 MHz<br>CH. 2 469.550 MHz<br>CH. 3 464.500 MHz<br>CH. 4 464.550 MHz |
| | Range | 500 m or more<br>(with no interference between locator and monitor) |
| Dimensions | | (H)176 mm × (W)163 mm × (D)125 mm |
| Weight | | 2.4 kg (including batteries) |
| Material | | Stainless steel, Waterproofing |
| Dust - proof･Waterproof | | Conforms to IP65 standards |

### 3) Probe

#### General Specifications

| Item | | Standard |
|---|---|---|
| Power source | | 2 Alkaline “C” batteries |
| Battery life | | 10 hours or more (at 25°C, using alkaline batteries) |
| Power saving function | | Automatically turns off after 10 minutes without rotating |
| Operating temp. range | | -20 ~ 60°C |
| Meas. functions | Pitch angle | Displayed in degrees ↑50.0°~ ↓50.0°<br>Displayed as % ↑119.0% ~↓119.0%<br>Resolution: Below 22.5°: 0.1°<br>Above 22.5°: 0.5° |
| | Roll angle | 360° divided into 24ths<br>(Angle of rotation relative to direction of travel) |
| | Temperature | Temperature range -20°C ~ 90°C<br>Resolution: 30°C ~ 70°C: 5°C<br>Otherwise: 10°C |
| | Remaining battery life | 0% ~ 100%（displayed in 20% increments） |
| Transmitting output | | 1 W or less |
| Range | | 25 m (with no interference of noise） |
| Dimensions | | Diameter: 31.5 mm × length: 380 mm |
| Weight | | Approx. 1 kg (including batteries) |
| Material | | Body: Glass fiber battery portion: BSBM（Ni coated） |
| Waterproofing | | W.R. 3 bar (3 atmosphere), water will not seep into the probe |

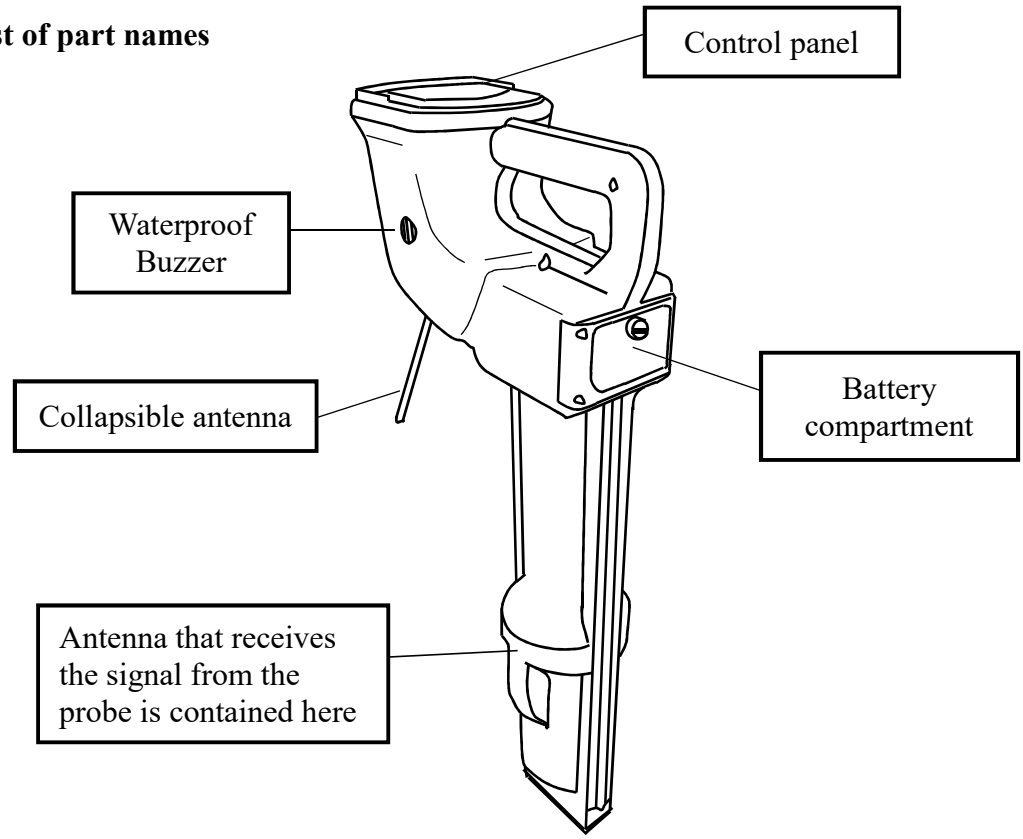
#### Individual Specifications (for each probe)

| Item | Standard |
|---|---|
| VPL-G9P | Body color: Teal<br>Frequency 9.575 kHz |
| VPL-G7P | Body color: Brown<br>Frequency 38.075 kHz |
| VPL-G4P | Body color Green<br>Frequency 14.375 kHz |
| VPL-G74P | Body color: Purple<br>Frequency 38.075 kHz / 14.375 kHz<br>※Change between frequencies by rotating the probe |
| VPL-G79P | Body color: Red<br>Frequency 38.075 kHz / 9.575 kHz<br>※Change between frequencies by rotating the probe |

# 3. List of Part Names

## 3-1. Locator

### 1) List of part names

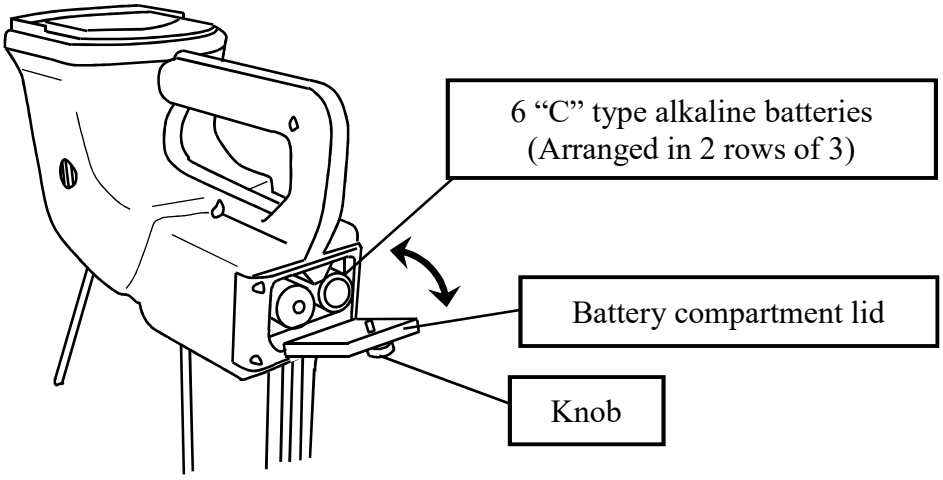



### 2) Replacing the batteries

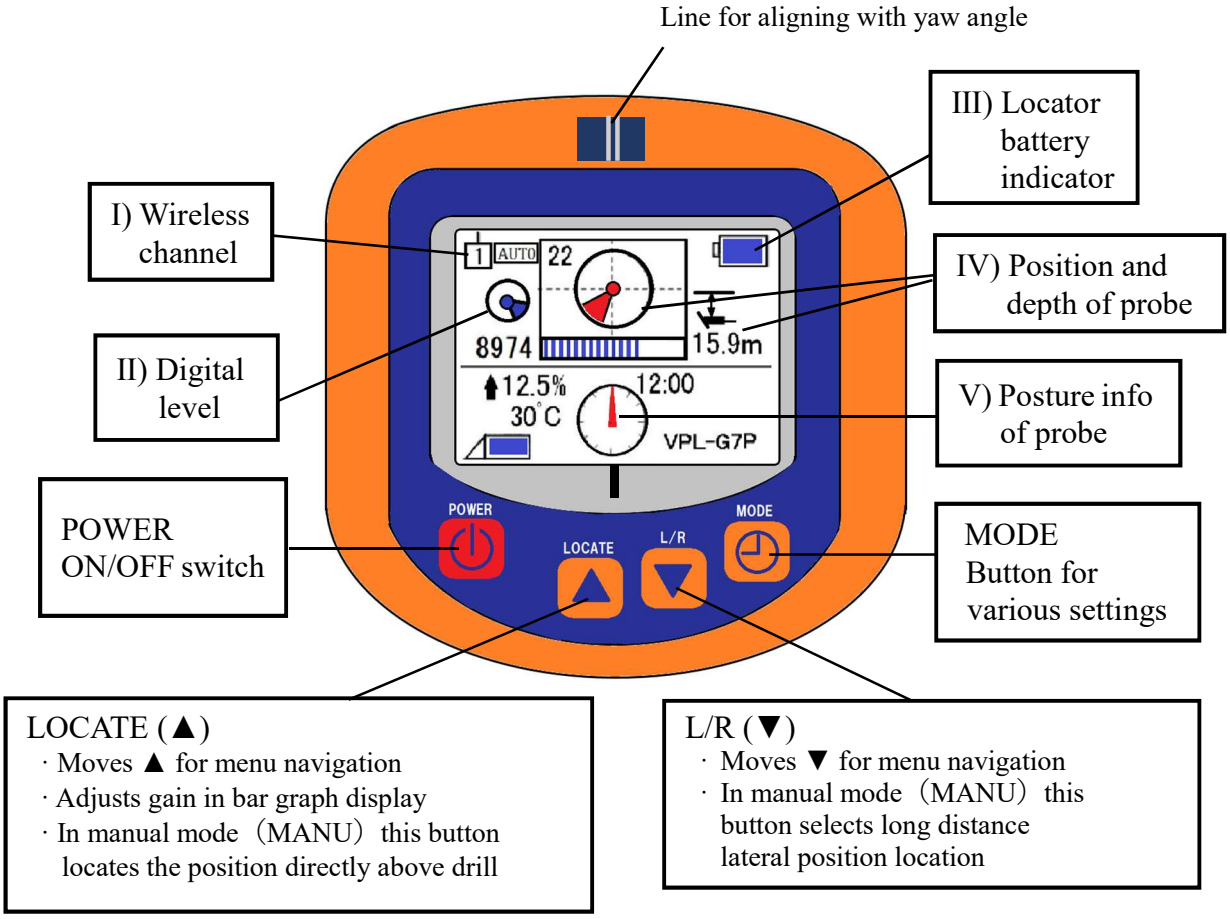
I) Turn the knob on the lid of the battery compartment on the back of the receiver.
counterclockwise to open it.
Holding down on the lid while turning the knob allows the knob to turn more easily.

II) Put in 6 new “C” type, alkaline batteries
Insert the batteries in the direction displayed on the label in the battery case.

III) Close the battery lid and turn the knob clockwise until it is tight.

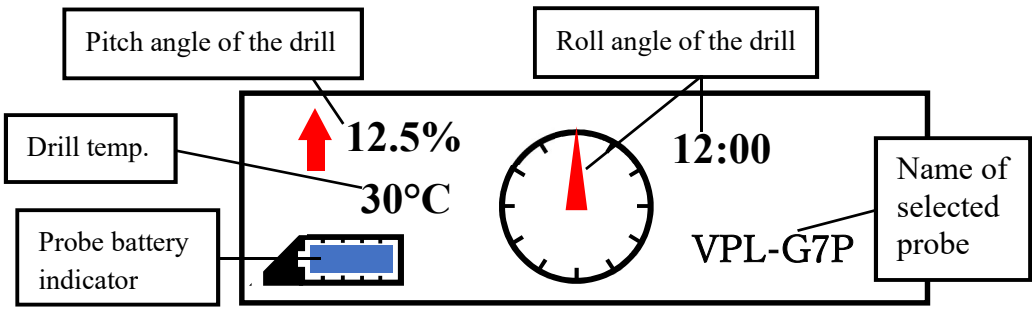


### 3) Explanation of Control Panel



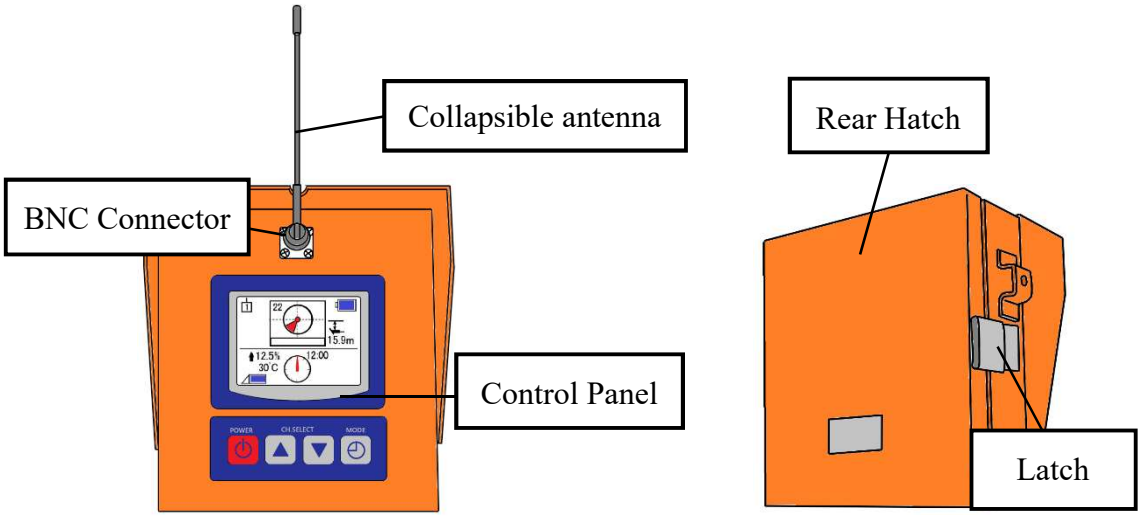

### Outline of Display Panel

| | |
|---|---|
| I) Wireless channel | Displays the wireless channel used between monitor and locator |
| II) Digital level | Displays the level of tilt of the locator |
| III) Locator battery indicator | Displays the remaining battery life of the locator itself |
| IV) Position and depth of probe | Displays EM field intensity of probe, Yaw angle, Linear position (front/back), lateral position (left/right), and depth |
| V) Posture info of probe | Drill angle (as measured by probe), temperature, remaining battery of the probe |



## 3-2. Monitor

### 1) List of part names




### 2) Replacing the batteries

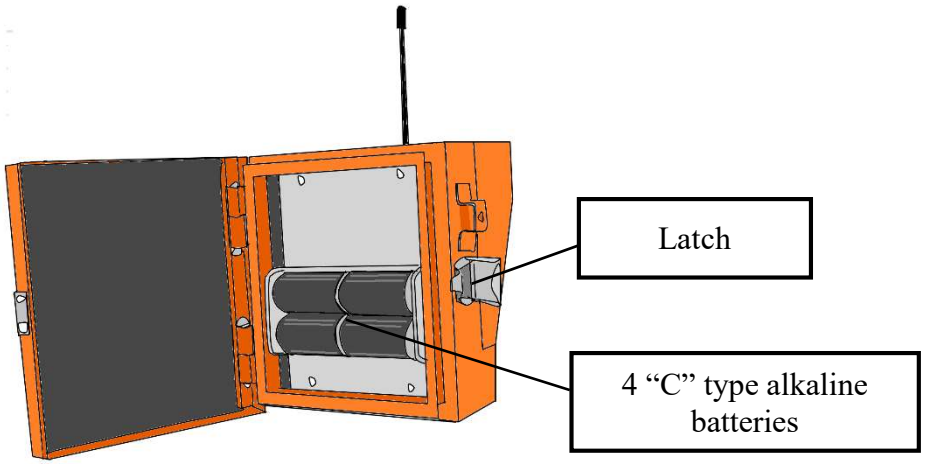
I) Release the latch on the side of the monitor to open the rear hatch.

II) Put in 4 “C” type alkaline batteries.

Insert the batteries in the direction displayed on the label in the battery case.

Take care not to pinch fingers or other extremities while replacing batteries.

III) Close the back hatch and the fasten the latch.




### 3) Attaching and removing the antenna

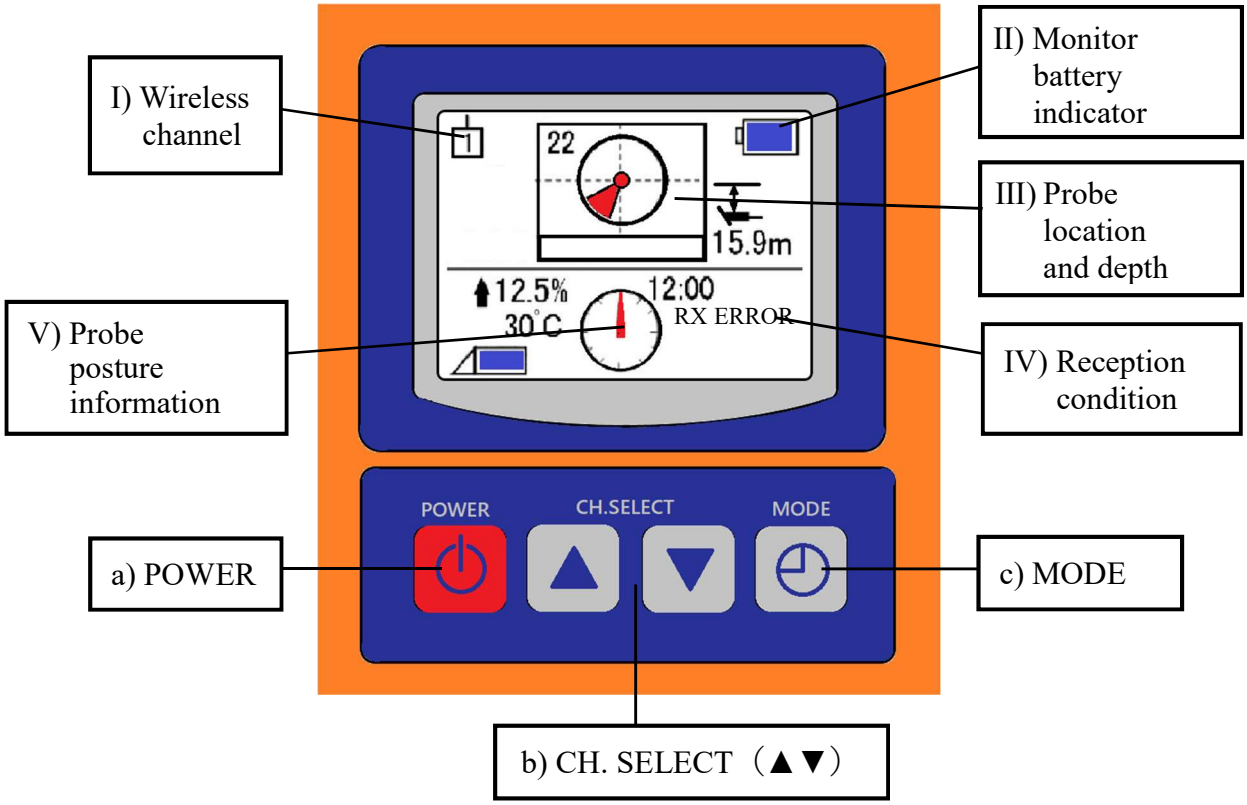
Connect the antenna to the BNC connector on the top of the monitor.

Hold the antenna by the base and align it with the hole, then turn clockwise to attach.

When removing the antenna, carry out this process in reverse order.

The antenna is collapsible and can be folded down in any direction.

### 4) Explanation of control panel




**Outline of LCD display**

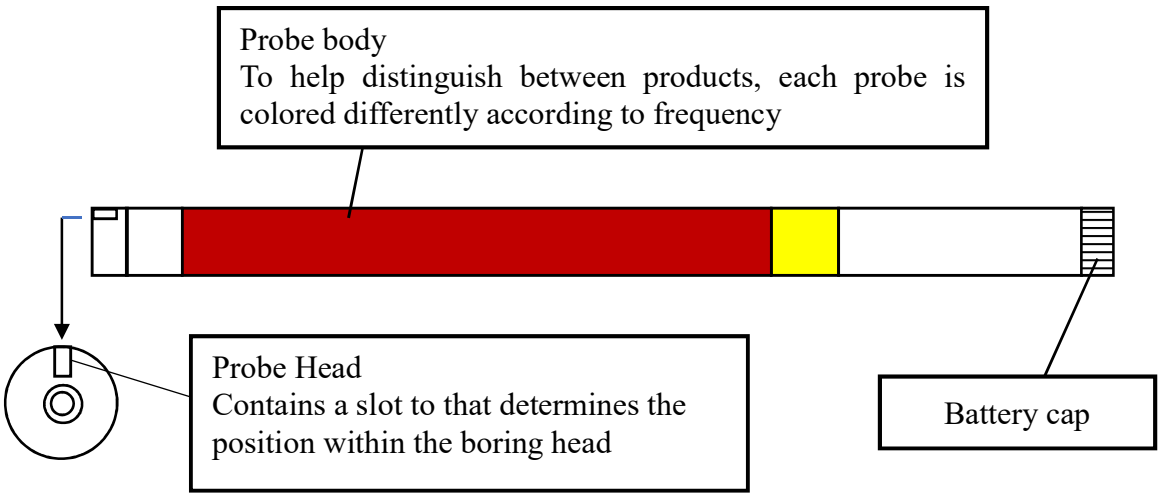
| | |
|---|---|
| I) Wireless channel | Displays wireless channel used between locator and monitor |
| II) Monitor battery indicator | Displays the remaining battery power of the monitor itself |
| III) Probe location and depth | Displays yaw angle, linear position (front and back),<br>lateral position (right and left) and depth |
| IV) Reception condition | Displays reception condition between locator and monitor |
| V) Probe posture information | Displays drill angle (measured by probe), temperature,<br>and remaining battery life of probe<br>※For more details, see explanation of locator display |

**Outline of buttons**

| | |
|---|---|
| a) POWER | Power ON/OFF button |
| b) CH. SELECT<br>（▲▼） | Selects wireless channel（ch. 1～ch. 4）<br>▲: Select higher channel　　▼: Select lower channel |
| c) MODE | Setting button（Select angle units） |

## 3-3. Probe

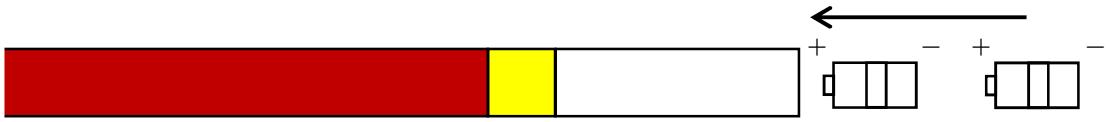
### 1) List of part names




### 2) Replacing the batteries

I) Remove the battery cap from the rear of the probe.

II) Insert two “C” type alkaline batteries, making sure the batteries are in the proper direction.

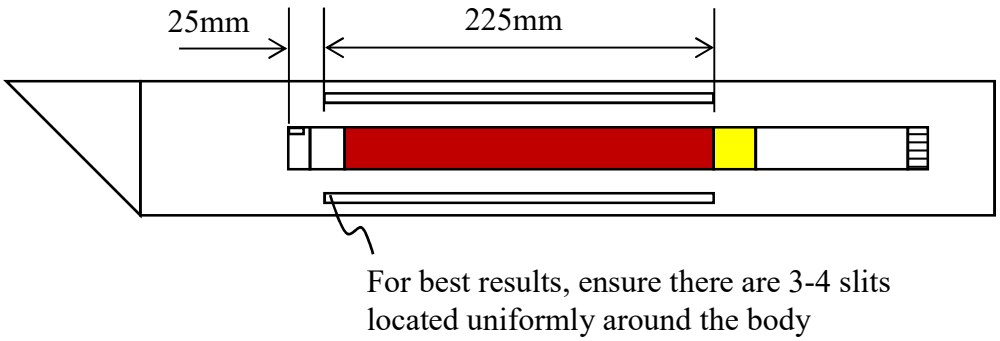



III) Refasten the battery cap.

### 3) Slit manufacturing dimensions

The portion of the boring head (drill) containing the probe has slits to allow the probe to transmit a magnetic field. For best results, ensure that slits are as indicated in the diagram below.

※ Suggested dimensions. Please contact maker for details.



# 4. Operating the Locator

## 1) Settings

Before use, it is necessary to adjust settings and perform depth calibration.

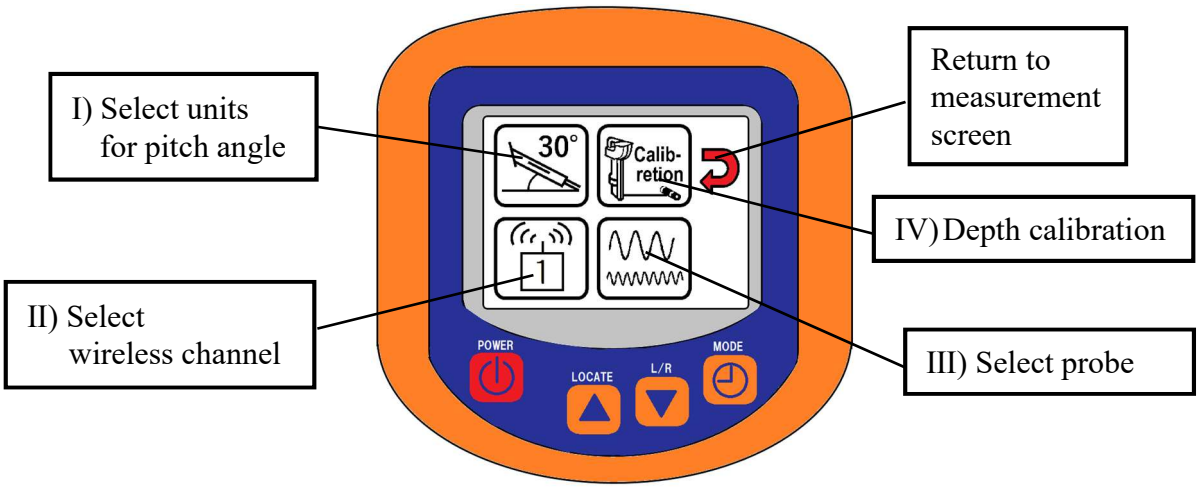
Pressing the MODE button from the measurement screen will bring up the **settings screen.**

(indicated in the **diagram below**)

Navigate the menu by pressing the locate (▲) and L/R (▼) button.

(The current selected setting will appear in red)

To make your selection, Press the **MODE** button.



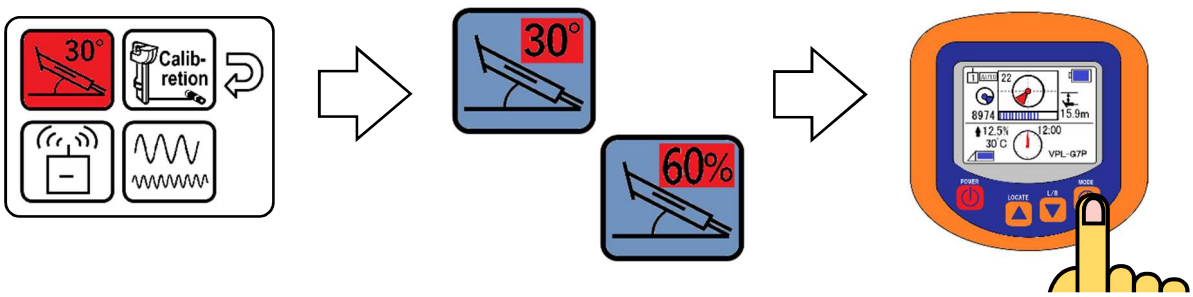

### I) Pitch angle unit selection

Pitch angle can be displayed either in degrees or as a gradient (percentage).

a) Navigate to the icon in the top left corner of the screen and press the MODE button.

b) Use the locate (▲) and L/R (▼) button to select degrees or percentage.

c) Press the MODE button and return to measurement screen.



**II) Selecting a wireless channel**

Set the locator and the monitor to the same wireless channel.

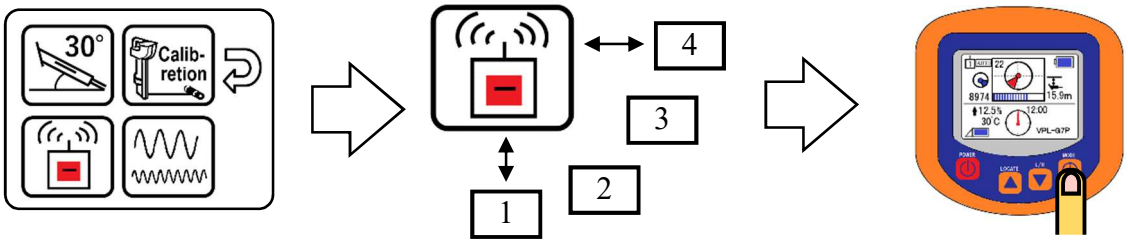
※The minus mark [-] as indicated in the figure below means that the transmission is off.

In the case of poor reception quality or interference, please change to a different channel.

a) Navigate to the wireless icon in the menu and press MODE button to select.

b) Toggle between channels using the locate (▲) and L/R (▼) button.

c) Press MODE again and return to the measurement screen.




**III) Selecting the probe**

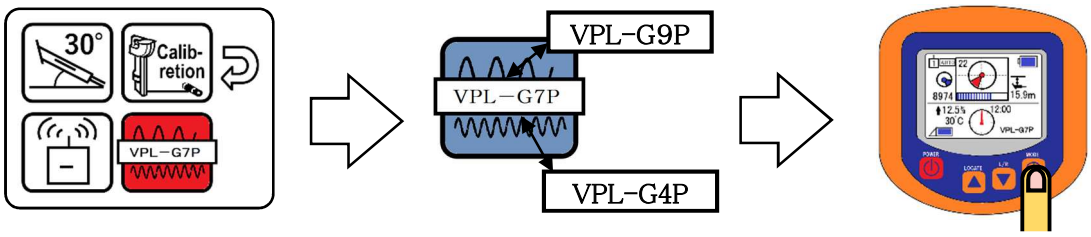
The probe has three available frequencies. Select the most suitable frequency for your jobsite.

For details, please refer to section **4) - "Measuring noise**".

a) Navigate to the probe icon in the bottom right corner and press MODE to select.

b) Toggle between frequencies using locate (▲) and L/R (▼) button.

c) Press MODE again and return to the measurement screen.




**IV) Depth Correction (Calibration)**

Navigate to the calibration icon in the top right corner of the screen and press MODE to select.

For details, refer to section **3) - "Depth correction (Calibration)".**

## 2) Selecting the measurement mode

**There are two scanning methods available:**

One for measuring the lateral position (L/R) of the drill from a long distance (long distance mode), and one for measuring the position from directly above the drill (Near distance mode).

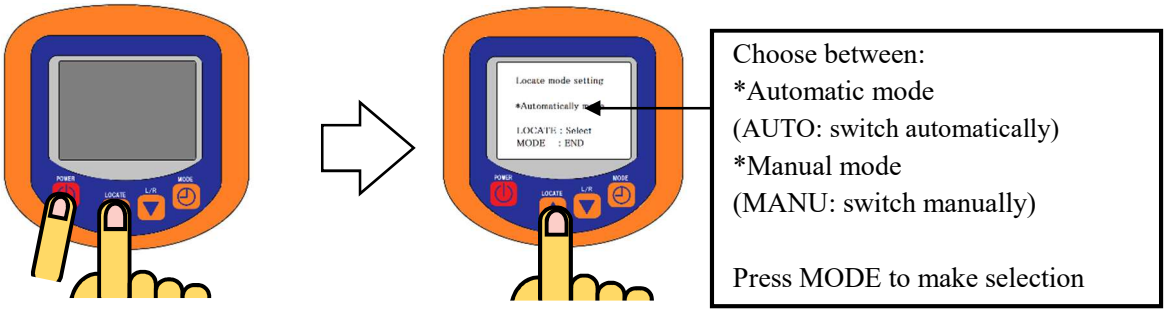
**There are two settings to switch between scanning methods:**

AUTO mode switches automatically, and MANU mode allows the user to switch between methods manually. For example, if the measuring conditions (distance, depth) do not change, it may be more convenient to keep the machine in MANU mode.

### I) How to choose

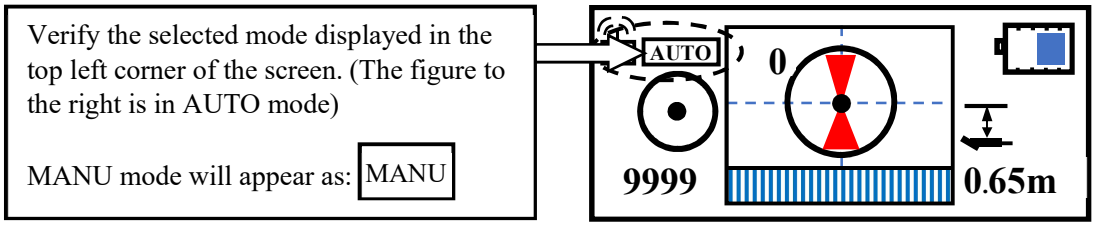
a) Press and hold the POWER and locate (▲) button until the selection screen appears.

b) When the selection screen appears, release the POWER and locate (▲) button. Then use the L/R (▼) button to make your selection.




### II) Confirm settings

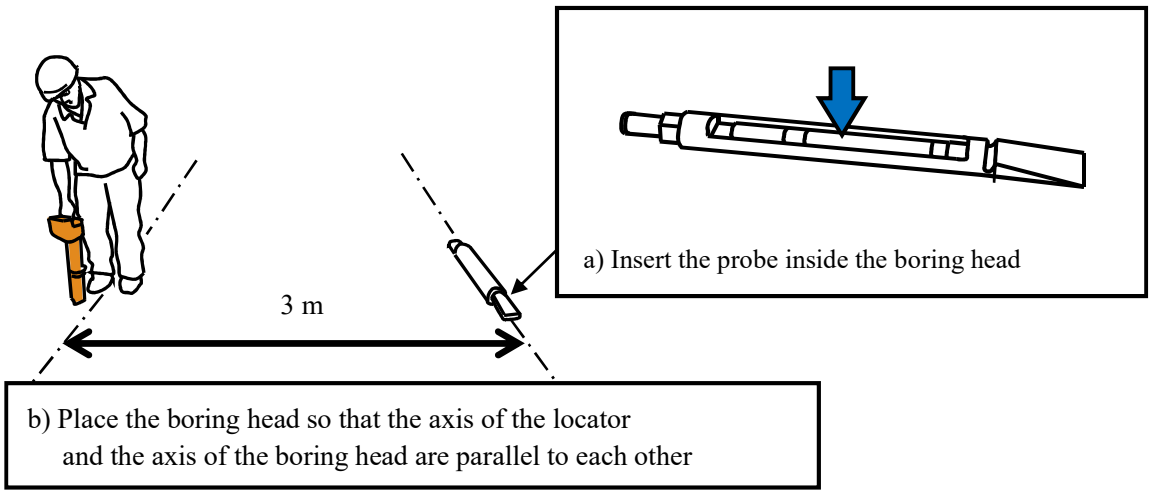
Pressing the MODE will enter the measurement screen. Verify that mode selected (AUTO or MANUAL) is displayed in the top left corner of the screen.



## 3) Depth correction (Calibration)

### I) Set-up

From a position of 3m from the boring head, place the locator as indicated in the diagram below.



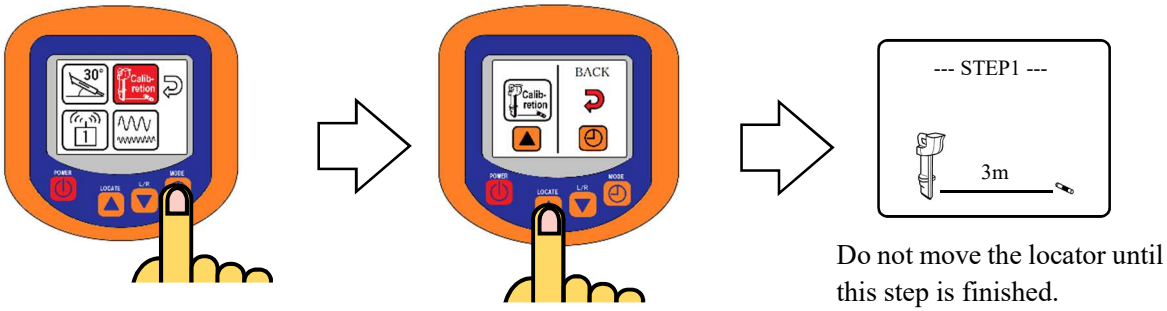

### II) Starting calibration

Turn the locator ON and begin depth calibration.

a) Select “Calibration” from the menu and press and hold MODE for 1 second.

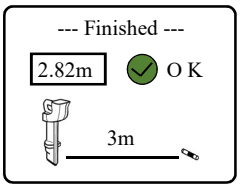
b) Press the locate (▲) button.

c) Depth calibration will begin.



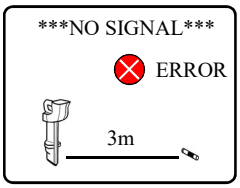

Do not move the locator until this step is finished.

### III) When the calibration is finishes with no errors




- After receiving a display screen like the diagram to the left, return to standard measurement mode.
- The measurement value should be displayed as 2.82m: the initial 3m minus the distance from the ground to the coil (18cm).
- When measuring a real drill under the ground, 3m will be displayed as 3.00m.

### IV) In the case of an error




An error message will be displayed when the signal cannot be received normally. Please perform the following checks:

- Is the batteries in the probe
- That the batteries are aligned properly in the probe
- The probe selected on the locator matches the probe being used

## 4) Measuring noise

As the levels of outside noise varies between job sites, the range of transmission will change.

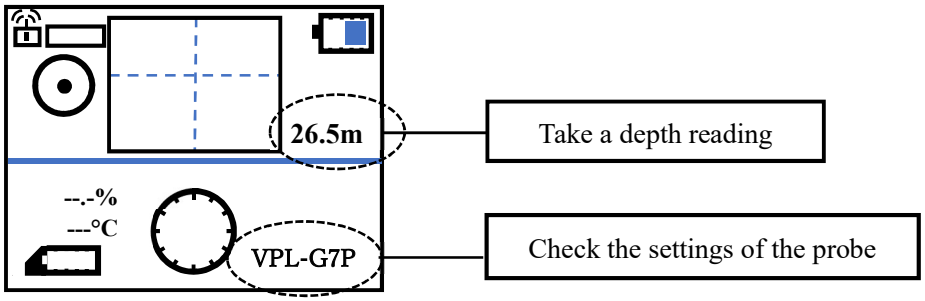
For this reason it is useful to take a reading of the noise level of the jobsite before beginning.

**I) Perform calibration as described in section 3) - Depth Correction (calibration)**

**II) Remove the batteries from the probe so that there is no signal coming from it.**

**III) Take a depth measurement.**

Confirm the measured depth on the locator of the jobsite at which you will be using the unit.




**IV) Calculate the transmission range of your site based on the measured depth.**

***Formula: Transmission range = Measured depth × 0.8***

（e.g. for a measured depth of 30.0 m, the transmission range would be 24.0 m）

The frequency and magnitude of noise varies depending on the jobsite.

For example, strong noise may be emitted from nearby power transformers or the lights from a large retail store.

For users with multiple probes, please measure the noise of your jobsite and select the probe that is best suited for that environment.

### Features of each probe type

· VPL-G7P: Frequency – 38 kHz

When the noise level is good, this probe has the longest range.

· VPL-G9P: Frequency – 9.5 kHz

This probe has the lowest frequency, making it less susceptible to interference from metal plating or other obstructions.

· VPL-G4P: Frequency – 14.4 kHz

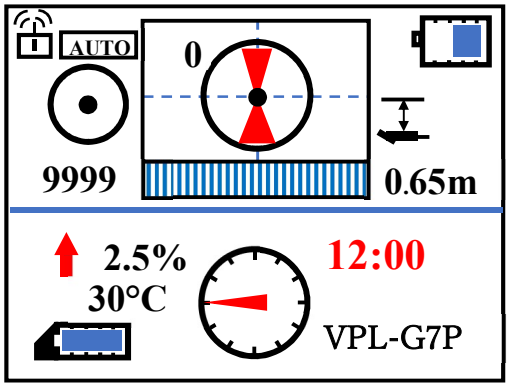
This is a more balanced, midrange probe.

### 5) Measuring position

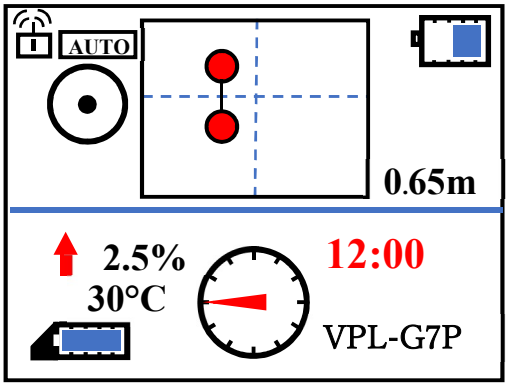
There are two methods for measuring location, as indicated in the diagram below.

The way of measuring varies based on if the unit is in AUTO mode or MANU mode.

a) Near distance mode



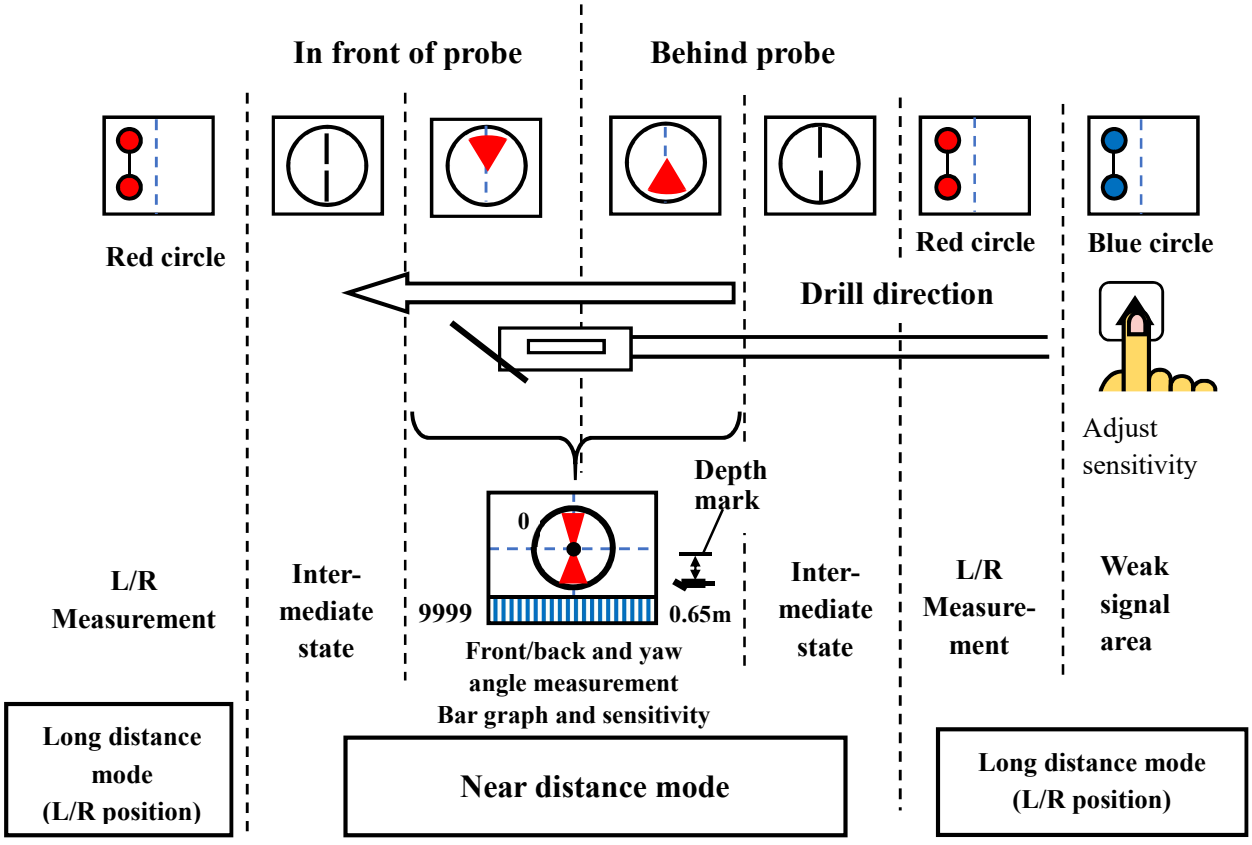

b) Long distance mode (L/R position)




**I) For AUTO mode (Automatically changes between methods)**

Scan method changes automatically based on the position of the drill/probe,

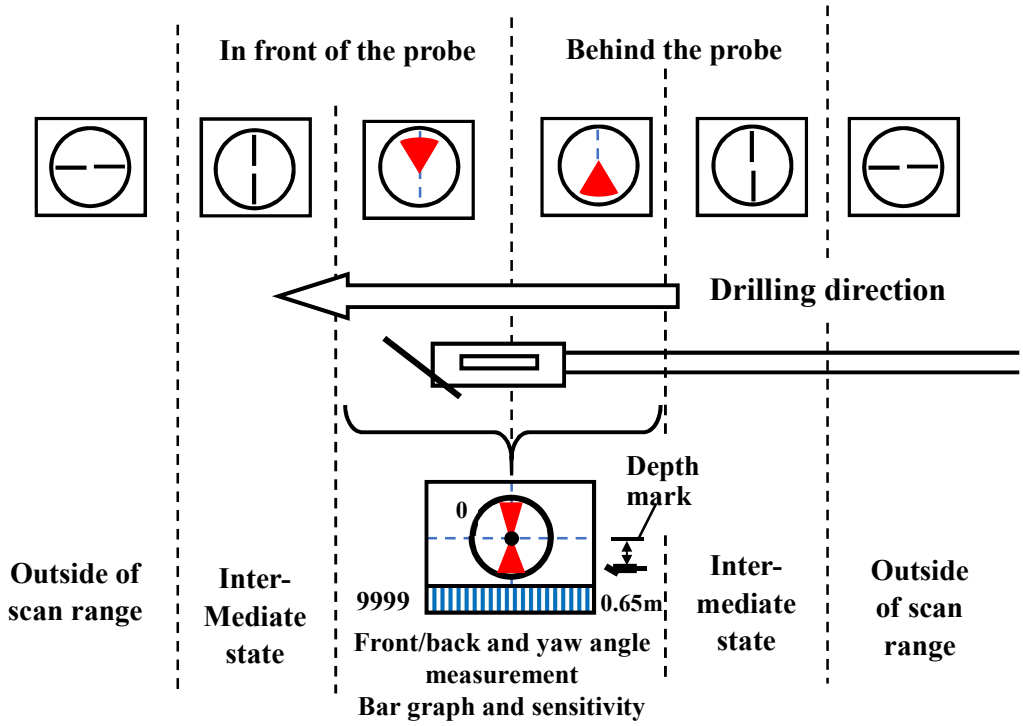
as indicated in the diagram below.



**II) For MANU mode (Manually change between methods)**

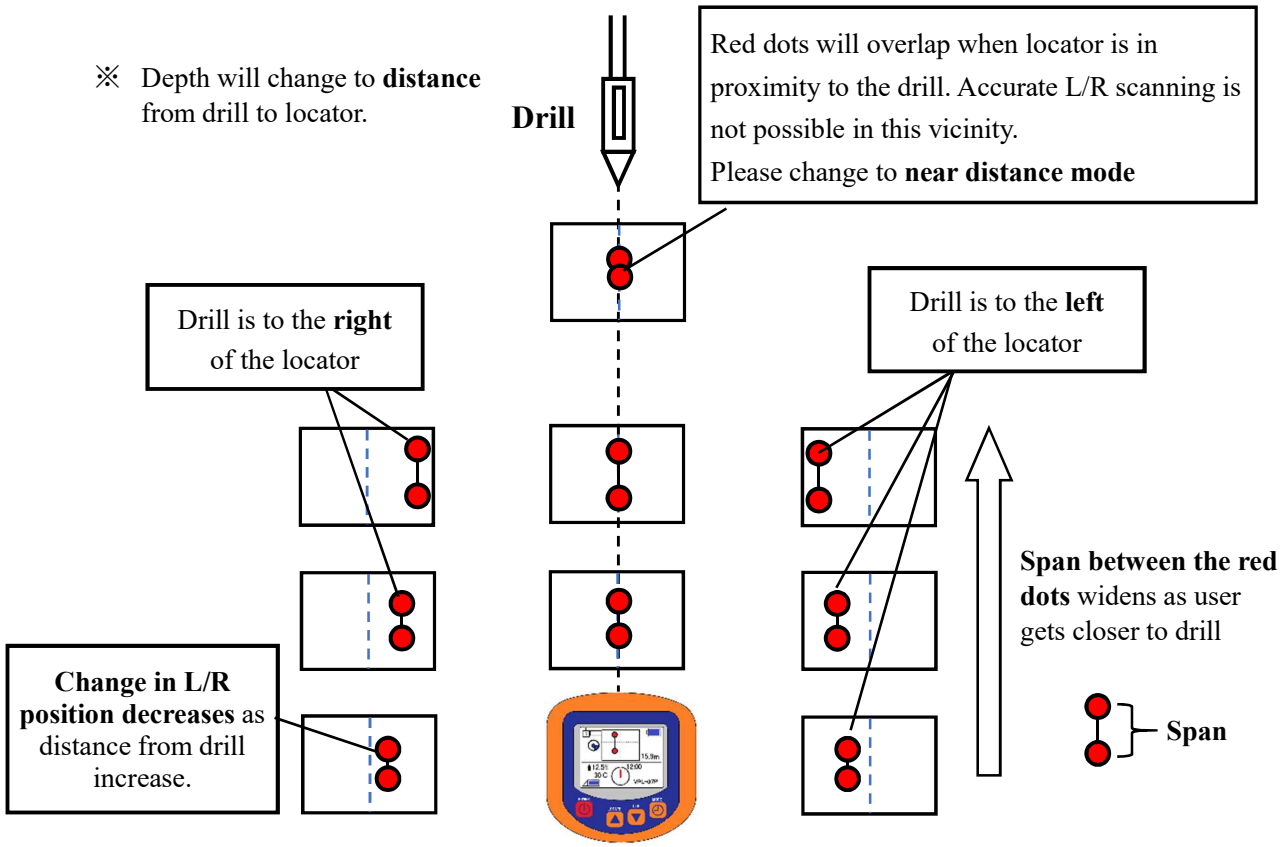
a) Pressing the LOCATE button (▲) will enter near distance mode.

Conduct scan as indicated in the diagram below (Side view).




b) Pressing the L/R button (▼) will begin long distance L/R scanning mode.

Conduct scan as indicated in the diagram below (Top view).

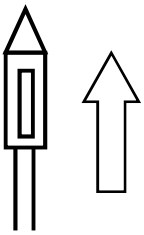


## 6) Near distance mode (Detailed explanation)

### I) Direction of locator

In **near distance mode** ensure that

the locator is facing in the same direction as the drill is moving in.

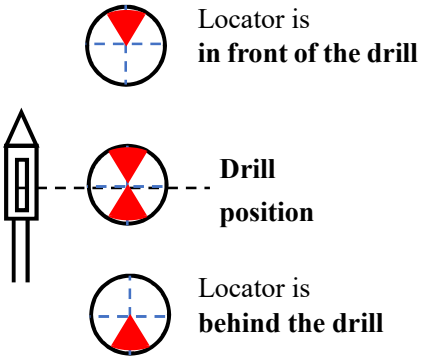


**Drilling direction**

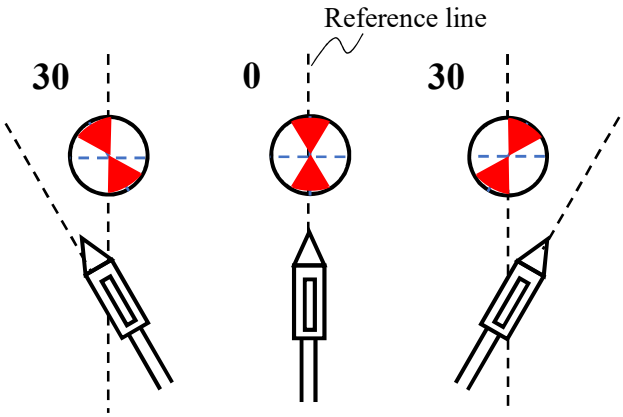
**Direction of locator**

> ***NOTE:***
> *If locator is facing the opposite direction, position errors related to pitch angle cannot be corrected properly.*

### II) Measuring linear position (front/back)




### III) Measuring tilt (yaw angle)

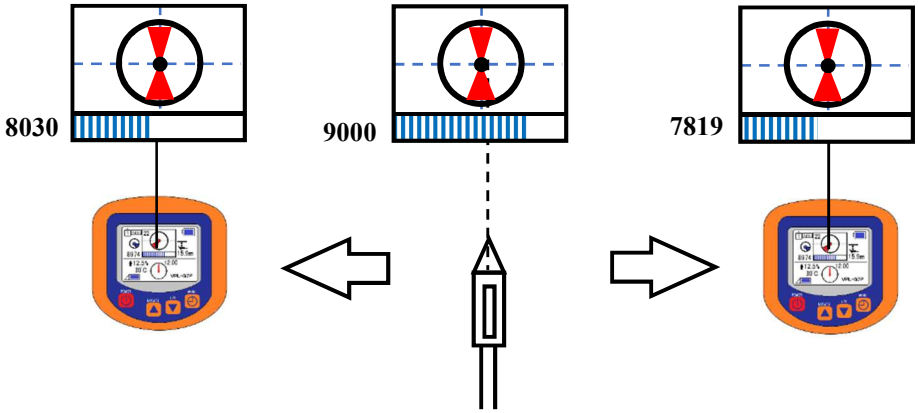



* First, conduct a linear (front/back) scan.
Then align locator with reference line.

### IV) Measuring Lateral position (Left/Right)

Measure the point at which reception sensitivity (bar graph display) is at its peak.

Peak sensitivity point = Position directly above drill

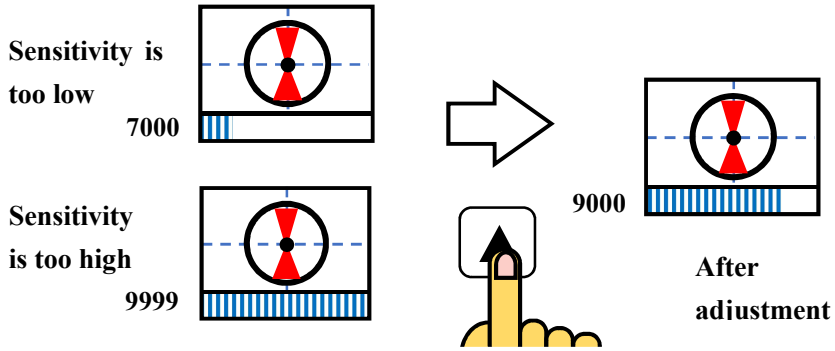


**V) Adjusting sensitivity**

When sensitivity is too low, or display shows 9999, press the LOCATE (▲) button.

Sensitivity will be adjusted automatically.

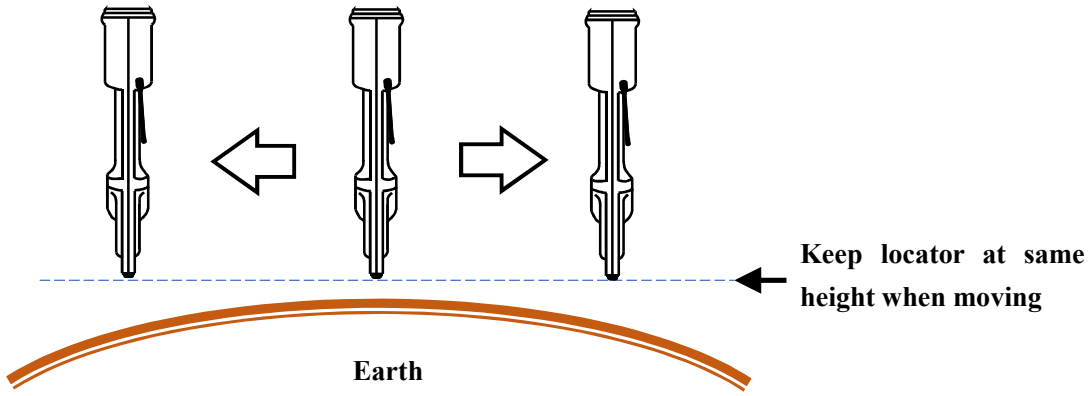
※When adjusting sensitivity, displayed value is relative value of 9000.




**VI) Position measurement precautions**

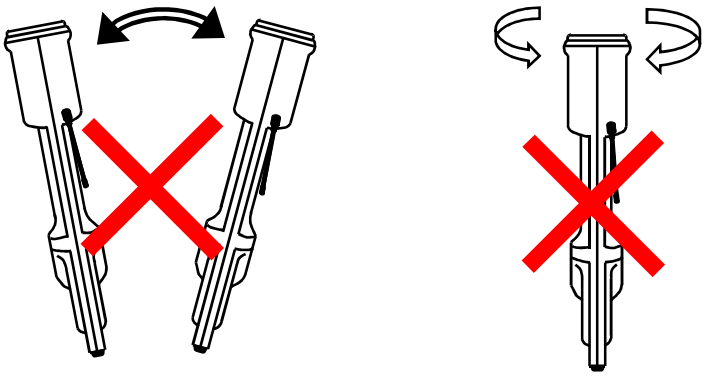
a) When moving the locator, ensure the height from the ground remains the same.

Failure to do so can result measurement errors.




b) Keep locator at consistent posture when moving it.

Avoid tilting or twisting of the locator as this can cause measurement errors.



**Call & Contact**

**TAKACHIHO SANGYO CO., LTD.**

**Tokyo office**
32-8, 5-Chome, Shiba, Minato-Ku, Tokyo 108-0014 TEL 81-3-3453-4778
Head office & Factory in Nagoya, Japan

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