Handheld Wrist Ultrasound Manual

1.0   Warranty

The warranty will cover, at a length of 1 year from date of delivery of goods, the ultrasound device, probe, rechargeable battery pack, and AC Adaptor from defects and failures resulting from normal use of the product.

1.1   Warranty Requirements

Instrumentation must be located in a non-static environment. Your system warranty will not cover damage caused by static charges due to carpet or other highly chargeable surfaces.

Non-approved UPS, battery, or backup power systems can void the warranty. Non-OEM replacement power transformers and power supplies can void the warranty. If you have a power-related problem please call our technical support department and we will make sure we get you the correct replacement product.

Disassembling or making physical changes to your instrumentation for any reason will void all warranty coverage.

MRDS and www.caninep4.com is not liable for any cost incurred to the user (including travel to and from a veterinarian office or testing facility, additional cost of testing, loss of litter, failed pregnancy) due to incorrect use of the equipment, poor interpretation of results, or use of any equipment beyond its stated qualifications.

Our obligation or liability under this warranty does not include any transportation or other charges or liability for direct, indirect, or consequential damages or delay resulting from the improper use or application of the product, or the use of parts or accessories not approved by us or repairs by people other than authorized personnel. The responsibility for maintenance and management of the product after delivery resides with the customer who has purchased the product.

1.2   Warranty Exceptions

Malfunction or damage caused by force majeure such as fire, vandalism, theft or acts of God.

Malfunction or damage caused by unstable, out-of-range power inputs, or alternate power supplies or batteries.

Malfunction or damage caused by improper use or man-made failure such as drops and improper use.

Damage or loss due to use outside the territory in which the system was originally sold.

Damage or loss involving systems purchased from a source other than canineP4.com or its authorized agents.

Damage or loss due to misuse or abuse.

Damage or loss caused by Acts of God such as fires, earthquakes, floods, lightning, etc.

Damage or loss caused by failure to meet the specified conditions for this system, such as

1.3   Return Policy

In the event that it becomes necessary to return this product or part of this product to us the following procedure should be followed:

Contact Customer Service at support@k9p4go.com or 844-673-7378 first. Please provide the instrument's serial number, and a brief description of the reason for return. It is for the purpose of obtaining a Return Materials Authorization (RMA) number. A video or image of the defect may be required to process a warranty replacement or return. Once approved, a label will be provided by caninep4 with which to ship the device back. Do not ship the device back without first contacting CanineP4.

1.4   Important Information

This system shall not be used to diagnose conditions by people other than fully qualified and certified medical personnel. Do not make changes or modifications to the software or hardware of this product. In no event shall CanineP4 be liable for problems, damage or loss caused by relocation, modification, or repair performed by personnel other than those designated by canineP4.com. The responsibility for diagnostic procedures lies with the physicians involved. Important data must be backed up on external recording media such as clinical records, notebooks etc. We shall not be liable for the loss of data stored in the memory of this system caused by operator error or accidents.

2.0   Product Information

Product Name: Veterinary Ultrasonic Diagnostic Imaging System
Model: WristScan V9
Version: SW201001E01
SKU: VME-PTSD-50508

Symbol	Signification
⚠	Indicates the points requiring attention. Be sure to read the operator's manual concerning these points before using the system.
⚠	(a) Cautions that the system must not be used around flammable gasses.
	(b) Urges Caution related to handling of the transducers. For handling of the transducers, refer to the transducers' manuals.
⚠	Cautions that the system must not be removed covers because the high voltage may cause electric shock.
Probe	Probe socket
DC11.1V	DC

Packing and transportation labels explanation

🍷	Handle carefully
⌇	Temperature limit
↑↑	Upward
⊟	Piling layer limit
☂	Keep dry
☀	Protect against heat

2.1   Equipment Safety Classification

WristScan V9 is not suitable for use in the presence of a flammable anesthetic mixture with air or with oxygen or nitrous oxide.

WristScan V9 is in continuous operation when powered on.

WristScan V9 contains an internal power supply which is powered by a lithium-ion battery.

WristScan V9 is type B ultrasonic equipment.

2.2   General Tips for Equipment Operation

While Using:

After shutdown, do not switch back on the equipment within 2 - 3 minutes.

When scanning, if any abnormal case is found, stop scanning immediately and turn off the equipment.

When operating, do not press the keyboard panel too much or with force, otherwise the equipment might be damaged.

After Using:

Clean off the probe with soft medical sterilized cotton ball. Do not use harsh bleaches or alcohols on the probe surface.

Return the probe to its protective case.

2.3   General Safety Message

Safety of the operator and patients and reliability of the equipment are taken into consideration during designing and producing, the following safety precaution must be implemented:

The equipment shall be operated by qualified operating staff or under their instructions.

Do not open the equipment and change the parameters without permission.

The equipment has already been regulated to its optimal performance. Do not adjust any preset control or switch unless operate as per instructions in the manual.

If there is an equipment failure, please shut down the equipment at once and contact us.

Do not hit the fragile TFT-LCD display. If it cracks, deal carefully with it to avoid getting the liquid crystal into the eyes or mouths.

Do not hit the inner chargeable Li-ion battery or throw it into fire in case it triggers an explosion; Do not short circuit the battery output electrodes, and please use the original charger to charge the battery.

Do not disassemble the power supply adapter. If failures happen, it should be handled by the professional; the charging output can only be used for charging the battery of the equipment, any improper use on other battery may cause explosion, fire, and other unexpected hazards.

Do not short circuit the output of the adapter, a long-term short circuit shall result in adapter damage.

It is suggested not to use the probe on or near wounds or acute inflammation to avoid cross infection.

2.4   Environmental Requirements

During Use:

Environment Temperature Range: +50°F - 86°F

Relative Humidity Range: 30% - 75% RH

Atmosphere Pressure Range: 0.69 – 1.05 ATM

While in Storage:

Environment Temperature Range: +68°F - 110°F

Relative Humidity Range: 10% - 100% RH

Atmosphere Pressure Range: 0.49 – 1.05 ATM

3.0   Basic System Features

This instrument with the probe-main unit integrated, wrist-mounted ultrasound scanning system adopts the microcomputer control, digital scanning converter, wide dynamic range and low-noise pre-amplifier as well as technology such as logarithm compression, dynamic filter, edge enhance. The whole image is clear, stable with high resolution.

This instrument applies the TFT-LCD displayer of 3.5 inch with 256 grey-scale. The instrument provides 2 kinds of scanning mode as B mode and M mode to give the following functions: to store, recall, real time display, freeze-display, or magnified-display of the image; case number annotation; measurement of distance, heart rate, slope and time, and gestational age of canine as well as pig, horse cattle, goat, and cat.

Field programmable gate array (FPGA) and surface mounted technology (SMT) are applied in this instrument, so the whole unit is small in volume and light in weight.

The instrument applies a power supply which combines the built-in lithium ion rechargeable battery and the regular dry battery, while it also supports the power-save mode which is able to prolong the power supplying time.

The instrument is designed to be water-proof with injection mounding envelopment and WristScan structure which will help the animal diagnosis.

3.1   Technical Specifications

Monitor: 3.5 Inch high resolution color TFT LCD 640x480 pixels

Probe: multi-frequency mechanical sector probe

Frequency: 2.5/3.5/5.0 MHz adjustable

Depth: maximum 160mm depth

Scan Angle: 78 degrees

Gray Shade: 256 gray levels

Built-In Memory: stores up to 128 images

Common Measurement: Distance, Area, Volume, Heart Rate

OB Measurement: Dog BD, GSD, CRL, HD, BD

Battery: lnternal Lithium-Ion battery, over 4 hours continuous use on a full charge, fully charges batteries in 2.5 hours

3.2   Basic Principle

B-ultrasound works in this following procedure: different tissues possess different densities and speeds of transmission of ultrasound, i.e. different acoustic impedance (product of media density and sound speed).when piezo-chip (transductor) gets regulated electric impulse, it will produce ultrasound wit fixed frequency. when this ultrasound (sound energy) is transmitted through tissue, different organ surfaces will produce reflection echo, the different size reflection is received by the transductor which emits ultrasound, and is converted into electric impulse. This electric impulse is amplified, demodulated, digital scanned, shifted and some other handling, video standard signal is produced and organ cross-sectional images are displayed on the monitor.

3.3   Installation and Disassembly

To remove the battery, ensure the battery is not currently being charged and disconnect the charging cable. With a Phillips screwdriver, remove the screw as shown in the photo below:
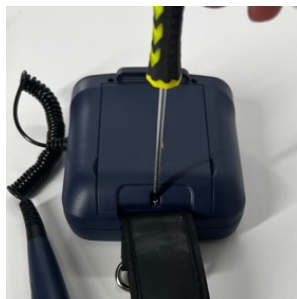
Then, once the screw is removed, gently insert a flat screwdriver into the cavity on the side, and lift up.

Once dislodged, remove the battery by hand by grabbing the end nearest where the set screw was, and pull up and out. Reinstall in reverse sequence.

3.4   Battery Charging

When the main unit displays the battery in the empty status in the right top corner of the display screen, it indicates that the battery should be charged. The battery should be charged via the original charging

adapter cable. DO NOT use the unit while it is charging. Ensure that the power cable is removed before using the unit.

4.0 Operation Warnings

Warning! If in intense electromagnetic environment, images may be interfered and the diagnoses may be affected. If occurring, stop top operating to avoid misdiagnosis and poor instrument performance. Begin use after the electromagnetic interference is removed.

Warning! Replacement of parts that are not according to specs or connection to other devices might cause unexpected EMC problems. The possibility of unexpected EM coupling effect should be considered carefully.

Warning! Working when the device or cables are overlapped with other devices or close to others might cause unexpected EMC problems; If they have to be put together, please check every one to ensure no one is affected by unexpected EM coupling.

4.1 Keyboard Functions

The keyboard of the WristScan V9 is given as the following picture:
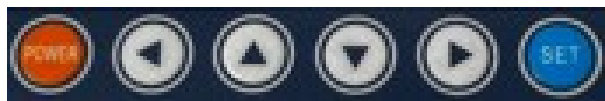
Power Key: Used to turn the machine on and off

Directionals Keys: Used to select function and navigate, and adjust parameters

Set Key: Used to function and access parameter settings

4.2 Power Key

Press this button to turn on or turn off the machine. If the machine "Crashes" due to an unexpected reason or operating mistake, you can press this button to restart the instrument

4.3 Image Freeze Button

The image freeze button is built-in the specialty rod. You can press this button to freeze and view a still frame, and again to reactivate the live image.

4.4   Directional Keys

When the measurement cursor is displayed, use the directions keys to move the measurement cursor.

From the normal screen, press the buttons to select the submenu.

When in the submenu, press the button to exit the menu.

From the normal screen, press the button to enter into the submenu.

When the parameter setting item is activated, press the or buttons to set or change the specific parameters.

Under the real-time ultrasound viewing status, press the buttons to change the image depth.

Under the real-time ultrasound viewing status, press to switch between the B mode and M mode.

4.4   Image Parameter Setting Key

You can press the set button under the real-time viewing status to make changes to the probe frequency, overall gain, brightness, and colorized contrast.

You can press the set button under the freeze status to perform the operations such as distance measurement, image saving and recalling, obstetric measurement, annotation inputting, setting to character color on screen and clearance of the image memory.

4.5   Starting Instrument

Press the ![POWER] to turn on the power supply of the main unit, then the power indicator on the panel will light and the initial screen will appear/ Now you can press any button to enter into the scanning working status. You can adjust the brightness, overall gain, and pseudo color if desired to make the image quality meet your requirements.
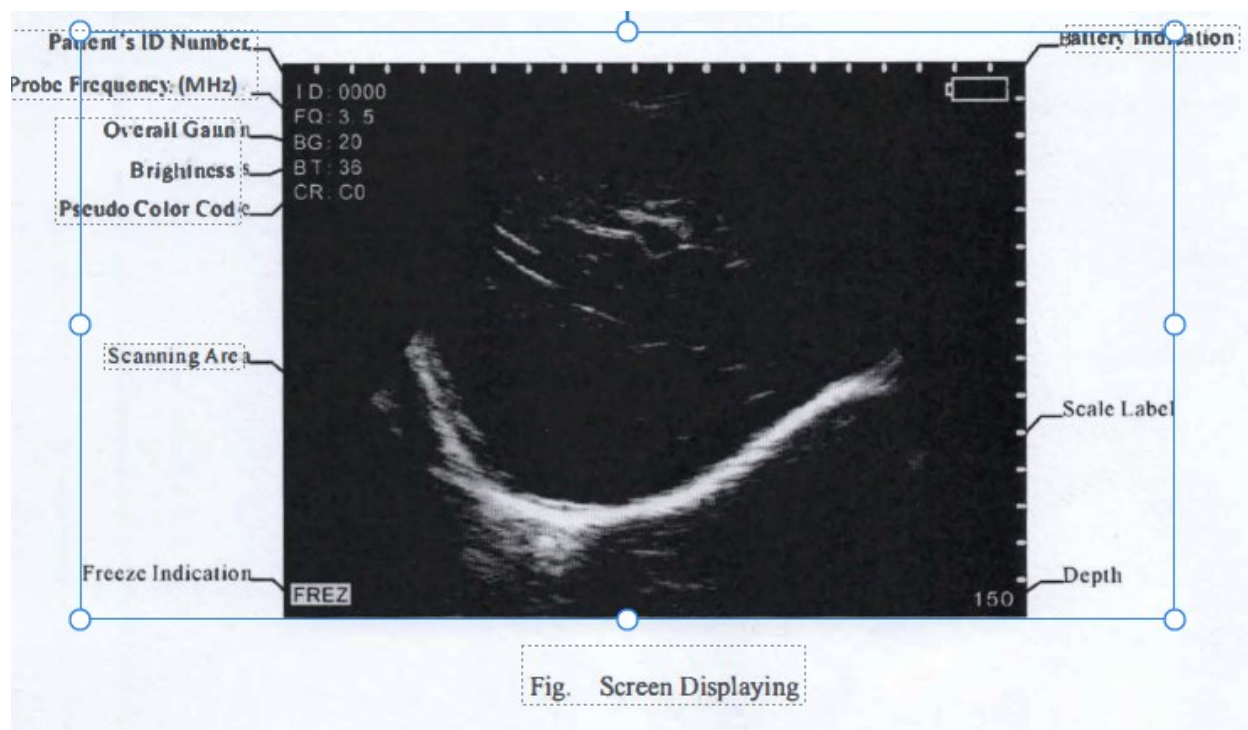

Fig.   Screen Displaying

4.6   Adjustment of Image Parameters: Probe Frequency Change

Press the ![SET] under the real-time scanning status, "FQ in the left top comer of the screen will become highlighted, then you can press the left or right arrow buttons to change the probe frequency within the adjustment range of 2.5MHz, 3.5MHz, or 5.0MHz

4.7   Adjustment of Image Parameters: Overall Gain Adjustment

Press the ![SET] button under the real-time canning status, "BG" in the left top corner of the screen will be highlighted, then you can press ![left] or ![right] to increase or decrease the overall gain within the adjustment of 0-40

4.8   Adjustment of Image Parameters: Image Brightness

Press the under the real-time scanning status, "BT" in the left top comer of the screen will be highlighted, or buttons to increase or decrease the brightness within the range of 20-50.

4.9 Adjustment of Image Parameters: Pseudo Color

Press under the real-time scanning status, "CR" in the left top comer of the screen will be highlighted, lighted, then you can press the left and right arrow buttons to adjust the pseudo color The pseudo color codes and the corresponding color are given as follows:

CO: Black & White   Cl: Red   C2: Yellow & Green   C3: Blue

4.9 Adjustment of Image Parameters: Depth

You can press the buttons under the B mode real-time scanning status to change the image depth within the adjustment range 90mm-160mm

4.10 Adjustment of Image Parameters: Mode Switch

You can press the under the real-time status to switch between the B mode and the M mode.

B Mode
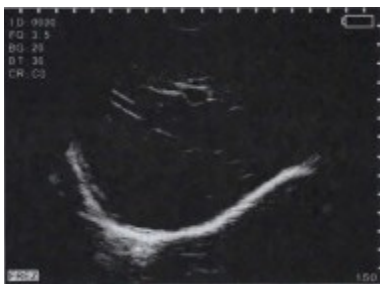
M Mode
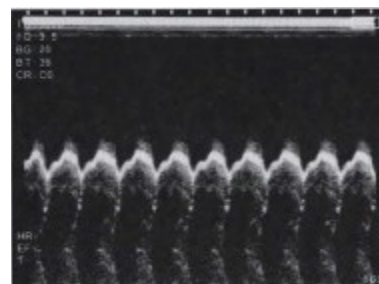
4.10 Adjustment of Image Parameters: Inputting ID Number

Press the image freeze button first, then press the ![SET] to display the main menu showing on the screen.

Press the up/down buttons to select and highlight "ID". Press the ![play] button to confirm the ID number.

```
DIST
SAVE
SVLOAD
OBTABLE
ID
AREA<E>
AREA<H>
NORMAL
CHARCOLOR
ERASE
```
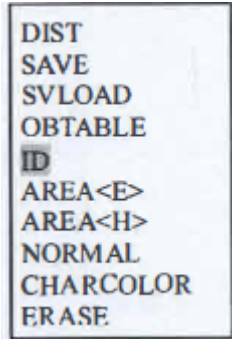
The ID includes 4 figures, and you can input the figures individually to input the ID number while the currently inputted one will be underlined as ID : 0 0 0 0. Now you can press the ![up down] button to select the desired ID number. You can also press ![left right] buttons to change the other figures, then press ![SET] to confirm and exit after inputting.

4.11   Adjustment of Image Parameters: Image Storage

First please freeze the image by pressing the freeze button, then press the set button to display the main menu on the screen:

Select and highlight "SAVE", press the ![play] button to confirm it. Now the currently saved picture's number will be displayed on the bottom portion of the screen as "SAVING • • • • • • xx". The picture saving is finished when the information note disappears.

You can repeat the above operation procedure to continue image saving. When the number of 00-20 is full of saved image, to saving more pictures, the system will begin saving images from 21 on. This instrument can store a maximum of 128 pictures. When the memory reaches the full capacity, to save more pictures, the screen will display a prompt box as "FULL.ERASE NO.001" to ask you to overwrite the picture of No.001. You can press ![SET] select Y and overwrite the 1st saved image.

4.12   Adjustment of Image Parameters: Image Recall

Press the set button under the freeze status, to display the main menu on the screen.

Select "SVLOAD" and press the screen will display "LOAD IMAGE NO.001" in the bottom part. Input the image ID code to retrieve the image.

The system is unable to load an image that has not been saved.

The inputted code number should in the range of 000-127, and when the inputted number is above 127, the system will perform no action.

4.13   Adjustment of Image Parameters: Stored Image Deletion

When the image memory reaches full capacity, you need to delete images manually to save more to memory.

Freeze the picture, then press the to select "ERASE", now the screen will display "ERASE ALL?" at the bottom, press the set button to erase all stored images. When the "ERASING" Prompt box disappears, it indicates that all images have been deleted and you can exit the screen.

Warning! Do not perform other operations or turn off while pictures are deleting.

4.14   Adjustment of Image Parameters: Color Setting for Screen Text

Enter into the freeze status, then press the button to display the main menu, press the buttons to select "CHARCOLOR" and press button to confirm. You can change the color of the characters on the screen by using this function.

4.15   Adjustment of Image Parameters: Preset Function

Within the menu, 2 items as "AREA<E>", "AREA<H>" have no current function.

5.0   Distance Measurement

This instrument is able to take measurement to 4 groups of distance with the unit of mm. The operating procedures are given as follows:

1. Set the instrument into the B mode freeze status, then press the SET button to display the main menu.

2. Select "DIST", and press the right arrow button to display the measurement cursor left/right/up/down will function as the directional buttons after the cursor is displayed

3. Move the cursor to the starting point of the measured distance, then press the SET button to confirm that starting point.

4. Press any direction button to display another cursor, move the cursor by repeatedly pressing the directional arrow to the ending point of the measured distance, then press the set button to finish this measurement and display the next measurement cursor.

5. Repeat the procedures of 3~4 to start another measurement.

The 4 groups of data will be displayed in the left portion of the screen listed as D 1 , D2, D3, D4. You can press the probe freeze button to clear the screen.

6.0   Heart Measurement

The measurement of heart includes the measurement to the heart rate, slope and time, and the detailed operating procedures are given as follows:

Enter into the freeze status under the B mode, then press the set button to display the main menu.

Select "DIST" and press the right arrow button to display the measurement cursor

Measure the peak-to peak distance with the method of distance measurement, and 3 groups of data will be displayed in the bottom left portion of the screen as:

Fig. Schematic Diagram for Heart Measurement
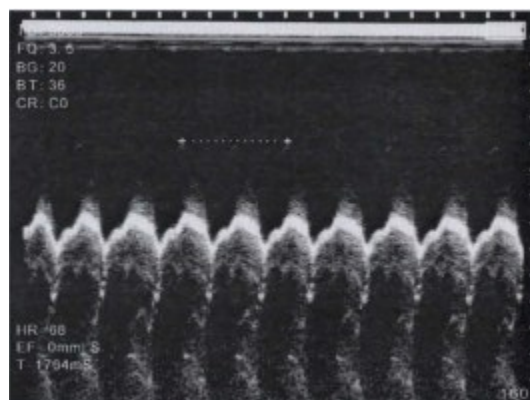Heart rate HR(Unit: Times/min),Slope EF (Unit: mm/s), Time T(Unit: ms).

7.0   Obstetric Measurement

This instrument provides the measurement function to examine an embryo's gestational age. After measurement to the parameters such as heart length (HL), gestational sac (GS), body length (BL), stomach length (SL), umb-spine distance (USD), head diameter (HD), biparietal diameter (BD), crown-rump length (CRL) , the instrument will display the corresponding gestational age (gestational week) automatically.

Enter the freeze status and press the set button and select the "OB TABLE" to enter the obstetric table.

Now you can press the up/down buttons to button to select the wanted measurement item. The currently selected item will be highlighted on screen, then press the right arrow key to enter into that measurement.

After selecting the corresponding animal's obstetric table, then you can take measurement to the distance value of selected parameter according to the method of distance measurement, and the corresponding gestational age data will be displayed in the left portion of the screen automatically.

7.1   Obstetric Measurement: DOG-BD (Biparietal Diameter)

Head diameter refers to the maximum inner skull diameter from the side of abdomen to back. After fetal head is formed, binary top diameter measurement becomes routine in ultrasonic examination. The measuring method is:

Fetal head axial plane scanning, look for BPD measuring standard plane from top to bottom.

According to distance measurement method to measure distance of selected parameters, the corresponding gestation age data will automatically show behind "G·A

7.2   Obstetric Measurement: DOG-GSD (Gestation Sac Diameter)

Gestation sac diameter measurement can be done horizontally or vertically. Gestational age is not automatically calculated using this method.

7.3   Obstetric Measurement: DOG-HD (Head Diameter)

Head diameter refers to the maximum inner skull diameter from the side of abdomen to back.

8.0   Transportation and Storage

Environmental requirements on transportation and storage:

Environment temperature range: 32°F - 104°F

Relative humidity range: 10% - 80%

Atmosphere pressure range: 0.5-1.05 ATM

Storage:

The equipment should be removed and powered on for four hours when storage time exceeds six months. Then shut down, stored securely, and kept safely stored indoors according to storage requirements listed above.

Do not expose the device to strong sunlight, excessive humidity, pressure, or caustic gases.

9.0 General Maintenance

Service life: Based on the manufacturer's design & production information, this model's usable lifespan is six years. The Product's material will gradually wear and age, if the product is continually used over the designed use life, it may result in reduced performance and increase in faults or errors.

Do not discard the equipment with standard household garbage.

Check the device power cord and probe cable and waterproof cover during use and at time of receipt. If any damage or breakage is found, do not use the device.

Check if the probe and main unit are connected securely.

Check the adapter EPS regularly, when the wall or power supply voltage exceeds specified accommodation limit (AC 100V-240V ± 10%, 50/60Hz), do not supply the main unit or charge the battery with adapter.

Do not turn off and on the device too frequently.

9.1 Probe Maintenance and Use

The probe is an expensive part and fragile. Avoid knocking it on hard surfaces or drop it on the floor.

You must use medical ultrasound gel during use. Inspect the probe enclosure before use, do not use if it is cracked and leaking do to damage.

Periodic inspection on probe cable, socket and acoustic window.

Never heat or freeze the probe.

Use ultrasonic gel only on probe head surface and then clean after use. Do not use alcohol to clean probe.

9.2 Battery Information

The equipment is installed with a rechargeable li-ion battery.

The battery can be charged and discharged about 100 times before battery performance will be effected. When usable battery time decreases, replace it with a new one.

Be sure to use the included charger only to charge the battery. Do not charge the battery to when charging is not needed. Do not charge the battery longer than 10 hours; otherwise the battery life may shorten. A fully charged battery will discharge by itself if it is long-time out of use.

Extreme environment temperature (overcooling or overheating) will effect battery charging. Do not charge the battery near an ignition source or under extreme heat

Lithium ion batteries may explode when in a fire. If the device or battery catches on fire, escape to a safe place away from the device.

Do not incorrectly connect the positive and negative polarity.

Do not combine the battery with primary battery (such as dry battery) or battery with different capacity, models and types.

Do not use the battery if it is smelling, heating, straining, leaking, discolored or with any other abnormal phenomena and remove it from the device or charger immediately and stop using it.

Dispose of the battery properly according to local related waste handling regulations.

10.0   Troubleshooting

If a malfunction occurs with this instrument, you can proceed to resolve according to the following table. If the malfunction still exists, please contact us at support@k9p4go.com.

Problem Description	Problem Reference
Power Adaptor Light is not on	1. Check the power supply and wall connection.
	2. Check wall voltage.
LED light of main unit will not turn on	1. Charge the battery, or replace if battery is defective.
Interruptive barred interference and snow like interference appear on the screen	1. Check the power supply of adapter, it might be cause by cable EMF interference from another device.
	2. Check the environment to see if there is any electric, static, or magnetic interference around the instrument.
The image on the screen is not clear	1. Adjust the overall gain.
	2. Adjust the brightness

11.0   Calculating Canine Gestational Age

Please note: All equations are used from measurements in millimeters(mm) (for reference, 1mm =0.1 centimeter (cm); 10mm = 1.0 centimeter (cm)).

<40 DAYS:

[(0.6 x Gestational Sac Diameter in mm) + 20] OR [(0.3 x Crown-Rump Length in mm) + 27]

>40 DAYS:

[1.5 x Biparental Diameter mm) + 20]

Disclaimer: All measurements are approximate. To best calculate gestational age, record the dates of the insemination. All estimates in the chart below are +/- 3 days and depend on accuracy of measured diameters.

Crown-Rump Length CRL (mm)	Biparietal Diameter BD (mm)	Gestational Sac Diameter GSD (mm)	Gestational Age (day)
		8	25
		9	25.5
		10	26
		11	26.5
1		12	27
3		13	28
5		14	28.5
7		15	29
10		16	30
11		17	30
13		18	31
15		19	31.5
17		20	32
18		21	32.5
20		22	33
23		23	34
25		24	34.5
27		25	35
28		26	35.5
30		27	36
33		28	37
35		29	37.5

37		30	38
38		31	38.5
40		32	39
43	15	33	40
	17		41
	19		42
	20		43
	22		44
	23		45
	25		46
	26		47
	27		48
	28		49
	30		50
	31		51
	33		52
	34		53
	35		54
	37		55
	39		56
	40		57
	41		58
	43		59
	45		60
	46		61
	47		62
	50		63