

Accutension

Smartphone Aided Auscultatory Blood Pressure Kit

Dear Customer,

Thank you for choosing Accutension. Before you use the product, please read the manual carefully and follow the instructions. This kit is not an automatic blood pressure monitor, so some practice may be needed to make it work properly. Please contact us if you encounter any problem.

1. Packing List

Item	Quantity
Cuff (22cm-32cm)	1
Cuff (32cm-42cm)	1
Pressure Sensor Module	1
Hand pump with quick release	1
Stethoscope with microphone	1
Micro USB charging cable	1
Headphone plug converter	2
Slow deflation vent	3
Short rubber tube	2

2. Setup the kit

Figure 1 shows how the parts are connected together and how the kit is operated. The cuff tube is connected to the pressure sensor module, then to the slow deflation vent and then to the hand pump with quick release valve. You can use the short rubber tube we provided to make the connection. Three slow deflation vents with different deflation rates are provided. You need to choose the right one after you learned your rough blood pressure value and the right cuff size with the aid of App that will be introduced later. You need to choose the right cuff size. The cuff has an index and please make sure it is within the OK range when you wear it.

3. Get familiar with the App

Search "Accutension" in Apple App Store to install the app. Figure

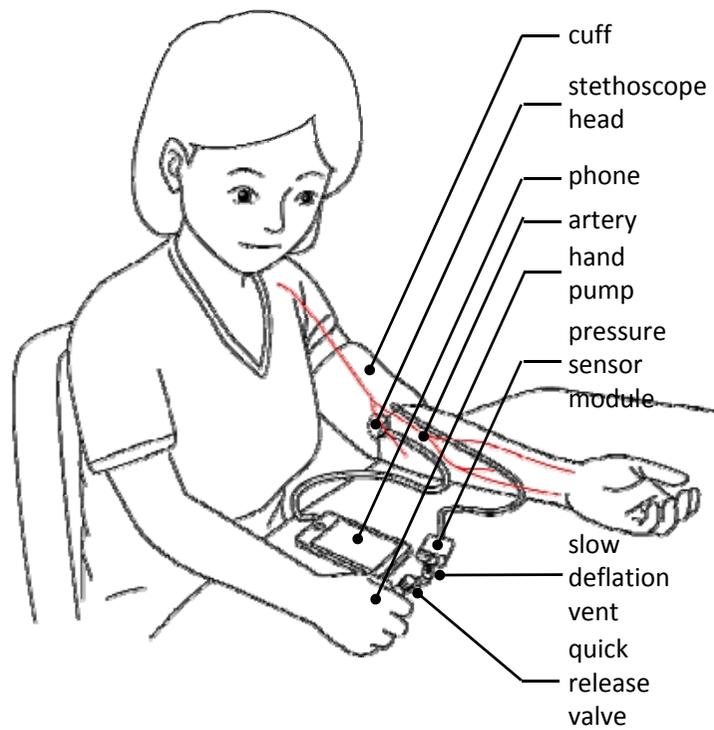


Figure 1. The Kit Setup And Operation

2 shows the measurement user interface. No.1 is the pressure sensor module battery indicator and it shows up when the connection is formed. No. 2 is the connection button. Before measurement, you need to touch this button to set connection after the pressure sensor module is powered on. No. 3 is the current user icon. Default is Guest. You can create new users in "more" tab. If there are multiple users, you can touch this button to switch the user. No.4 is the location to show cuff pressure during cuff inflation and deflation. No. 5 and 6 are the systolic and diastolic BP marking lines respectively. You can move No. 5 to the first sound of blood flow pulse and No. 6 to the last. These two lines can be moved by scrolling No. 8. When you scrolling up and down No.8, the numbers change with BP marking line locations. No. 7 shows the cuff deflation speed after the measurement. Cuff deflation speed is important for Auscultatory method. Please select right slow deflation vent to make the speed within 2-4 mmHg/s.

4. Do a measurement

Power on module. Push the button for a while will turn on the pressure sensor module. When it is on, the blue light will blink.

Plug the stethoscope into your phone. One end of the stethoscope

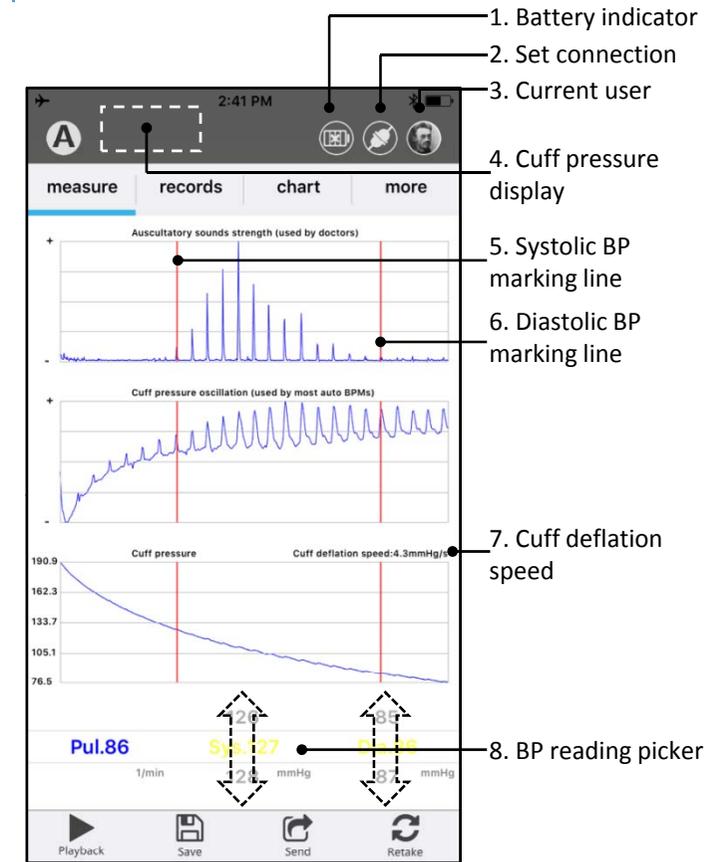


Figure 2. Measure User Interface

is a standard 3.5mm headphone plug, please plug it into your phone jack. If you want to hear the sounds in real time, you can use the headphone plug converter. In this case, please plug the stethoscope and your headphone into the converter and then plug the converter into the phone. You need to choose the converter with the right color depending on your iDevice as shown in the table below.

	Suitable for iDevice in China
	Suitable for iDevice out of China

Start the App.

Set Bluetooth connection. Touch the connect icon (No.2 of Figure 2) and in the popup window choose Accutension. The Bluetooth connection between the pressure sensor module and the phone will be set. The blue light of the pressure sensor module will stop blinking.

Choose the user. Follow instructions in Section 3 to change a user.

Wear the cuff. The bottom cuff edge needs to be 1 inch above the antecubital fossa. The Cuff can't be too loose or too tight. It is OK to have some space to put into two finger tips. The cuff INDEX needs to be within the OK range as printed in the cuff, otherwise try another one.

Start measurement. Quickly pump the cuff to the pressure 30mmHg higher than the estimated blood pressure value. For example, if your systolic blood pressure is 120mmHg, you need to pump the cuff to at least 150mmHg. Then stop pumping, the cuff will start self deflation. You can see the sound signals on the phone screen. The Korotkoff sound signal will appear when the systolic blood pressure is reached. Then the sound signal will continue on the screen until the diastolic blood pressure is reached. Then you need to push the quick release button on the manual pump to quickly deflate the cuff. Please make sure the cuff air is fully released when you release the button. Now the phone should display the blood pressure value. Please be noted that the blood pressure value is not the final value because this is not an automatic blood pressure kit. You might need to playback the sounds to double confirm.

Choose the right slow deflation vent. There are three slow deflation vents in grey, white and blue respectively. The grey one has the fastest deflation while the blue one has the slowest deflation. The deflation speed will be showed after each measurement. The best deflation speed is 2 - 4mmHg/s, so if it is higher than that, please select a slower deflation valve. The ideal range of deflation speed is 2mmHg-4mmHg to balance accuracy and comfort.

Playback the sounds. Touch Playback in the App to playback the sounds. You need to use headphone to listen clearly because the iphone speaker is not good at playing low frequency (bass) sounds.

Adjust the reading if necessary. You can scroll the blood pressure number picker to adjust the blood pressure marking line location.

Interpret the sounds curve. Figure 3 shows various sounds strength curves. Please note noise such as friction can induce a peak in the sounds curve, so the features of blood flow sounds can help you recognize the noise sometimes.

(a) is the most common curve. It shows regular heart beat, there is clear first sound and last sound of blood flow pulse. ① is systolic BP and ② is diastolic BP.

(b) shows there is a gap between regular sounds signals. For this case, you need to listen to confirm whether the first part ① - ② are the blood flow pulse sounds or noise. If they are the former, the gap is called auscultatory gap and it happens to some people.

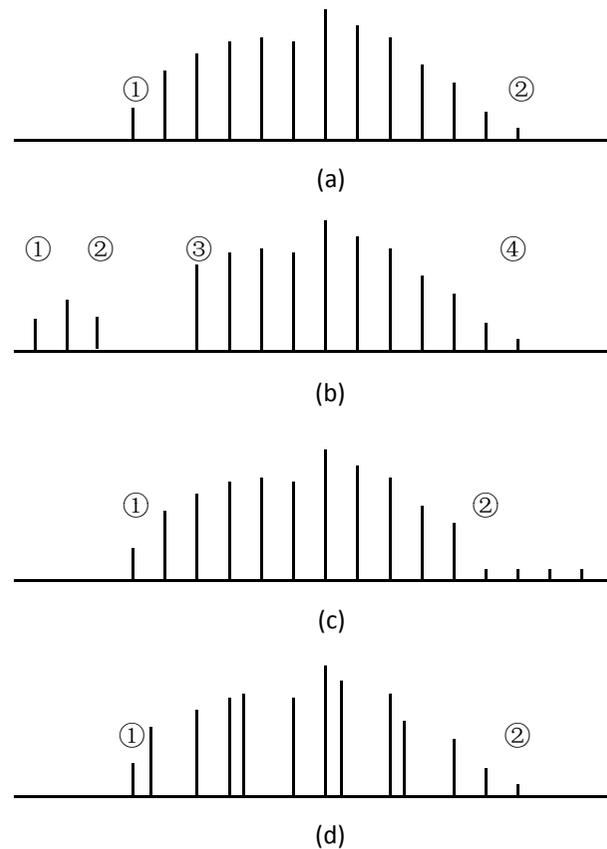


Figure 3 Various Sounds Strength Curves

① is systolic BP and ④ is diastolic BP. If they are the latter, ③ is systolic BP and ④ is diastolic BP.

(c) shows that the auscultatory sounds do not disappear. After ②, the sounds become weak and the sounds strength keeps almost unchanged. This also happens to some people. In this case, ② is diastolic BP.

(d) shows irregular heart beat. For example Afib patients have this kind of sounds strength curve. For this case, you need to playback and listen carefully to find out the first and last sounds of blood flow. Accutension can help you find out this kind of irregular heart beat. You need to consult your doctor when you find this phenomenon. It could be linked to some diseases.

Turn off the pressure sensor module. Please do not forget to turn off the pressure sensor module after use!

5. Others:

a. The sound quality determines the measurement quality. So

please do your best to avoid noise. For example, find a quiet place to do the measurement. Ask others not to talk during measurement. Keep the tube of the stethoscope clear from the cuff tube to avoid unnecessary noise. Don't touch the tube of the stethoscope during measurement.

- b. Please do not use when you charge your phone because of heavy electrical noise.
- c. If you have questions on the sounds or the number, you can send the sounds to your doctor or medical professionals through email. You doctor can open the measurement data in his/her phone to find the BP readings for you.
- d. Follow all the normal blood pressure measurement requirement. For example, take a rest before measurement, be seated on a chair with back support, put two feet on the floor, keep the cuff on the same level of the heart, etc.
- e. The pressure sensor module can be cross-calibrated with most of the upper arm automatic blood pressure monitors or traditional blood pressure kit, so if you find any abnormal of the pressure number, you can do this by finding another blood pressure monitor.
- f. You can use the micro USB cable to charge the pressure sensor module. The red light is on during charge. The green light is on when the charge is full.
- g. You can use Accutension Stetho App to check the algorithm accuracy of an automatic BPM. That App requires a QR code to register. Here is the code to scan. In the future, Accutension App may also need this code. So Please keep this manual.



FCC Statement

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.