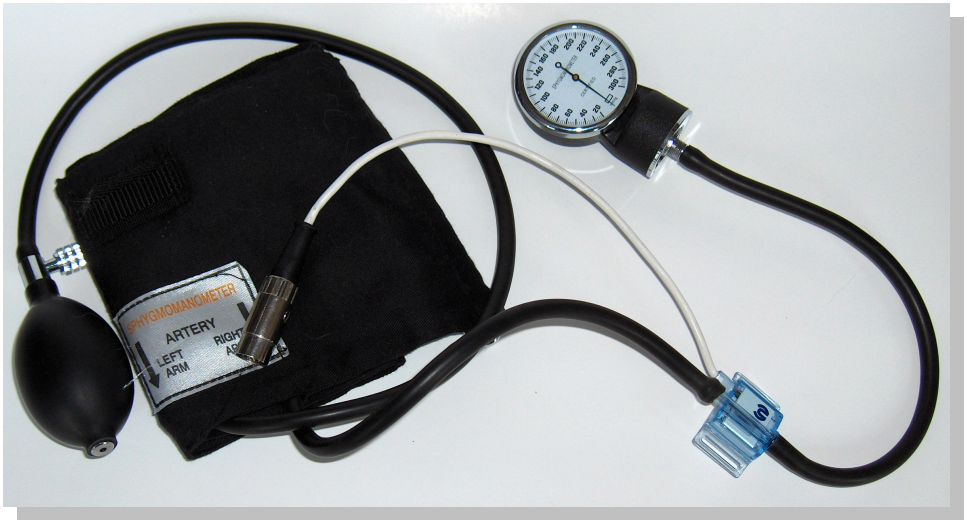
BP-600 Noninvasive Blood Pressure Sensor

Technical Note



BP-600

Overview

A person's cardiac output, peripheral vascular resistance, blood pressure, and other cardiovascular parameters change in response to the activities and events taking place in the person's daily schedule. A device like the BP-600 Noninvasive Blood Pressure Sensor makes it easy to study the changes in blood pressure that take place over the course of an event or an activity. The BP-600 has two major components: a blood pressure cuff used to occlude the flow of blood in a subject's brachial artery; and a pressure transducer used to monitor the pressures in the cuff that correspond to the systolic and diastolic blood pressures. The output of the pressure transducer is a voltage that can be recorded by an iWorx data acquisition unit and converted into units of pressure (mmHg) by calibration.

After blood flow in the subject's arm is occluded, the pressure is released from the cuff by another student who is listening for the return of pulsatile blood flow in the arm. The first Korotkoff sound to be heard occurs at the systolic pressure and the last Korotkoff sound is at the diastolic pressure. To make it easier for students to find the systolic and diastolic pressures, the output of a pulse transducer attached to the subject's finger can be used to indicate the presence or absence of blood flow in the arm before, during, and after the occlusion of the subject's brachial artery.

How It Works

When the blood pressure cuff is placed on a subject's upper arm and inflated to a pressure above that person's systolic pressure, blood flow to the lower arm is occluded so that a pulse wave will not be seen when a pulse plethysmograph is used. As pressure is released from the cuff, the output of the pressure transducer will go down. Blood will begin to flow as the pressure in the cuff falls below the subject's systolic pressure. The pressure at which the pulse is first seen on the

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recording from the pulse plethysmograph can be identified on the recording by a mark that labels the systolic pressure. As the pressure continues to be released from the cuff and the output of the pressure continues to go down, the amplitude of the pulse wave increases up to a maximum. The pressure at which the first maximum amplitude pulse wave is seen during the release of pressure from the cuff is the diastolic pressure.

How to Use the BP-600

Equipment Setup

Plug the DIN connector of the BP-600 into the extension cable. Plug the extension cable into a DIN8 transducer input of an iWorx data acquisition unit or amplifier.

Calibration of the BP-600

1) Put the blood pressure cuff on the upper arm of the subject. Align the arrow on the cuff over the subject's brachial artery. Place the plethysmograph on the distal segment of the middle finger. Wrap the Velcro strap around the end of the finger to hold the unit firmly in place.
2) Click **Record** and record the output of the BP-600 for five seconds. Type "70 mmHg" on the comment line to the right of the **Mark** button. Continue recording.
3) Increase the pressure in the cuff to 70 mmHg and press the Enter key on the keyboard. Hold the pressure in the cuff at this level for another five seconds. Type "140 mmHg" on the comment line. Continue recording.
4) Increase the pressure in the cuff to 140 mmHg and press the Enter key on the keyboard. Hold the pressure in the cuff at this level for another five seconds.
5) Click the **Stop** button. Release all the pressure from the blood pressure cuff.
6) Use the **Display Time** icons on the LabScribe toolbar to adjust the time displayed on the **Main window** so that the complete block of calibration data can be viewed on the screen
7) Click the **2-Cursor** icon so that two blue vertical lines appear on the **Main window**. Place one cursor on the section of the recording marked as "70 mmHg" and the second cursor on the section of the recording marked as "140 mmHg".
8) Right-click on the data area of the blood pressure channel to open its right-click menu. Select **Units** from this menu and **Simple** from the submenu to open the **Units Conversion** dialog window.
9) Perform a two-point calibration by selecting **2 point cal** from the pull-down menu at the top of the dialog window. The voltages at the positions of the two cursors are already entered on the window.
10) Change the values in the boxes to the right of these voltages to the corresponding calibration pressures, 70 and 140. Change the units to **mmHg**. Click **OK** and the units on the Y-axis of the blood pressure channel change.

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Using the BP-600 Blood Pressure Sensor with a pulse plethysmograph

1) Click **Record** to begin recording the subject's pulse wave and the pressure in the cuff of the blood pressure sensor. Inflate the blood pressure cuff until the finger pulse wave on the pulse channel disappears.
2) Once the pulse wave disappears, release the cuff pressure at the rate of 10 mmHg per second. Continue to release the cuff pressure until the aneuroid gauge reads 0 mmHg. Click the **Stop** button.
3) Scroll to the section of data recorded while the pressure in the cuff was being released. Use the **Display Time** icons on the LabScribe toolbar to display the data that includes the reappearance of the pulse wave and its return to maximum amplitude on one screen.
4) Click the **1 Cursor** icon on the LabScribe toolbar to place a single blue cursor on the window.
5) On the pulse channel, find the first detectable pulse wave that occurs as pressure is released from the cuff. Place the cursor over this pulse wave.
6) The pressure in the cuff during this particular pulse wave is equal to the systolic blood pressure of the subject. Look in the upper right corner of the data window for the blood pressure channel to find the systolic blood pressure. It is listed next to the label **Value (V)**.
7) To the right of the cursor, the amplitude of the pulse wave increases as the pressure in the cuff decreases. In this sequence of progressively larger pulse waves, find the first pulse wave that has the greatest amplitude. Place the single cursor on the peak of this pulse wave.
8) The pressure in the cuff during this particular pulse wave is equal to the diastolic blood pressure of the subject. Look in the upper right corner of the data window for the blood pressure channel to find the diastolic blood pressure. It is listed next to the label **Value (V)**.
9) See the sample LabScribe recording on the next page. It shows the BP-600 and pulse plethysmograph channels with two cursors indicating the systolic and diastolic blood pressures.

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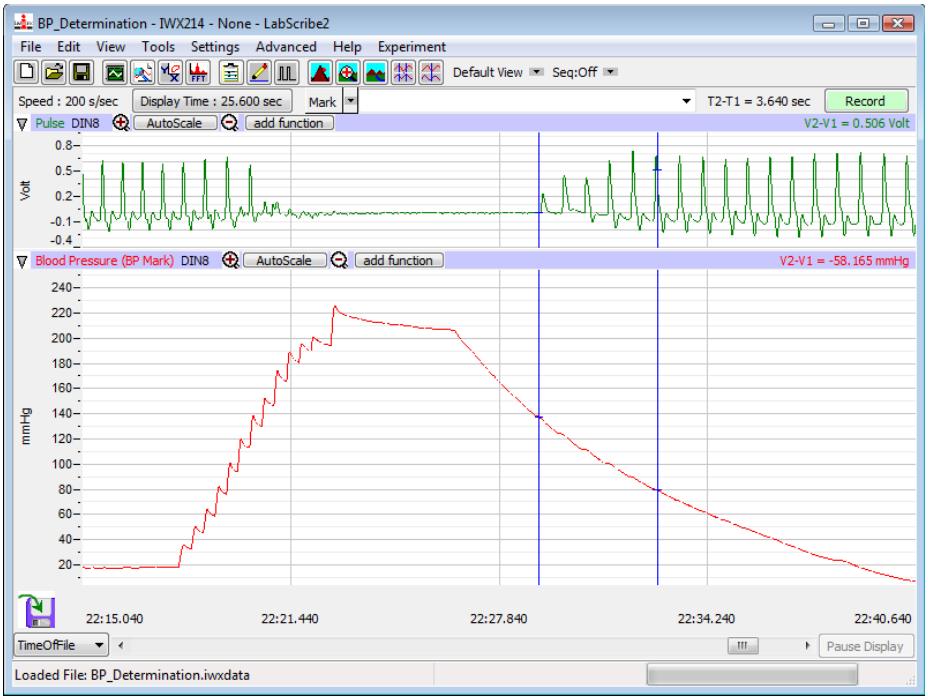

LabScribe recording of BP-600 and pulse plethysmograph

Experiments

LabScribe experiments using the BP-600 Noninvasive Blood Pressure Sensor include:

- **Experiment HC-1: Blood Pressure, Peripheral Circulation, and Body Position** (found in the **Human Circulation** category of the LabScribe **Settings** menu as **BloodPressure-BodyPosition**)
- **Experiment HC-2: Blood Pressure, Peripheral Circulation**, **and Imposed Conditions** (found in the **Human Circulation** category of the LabScribe **Settings** menu as **BloodPressure-ImposedConditions**)
- **Experiment HC-5: Body Position, Exercise, and Cardiac Output** (found in the **Human Circulation** category of the LabScribe **Settings** menu as **CardiacOutput**)
- **Experiment HC-4: Pulse Contour Analysis** (found in the H**uman Circulation** category of the LabScribe **Settings** menu as **PulseContourAnalysis**)

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Technical Data and Specifications

SPECIFICATIONS	
Impedance	<900 ohms Ω
Sensitivity	5μV/V/mmHg
Excitation Voltage	+4VDC
Output Connector	DIN8
Operating Pressure	+0.50 to +300mmHg
Temperature Effect	+0.25mmHg/°C
Power	From DIN8 input of iWorx amplifier or A/D unit

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