Little Doctor®

LD-587, LD-587A

ENG INSTRUCTION MANUAL FOR DIGITAL BLOOD PRESSURE MONITOR LD.

fig.1. PARTS AND COMPONENTS

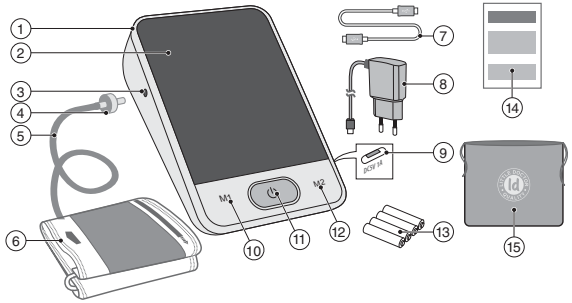


fig.2. BATTERY INSTALLATION

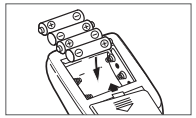


fig.3 CORRECT POSITION DURING MEASUREMENT

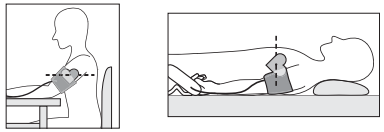


fig.4. CUFF PREPARATION

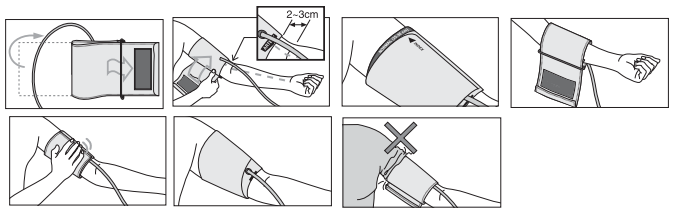
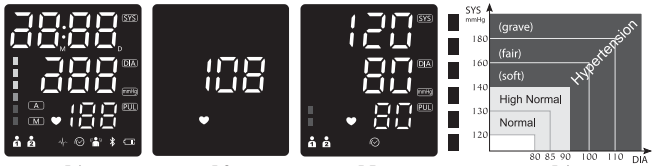
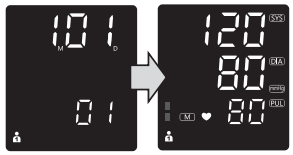


fig.5. MEASUREMENT PROCEDURE



5.1 5.2 5.3 5.4

fig.6 MEMORY FUNCTION



1. PARTS AND COMPONENTS (Fig. 1)

❶ Electronic block
❷ LCD display
❸ Cuff socket
❹ Cuff connector
❺ Air hose
❻ Cuff Cuff-LDU (Applied part)
❼ USB power cord (supplied as part of package for model LD-587)
❽ AC adapter LD-N069 (supplied as part of package for model LD-587A)
❾ USB Type-C socket for power source connection
❿ Button M1 (Memory 1)
⓫ Button ⏻ (Start/Stop)
⓬ Button M2 (Memory 2)
⓭ Batteries
⓮ Operation manual with warranty card
⓯ Bag

2. GENERAL INFORMATION

This manual is intended to provide assitance to user in terms of safe and effective operation of arterial blood pressure and heart rate measuring device with value display led (versions LD-587, LD-587A) (hereinafter referred to as the "DEVICE"). The Device should be used in accordance with the rules stated in this manual and should not be used for the purposes other than those described herein. It is important to read and understand the entire manual, especially the section "Recommendations for proper use".

INTENDED USE AND INDICATIONS

The device is intended for measuring systolic (SYS) and diastolic (DIA) blood pressure and determining pulse rate in patients aged 15 years and older. It is recommended for use by patients with unstable blood pressure or diagnosed hypertension in both clinical settings and home environments as a supplementary tool to medical supervision.

CONTRAINDICATIONS

When proper precautions are observed, the device has no absolute contraindications.
Measurement Precautions:

- If the patient has untreated shoulder injuries, perform measurements on the opposite arm
- If the patient is receiving intravenous infusion or blood transfusion, use the opposite arm for measurements

PRINCIPLE OF OPERATION

Oscillometric method of arterial blood pressure and heart rate measurement is used in the device. The cuff is wrapped around the upper arm and pumped automatically. The sensitive element inside the device detects weak fluctuations of pressure in the cuff generated by expansion and contraction of the brachial artery in responce to each heart beat. Amplitude of the pressure waves is measured, converted into millimeters of mercury column and is displayed in the form of a digital value. Please note that the device may not ensure the specified measurement precision, if it is used or stored at temperature or moisture other than those stated in the section "Technical characteristics" of this manual. We give notice of possible errors in measurement of arterial blood pressure with this device in people with pronounced arrhythmia. Please consult your physician as to how to measure arterial blood pressure in children.
The patient is an intended operator. But persons who suffer from arrhythmia, diabetes, cardiovascular problems or who have had a stroke should consult your doctor before using the device.

IMPORTANT SAFETY INSTRUCTIONS

- Do not service or maintain the cuff while in use with patient.
- Do not use the device with other medical electrical (ME) equipment simultaneously.
- Do not use the device in the area the HF surgical equipment, MRI, or CT scanner exists, or in the oxygen rich environment.
- Do not use a mobile phone or other devices that emit electromagnetic fields, near the device. This may result in incorrect operation of the device.
- Never use any accessories or parts from other manufacturers. Using such accessories or parts could cause a hazardous situation for the user or damage to the device.
- Do not modify this equipment without authorization of the manufacturer.

3. RECOMMENDATIONS ON CORRECT MEASUREMENT

1. For correct measurement you should know that THE BLOOD PRESSURE IS SUBJECT TO SHARP VARIATIONS EVEN WITHIN THE SHORT TIME INTERVALS. The blood pressure depends on many factors. It is usually lower in summer and higher in winter. The blood pressure varies together with the atmospheric pressure, depends on physical loads, emotional excitement, stresses and dietary regime. Drugs, drinking alcohol and smoking produce significant.

Effect on blood pressure. Even the very procedure of blood pressure measurement in a hospital sends the blood pressure high in many people, thus, the blood pressure measured at home often differs from the values received in a hospital. As the blood pressure tends to rise at low temperatures, make measurements at an indoor temperature (approximately 20 °C). If this Device was stored in the room with low temperature, keep it for at least 1 hour at an indoor temperature before use, otherwise the measurement result may be incorrect. During the day, the difference in readings for healthy people may be 30-50 mmHg of systolic pressure and to 10 mmHg of diastolic pressure. The dependence of the blood pressure on various factors is individual for each person. Accordingly, it is recommended to keep a special book with blood pressure measurement records. ONLY A CERTIFIED DOCTOR IS CAPABLE TO ANALYZE THE TENDENCY OF YOUR BLOOD PRESSURE VARIATIONS USING YOUR RECORDS.

2. People with cardiovascular and some other diseases requiring blood pressure monitoring should make measurements in the hours fixed by attending doctor. REMEMBER THAT THE DIAGNOSTIC AND ANY TREATMENT OF HYPERTENSION MAY BE CONDUCTED ONLY BY A CERTIFIED DOCTOR ON THE BASIS OF BLOOD PRESSURE VALUES OBTAINED BY THIS DOCTOR. DRUGS PRESCRIPTION SHOULD BE CARRIED OUT ONLY BY YOUR ATTENDING DOCTOR.
3. At such disorders as deep vascular sclerosis, weak pulse wave and also in patients with the prominent distortions of cardiac rhythm it may be difficult to measure the blood pressure accurately. IN SUCH CASES CONSULT A CERTIFIED DOCTOR ABOUT APPLICATION OF THE ELECTRONIC DEVICE.

The following persons should also consult their doctor before using the device: persons with abnormalities in the shoulder area that interfere with normal blood flow; persons with disorders of the peripheral circulatory system (diabetes mellitus, cirrhosis, atherosclerosis, etc.); persons who use implantable or wearable medical electrical equipment, such as a pacemaker, defibrillator, or electrocardiographic monitor; persons undergoing haemodialysis or treatment with anticoagulants, anti-platelet drugs, or steroids. THE PULSE RATE INDICATOR IS NOT INTENDED FOR PACEMAKERS' OPERATION MONITORING.

4. KEEP QUIET DURING A MEASUREMENT TO OBTAIN THE ACCURATE VALUES OF YOUR BLOOD PRESSURE WITH THE ELECTRONIC DEVICE. Measure your blood pressure in the calm and comfortable conditions at the indoor temperature. No eating an hour before measurement; no smoking, no taking tonic agents or alcohol 1.5-2 hours before measurement.
5. The accuracy of blood pressure measurement depends on whether the cuff matches the size of your arm. THE CUFF SHOULD NOT BE TOO SMALL OR TOO LARGE.
6. Wait 3 minutes between measurements for the blood to restore its circulation. However, the persons with prominent atherosclerosis due to considerable loss of vascular elasticity may need to increase the wait time between measurements (10-15 minutes). This also refers to the patients suffering from diabetes. For more accurate determination of blood pressure, it is recommended to make a series of 3 consecutive measurements and to use the average value.

4. POWER SUPPLY OF THE DEVICE

INSTALLATION OF BATTERIES (FIG. 2)

1. Open the cover of the battery compartment and insert 4 batteries of type AAA as it shown on the figure inside the compartment. Make sure the polarity is correct. Do not apply undue exertion when opening the cover of the battery compartment.
2. Close the battery compartment cover.

- Replace all batteries when the indicator of batteries replacement "▭" is being constantly displayed or there is no indication on the display. The battery replacement indicator does not show the level of discharge.

The batteries that come with the device are intended for check of the device serviceability when purchased, their service life can be less than that for recommended batteries.

- When replacing the batteries replace all of them simultaneously. Do not use second-hand batteries.
- If the device is not used for long time, remove the batteries from the device.
- Do not leave used batteries in the device.

USE OF THE DEVICE WITH AC ADAPTER

The AC adapter is specified as a part of the blood pressure monitor. Use the AC adapter (model LD-N069, supplied as part of package for model LD-587A) with the following technical characteristics.

Output voltage : 5V ± 5%
Load current : at least 1A
Type of connector : USB Type-C

The socket for the stabilized power supply is located on the right side of the device.
In order to use the device with a power source connect the power sorce connector to the device and insert the power source plug into the socket outlet and press the button ⏻. Upon completion of measurement switch the device off by pressing the button ⏻, remove the power source plug from the socket outlet and disconnect the power source connector from the device.

5. SETTING OF DATE AND TIME

1. To shift to mode of date and time setting, it is necessary to press ⏻ and hold for over 5 seconds.
2. If mode of date and time setting is switch on, to set date and time it is necessary, holding M1, depress button ⏻. Parameter will blink. Change of selected parameter toward increasing is taking place when depressing button M2, towards decreasing – when depressing button M1. To shift to setting of the next parameter, year/month/hours/min, it is necessary to depress ⏻.
3. If no actions are done in mode of date and time setting for more than 1 minute, the Device is independently changed over to mode of date and time indication. In this case, all the changes that have been already made will come into effect.

After replacing the batteries the mode of date and time indication is always off. The factory setting of the clock mode is OFF. When power cells are replaced, date and time will zero, and measurement results will be safe without date and time setting. If the device does not take measurements while the date and time indication mode is ON, the display will show current date and time.

6. CORRECT POSE DURING MEASUREMENT (fig. 3)

1. Sit near a table so that your arm rests on its surface during measurement. Make sure that the point of the cuff application is approximately at the same height as your heart, and that your forearm lies freely on the table and does not move.
2. You can measure pressure when lying on your back. Look at the ceiling, keep calm and do not move during measurement. Make sure that the measurement point on your upper arm is approximately at the same level as your heart.

7. CUFF PREPARATION (fig. 4)

1. Insert the cuff end for about 5 cm into a metal ring as shown in figure.
2. Apply the cuff to your left upper arm so that the air tube is directed to your palm. If the measurement on your left arm is difficult, you may use your right arm. In this case remember that the readings may differ by 5-10 mmHg and even more.
3. Wrap the cuff around your upper arm so that the bottom of the cuff is approximately 2-3 cm above your elbow. The sign "ARTERY" should be over the arm artery.
4. Fix the cuff so that it fits tightly to the arm, but make sure that it is not overtight. Too tight or too loosen placement of the cuff may give inaccurate readings.
5. On the fixed cuff the sign «INDEX» should point to the area «NORMAL».It means that the cuff is chosen correctly and fi ts the size of your upper arm. if the sign points to the area marked «◀▮▮▮» the cuff is too small and the readings will be higher. If the sign points to the area marked «▮▮▮▶» the cuff is too large and the readings will be lower.
6. If the arm has a conic form, the cuff should be put on with a spiral movement as shown in the figure.
7. If the rolled-up sleeve squeezes the arm interfering with free blood flow the Device may give inaccurate figures not corresponding to your actual blood pressure.

8. MEASURING PROCEDURE (Fig. 5)

1. Insert the cuff connector into the cuff socket. Before measurement take a deep breath 3 to 5 times and relax. Do not move, do not talk and do not strain your arm during measurement.
2. Press the button ⏻.
3. All symbols will appear for a short time on the display (Fig. 5.1), a short signal will sound and the air will start quickly pumped into the cuff.

Cuff Application Indicator

The indicator helps verify whether the cuff is properly applied. At the start of measurement, the «⊙» symbol will blink on the display. If the cuff is correctly positioned, the «⊙» symbol will stop blinking and remain illuminated until the measurement is complete. Otherwise, an error message will appear and the measurement will abort.

Motion Detection Indicator

If hand or body movement is detected during measurement, the motion detection symbol «🏃» will appear on the display. In this case, it is recommended to repeat the measurement.

4. After reaching 18-20 mmHg the cuff will start pumping additionally, first slowly, then quickly. The pulse symbol ♥ (Fig. 5.2) will start flushing during pumping. The algorithm Inflation Measuring System (IMS) allows determination of systolic and diastolic blood pressure in the process of inflation. SINCE THE ARTERIAL BLOOD PRESSURE AND THE PULSE ARE MEASURED DURING INFLATION OF THE CUFF, TRY TO REMAIN IMMOBILE AND DO NOT MOVE YOUR ARM DURING MEASUREMENT AS WELL AS NOT TO STRAIN MUSCLES OF YOUR ARM.
5. When the measurement is complete the sound signal is given, the arm cuff completely deflates and your measurement results flash on the screen (Fig. 5.3) and Indicator «🏃» will blink, reminding that to retain results, it is necessary to choose memory 1 or 2, having depressed M1 or M2, respectively. The result may be saved before the beginning of the next measurement or before turning the device OFF. If irregular pulse rhythm is detected during measurement, symbol of arrhythmia «〰», will appear upon measurement end. Appearance of arrhythmia indicator may also be caused by body movement during measurement (Fig. 5.4). During periodical appearance of this indication apply to You attending doctor. Apart from numerical value of pressure, result is also displayed on scale WHO. Scale WHO – three-color scale of classification of received value of arterial pressure, according to recommendation of World Health Organization. The scale is available from the left.
6. Press the button ⏻ to switch off the device.

TO OBTAIN THE ACCURATE RESULT IT IS NECESSARY TO MAKE A PAUSE BETWEEN MEASUREMENTS IN ORDER TO RECOVER BLOOD CIRCULATION. DATA ARE STORED IN MEMORY EVEN WHEN THE DEVICE IS KEPT WITHOUT BATTERIES. YOU MAY REMOVE DATA STORED IN THE DEVICE MEMORY BY PERFORMING ACTIONS DESCRIBED IN THE SECTION "MEMORY FUNCTION". If no actions were performed after measurement during 3 minutes the device automatically switches off.

FORCED DEPRESSURIZATION OF THE CUFF

If during inflation of the cuff you need to quickly depressurize the cuff, press the button ⏻. The device will release air from the cuff and switch off.

9. MEMORY FUNCTION (FIG. 6)

1. Result of each measurement (pressure, pulse, time and date of measurement) may be kept in the device memory. For this purpose, after measurement, within not more than 3 minutes, memory M1 or M2 shall be selected for memory storage. IF THE NOTICE ON ERROR APPEARS THE MEASUREMENT RESULT WILL NOT BE STORED.
2. Press the M1 (or M2) Button to see the figures stored in the memory.At the first depression of button M1 (or M2) mean value of 3 last measurements, kept in memory M1 (or M2), will appear on the screen, marked by symbol«A». At repeated depression of button M1 (or M2) indicator of selected memory M1 (or M2) and number of memory cell will appear on the screen, and in 1 second its content is displayed.

When content of memory cell is displayed, date and time of measurement are displayed alternately in the display lower line. Each depression of button M1 (or M2) causes shifting to the next memory cell.

CLEARING THE DEVICE'S MEMORY

To delete all values stored in the memory, press the M1 (or M2) Button and hold it down for more than 5 seconds. Symbols "Clr" will appear on the screen and all values will be deleted from the memory.

10. ERROR MESSAGES

INDICATION	POSSIBLE CAUSE	SOLUTION
Err	The cuff is put on incorrectly or the air tube tee connector is inserted loosely. Measurements could not be done because of the arm movement or talking during measurement.	Make sure the cuff is put on correctly, and the tee is inserted tightly, and repeat the measurement procedure. Repeat the measurement with full observation of the recommendations of this operation manual.
▭	Batteries are discharged	Replace all batteries with new ones
Lo	The result of measuring systolic pressure is below 60 mm Hg. or measurement of diastolic pressure below 40 mmHg.	Repeat the measurement following strictly the recommendations of this Manual. During periodical appearance of this indication apply to You attending doctor.
Hi	The result of measuring systolic pressure above 260 mm Hg. or a diastolic blood pressure reading greater than 180 mmHg.	Repeat the measurement following strictly the recommendations of this Manual. During periodical appearance of this indication apply to You attending doctor.

11. CARE, STORAGE, REPAIR AND DISPOSAL

1. This Device should be protected from increased humidity, direct sunrays, impact, vibration. THE DEVICE IS NOT WATERPROOF!
2. Do not store and do not use the Device in close proximity to heating Devices and open fire.
3. If the Device is not used for a long time, remove the batteries from the Device. Battery leakage may damage the Device. KEEP THE BATTERIES AWAY FROM CHILDREN!
4. Do not contaminate the Device and protect it from dust. You can use soft dry cloth to clean the Device.
5. Avoid contact of the Device or its parts with water, solvents, alcohol. Do not use petroleum.
6. Protect the cuff from sharp object, and do not try stretching or twisting the cuff.
7. Do not expose the Device to strong impacts and do not drop it.
8. The Device does not have any measurement accuracy controls. Individual disclosure of the electronic unit is prohibited. If necessary, the repair shall be performed only in specialized organizations.
9. After the end of the established service life you should periodically contact experts (specialized repair organizations) to check the technical condition of the Device.
10. Disposal is governed by the rules in effect in your region. The manufacturer does not establish any special disposal conditions for this Device.
11. The cuff is resistant to repeated sanitary treatment. It is allowed to treat the inner side of the cloth surface of the cuff (the one contacting with the patient's arm) with a cotton wool pad damped in 3 % hydrogen peroxide solution. In case of continuous use, partial decoloring of the cloth surface of the cuff is admissible.

Wet wash of the cuff, as well as its treatment with a hot iron, is not allowed.

12. POSSIBLE PROBLEMS

PROBLEM	POSSIBLE CAUSE	SOLUTION
No image on display after pressing the ⏻ button	Batteries are discharged. Polarity of batteries is not observed. Battery contacts are contaminated.	Replace all batteries with new ones. Install the batteries correctly. Wipe the contacts with a dry cloth.
Blood pressure is different every time. Measurement values are too low (too high).	Is the cuff located at the heart level? Was the cuff put on correctly? Is your hand relaxed? Maybe you were talking or moving your hand during measurement.	Take the correct pose for measurement. Put the cuff on correctly. Relax before measurement. Keep quiet and calm during measurement.
Pulse rate value is too high (too low).	Maybe you were talking or moving your hand during measurement. Were the measurements done after a physical load?	Keep quiet and calm during measurement. Repeat measurement after at least 5 minutes.
Independent switching off.	Automatic switch off system activates.	This is not a failure. The Device switches off automatically 3 minutes after the last measurement.

13. WARRANTY

1. The manufacturer guarantees the warranty period of 5 years for the device from the sale date provided that the consumer observes operation, transportation and storage requirements. The warranty period for the cuff and the AC Adaptor is 12 months from the sale date.
2. Warranty liabilities are documented with the warranty certificate upon selling the device to the buyer. The guarantee is valid provided that the device has not been opened or damaged by the buyer.
3. The addresses of organizations providing warranty service can be found in section "INFORMATION ON THE MANUFACTURER, AUTHORIZED REPRESENTATIVE AND IMPORTER" or on the website www.littledoctor.sg.

14. TECHNICAL SPECIFICATIONS

Method of measurement	oscillometric
Indicator	LED
Range of pressure indication in the cuff, mmHg	0 to 300
Measurement range: pressure in the cuff, mmHg pulse rate, 1/min	 40 to 260 40 to 180
Limits of allowable absolute error when measuring air pressure in the compression cuff, mmHg	±3
Limits of allowable relative error when measuring pulse rate, %	±5
Inflation	automatic (air pump)
Depressurization	automatic
Memory	2x100 recent measurements + average value of the last three measurements
Cuff range	universal for adults (22-42 cm)
Type of power socket USB	USB Type-C
Power supply, V	4x1.5V(AAA) or DC 5V 1A
Operational conditions: temperature, °C relative humidity, % Rh atmospheric pressure, kPa	 10 to 40 15 - 85 86 - 106
Storage and transportation conditions: temperature, °C relative humidity, % Rh atmospheric pressure, kPa	 from minus 20 to 50 15 - 85 50 - 106
Overall dimensions: Size (electronic block), mm Weight (without packing, batteries and power source), g	 (106 ± 2) × (48 ± 2) × (140 ± 2) 233±5
Year of manufacture	Year and month of manufacture are indicated in the serial number after the symbol "A". Serial number is located on the device bottom.

SYMBOL EXPLANATION:

- CE 0123 Compliance with the Directive MDD 93/42/EEC
- Important: Read the manual
- EU REP Authorized Representative
- Manufacturer
- Keep from moisture
- Importer
- BF type product
- Storage/operation temperature, humidity and atmospheric pressure limitation
- SN Serial number
- Date of manufacture
- Protection class II

iTN system Inflation Measuring System (IMS) allows determination of systolic and diastolic blood pressure in the process of inflation.

fuzzy algorithm Fuzzy Algorithm is the algorithm for processing the measurement values with regard to peculiarities of the man's heartbeat, thus, ensuring high measurement accuracy.

This Device manufacturing is certified according to international standard ISO 13485. Device complies with the requirements of European Directive MDD 93/42/EEC. Protection level against electric shock: Class II, Type BF. Any serious incident that has occurred in relation to the device should be reported to the manufacturer and the competent authority of the Member State in which the user and/or patient is established.
The revision date of this Operation manual is indicated at the last page in the XX-XXXXX-YYMM-NN format, where YY is the year, MM is the month, and NN is the revision number.

15. INFORMATION ON THE MANUFACTURER, AUTHORIZED REPRESENTATIVE AND IMPORTER

Manufactured under control and for Little Doctor International (S) Pte. Ltd. (7500A BEACH ROAD #11-313 THE PLAZA SINGAPORE 199591. Postal Address: 3 Coleman Street #03-24 Singapore 179804).
Manufacturer: Little Doctor Electronic (Nantong) Co. Ltd. (No. 8, Tongxing Road Economic & Technical Development Area, 226010 Nantong, Jiangsu, People's Republic of China).
EU REP Little Doctor Europe Sp. z o.o., 57G Zawiła Street Kraków 30-390 Poland.
Importer: Little Doctor Europe Sp. z o.o., 57G Zawiła Street Kraków 30-390 Poland.

16. IMPORTANT INFORMATION REGARDING ELECTRO MAGNETIC COMPATIBILITY (EMC)

This Device manufactured by Little Doctor Electronic (Nantong) Co. Ltd. confirms to IEC60601-1-2:2014 Electro Magnetic Compatibility (EMC) standard. Further documentation in accordance with this EMC standard is available at Representative in EU Little Doctor Europe Sp. z o. o. at the address mentioned in this instruction manual or at www.littledoctor.sg. Refer to the EMC information for Device on the website.

Warranty card

Model	Date of sale
Serial number	
Buyer's name	
Seller's signature	Seal (stamp) of the selling company

To be filled out by the representative of the authorized service center

Date	Notes on servicing

Little Doctor Electronic (Nantong) Co., Ltd.,
No.8, Tongxing Road Economic & Technical Development Area, 226010 Nantong, Jiangsu, People's Republic of China
EU REP Little Doctor Europe Sp. z o.o. 57G Zawiła Street Kraków 30-390 Poland

CE 0123

www.littledoctor.sg

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