

# **MSA100 Peak Flow Meter**

## **Instruction Manual**

**Version: V 1.9**

PLEASE READ ALL OF THE INFORMATION IN THE PACKAGE INSERT BEFORE USING THE PEAK FLOW METER.

IF YOU DO NOT UNDERSTAND THE INSTRUCTIONS, CONSULT M&B, CALL (+86) 10 61253803 (Working Time: from Monday to Friday, 8:30 ~ 17:30), OR WRITE TO [market@mbelelec.com](mailto:market@mbelelec.com).

 **Beijing M&B Electronic Instruments Co., Ltd.**

**May 2016**



## About this manual

Firstly, thank you very much for using our M&B product.

To ensure correct use of MSA100 Peak Flow Meter (herein below mentioned as MSA100 or Peak Flow Meter or the Meter), read the following points carefully and adhere to them. After reading this manual, keep it in a safe place where it can be referred to anytime a question arises.

Model Number: MSA100

Product Name: Peak Flow Meter

Manufacturer: **Beijing M&B Electronic Instruments Co., Ltd.**

Address: Room 6319, Building 1, No.27, Yongwang Road, Daxing Bioengineering and Medicine Industry Base, Zhongguancun Science Park, Daxing District, Beijing

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M&B is responsible for the product's safety, reliability and performance if below conditions are satisfied:

- Assembly, extensions, modifications or repair are carried out by persons authorized by M&B.
- The other related electrical equipment used together with the Meter conforms to CE standards.
- MSA100 is used in accordance with the instructions manual.

## Maintenance Service

Free service range:

- Free services are offered in accordance with M&B warranty regulations.

Fee based service range:

- Beyond M&B warranty regulations.
- During the warranty period, warranty shall not extend to the following conditions:
  - 1) It is damaged from improper use.
  - 2) Battery voltage is beyond the scope of product specification.
  - 3) Natural disasters.
  - 4) Replaced accessories, consumables without M&B authorization.
  - 5) Modification or repair by anyone except for Beijing M&B authorized person or company.

## Contact us

Service telephone and product support:

Please contact M&B if you have any questions regarding product support.

**+86-10-61253803 (Working Time: Monday ~ Friday, 8:30 ~ 17:30);**

Or contact the regional service partner or distributor.

## Order consumables and repair parts

Please purchase repair parts (mouthpiece etc.) from the M&B service partner or distributor in your country.

## Other questions

Please contact us as below or visit our website: [www.mbelec.com](http://www.mbelec.com).

### Headquarters

Company: Beijing M&B Electronic Instruments Co., Ltd.

Address: Room 6319, Building 1, No.27, Yongwang Road, Daxing Bioengineering and Medicine Industry Base, Zhongguancun Science Park, Daxing District, Beijing

### Information for The European Union representative:

European Union Representative Name: Shanghai International Holding Corp. GmbH (Europe).

European Union Representative Address: Eiffestrasse 80, 20537 Hamburg, Germany.

**CAUTION:** When the peak flow meter is used to watch lung conditions such as asthma, the user should be under the care of a physician or other licensed health care professional. A licensed health care professional's advice is required to understand the meaning and importance of the measures you get with your peak flow meter and to decide on an appropriate treatment plan. The treatment plan given to you by your physician or other licensed health care professional will tell you what action to take when there are changes in your peak flow number.

No matter what your peak flow measures are, if you have signs and symptoms such as chest tightness, shortness of breath, coughing or wheezing you should follow your licensed health care professional's advice for contacting him or her.

Instructions for using the peak flow meter must be followed carefully in order to get correct measure of airflow.

If you are unable to obtain a reading you should contact your physician immediately.

The peak flow meter should not be used by more than one person.

If you have any questions about your peak flow meter and its use, talk to your licensed health care professional.

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## **1 BRIEF INSTRUCTION**

### **1.1 Function Description**

MSA100 Peak Flow Meter is a hand-held pulmonary function measuring medical device that measures your maximum possible exhalation which is called peak expiratory flow (PEF) and forced expiratory volume in 1 second (FEV1). The accuracy meets American Thoracic Society (ATS) Standard 2005 Revision.

A peak flow meter is used to measure a person's "peak expiratory flow", which is a simple measure of airflow that can tell you how well you are breathing. It tells you how well air is moving through the airways in your lungs. Forced Expiratory Volume (FEV1) is a measure of the volume of air expelled in 1 second. If you have a breathing condition such as asthma, C.O.P.D., or chronic bronchitis, your physician (or other licensed health care professional) may recommend that you use a peak flow meter to watch for changes in your airflow. Your physician (or licensed health care professional) will give you a treatment plan that will tell you what actions to take when you have a change in airflow. In addition, you should record your peak flow measures as recommended by your physician (or other licensed health care professional). Reviewing peak flow measures can help you and your physician (or licensed health care professional) checks closely on your asthma or C.O.P.D. to provide the best treatment for you.

MSA100 is suitable for children through adults who are capable of following the instructions for use. Because the Meter has an automatic memory three hundreds readings, you can take the Meter with you the next time you visit your doctor for a review of many readings. The doctor makes an appropriate treatment plan based on them, and helps patients to recuperate health.

MSA 100 Peak Flow Meter supports USB connection. When measurement records add up to maximum volume, you can transfer the records to PC via USB. Then using software to help save and track for long term.

The peak flow meter should not be used by more than one person.

### **1.2 Intended Use**

MSA100 is intended for monitoring PEF (Peak Expired Flow Rate) and FEV1 (Forced Expiratory Volume) for patient use at home. The device is designed for pediatric to adult patients. When the Meter is used to monitor lung conditions such as asthma or C.O.P.D., the user should be under the

care of a licensed health care professional. A licensed health care professional's advice is required to understand the meaning and importance of measurements reported by the Meter and how to decide on an appropriate treatment plan. This treatment plan will tell the patient what action to take when there are changes in their peak flow measurements.

### **1.3 Indications for Use**

This device is intended for monitoring PEF (Peak Expired Flow Rate) and FEV1 (Forced Expiratory Volume in one second) for patient home use. The device is designed for pediatric to adult patients. The device is intended for monitoring respiratory conditions such as asthma.

### **1.4 Measuring Principle**

When air flow passes through turbine sensor, it makes the leaf of turbine rotate. Rotary speed of the leaf is linear relationship with air flow rate. By the technology of photoelectric conversion, turning of the leaf is converted to be pulse signal, which is processed by the main controller after sampling. The PEF and FEV1 value are calculated by an algorithm formula and displayed on the LCD.

### **1.5 Step -by -step Instructions**

**PLEASE READ ALL OF THE INFORMATION IN THE PACKAGE INSERT BEFORE USING THE PEAK FLOW METER.**

**IF YOU DO NOT UNDERSTAND THE INSTRUCTIONS, CONSULT M&B, CALL (+86) 10 61253803 (Working Time: from Monday to Friday, 8:30 ~ 17:30), OR WRITE TO market@mbelec.com.**

**ASK YOUR PHXSICIAN OR OTHER LICENSED HEALTH CARE PROFESSIONAL TO WATCH YOU USE THE PEAK FLOW METER. THIS WILL HELP ASSURE THAT YOU ARE USING IT CORRECTLY.**

**NO MATTER WHAT YOUR PEAK FLOW MEASURES ARE, IF YOU HAVE SIGNS AND SYMPTOMS SUCH AS CHEST TIGHTNESS, SHORTNESS OF BREATH, COUGHING OR WHEEZING YOU SHOULD FOLLOW YOUR LICENSED HEALTH CARE PROFESSIONAL'S ADVICE FOR CONTACTING HIM OR HER.**

**IF YOU ARE UNABLE TO OBTAIN A READING YOU SHOULD CONTACT YOUR PHYSICIAN IMMEDIATELY.**

- a. Get the peak flow meter ready (take out of case, insert mouthpiece, position indicator; directions will differ according to device)
- b. Stand up
- c. Take a deep breath in

- d. Place the meter in the mouth and close lips around the mouthpiece. Make sure your lips form a tight seal around the mouthpiece. Do not put your tongue into the mouthpiece. Do not bend your neck.
- e. Blow out as hard and fast as you can.
- f. Read the number next to the indicator. This is your peak flow measure. Write it down.
- g. After you move the indicator back to zero, repeat the steps two more times to get two more peak flow measures.
- h. Choose the highest number of your three peak flow measures. Write the number in your "Peak Flow Diary." Directions for the diary are written on the diary.
- i. How to store your peak flow meter (directions will differ according to device).

## 1.6 Technical Specification

### 1. Measuring method

Flow : Turbine sensor  
Volume : Flow Integration

### 2. Measuring rang

Volume : 0.01L~9.99L  
Flow : 50 L/min ~900L/min

### 3. Accuracy

Volume :  $\pm 3\%$  or  $\pm 0.05\text{L}$ , whichever is greater  
Flow :  $\pm 10\%$  or  $\pm 20\text{L/min}$ , whichever is greater

4. Display : Segment liquid crystal display

5. Memory : 300 measurements with data and time

## 1.7 Other Specification

 Type B applied part.

 Caution

Model: MSA100

Power source: AAA 1.5V×2 alkaline batteries

## 1.8 Composition of Package

| No. | Name           | Unit  | Quantity | Note   |
|-----|----------------|-------|----------|--------|
| 1   | Main equipment | piece | 1        | MSA100 |

|   |                    |       |   |  |
|---|--------------------|-------|---|--|
| 2 | Turbine sensor     | piece | 1 |  |
| 3 | Mouthpiece         | piece | 1 |  |
| 4 | Instruction manual | piece | 1 |  |
| 5 | USB cable          | piece | 1 |  |

## 1.9 Transportation and Storage Conditions

1. Environment temperature of -10 deg C ~ +55 deg C;
2. Relative humidity of  $\leq 93\%$ ;
3. Atmospheric pressure of 500hPa~1060hPa.

## 1.10 Operating Condition

1. Environment temperature of +10 Deg C~+40 Deg C;
2. Relative humidity of 25%~85%;
3. Atmospheric pressure of 860hPa~1060hPa.

## 1.11 Device Composition

MSA100 Peak Flow Meter is divided into parts below like Figure 1-1.

1. Main equipment.
2. AAA 1.5×2 alkaline batteries.
3. Mouthpiece and turbine sensor.

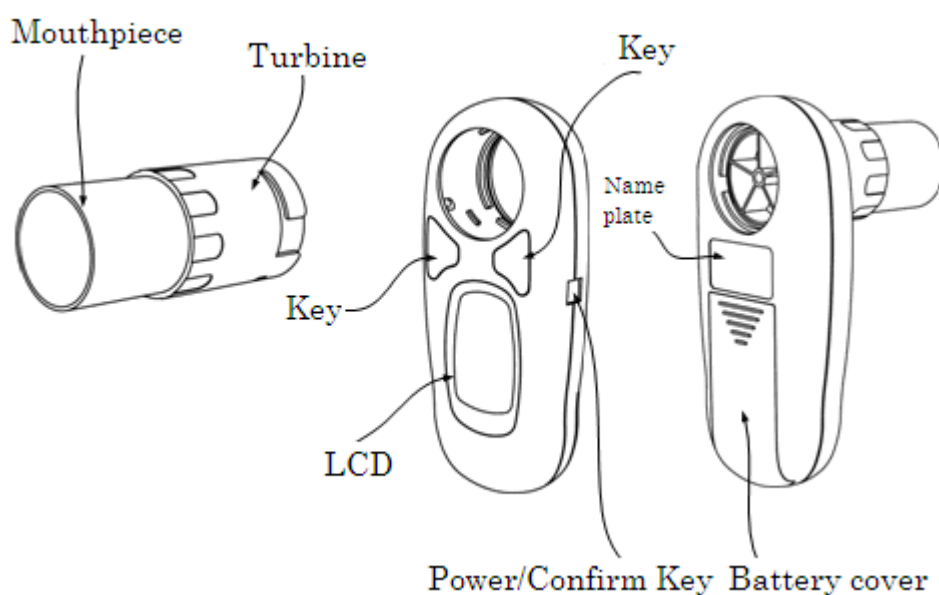


Figure 1-1 Make-up of MSA100 Peak Flow Meter

## 2 SAFETY PRECAUTIONS

### 2.1 Safety Information

#### 2.1.1 Terms and Symbols

As the manufacturer of medical devices, the company strives to ensure the security, reliability and performance of the instrument. For correct use of this instrument, read the following points carefully and adhere to them. After reading this manual, keep it in a safe place where it can be referred to anytime a question arises.

##### 2.1.1.1 Terms and Definition

This manual is using the term of "ATTENTION", etc. from beginning to end, which aims to indicate the danger and specified severity degree or level. Please be familiar with its definition and importance.

---

 **ATTENTION:** Denotes potential danger or unsafe treatment which may result in slight injury or damage to the device or other property. The note provides application hints or other useful information. Read the note carefully to ensure safe and correct use.

---

##### 2.1.1.2 Explanation of Safety Symbols

| Symbols                                                                             | Explanation                                                                    |
|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|
|  | Denotes a note or warning content;                                             |
|  | Denotes a prohibited operation. The operation must never be performed;         |
|  | Perform the operation accurately. The instruction must be strictly adhered to. |

##### 2.1.2 Environment

---

 **ATTENTION:**  Ambient temperature exceeding the range of technical specification will affect the Meter's accuracy, which will cause the machine damaged or machine life reduced.

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##### 2.1.3 Preparation

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 **ATTENTION:**  Before using the device, operator must verify whether work procedures and conditions are appropriate for the use of this instrument.

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##### 2.1.4 Other Notices

**⚠ ATTENTION:**  In order to avoid electric shock or detector failure, do not allow any liquid to permeate into the device. If liquid has permeated into it, please contact your local service partner or distributor of M&B to inspect the meter.

**⚠ ATTENTION:**  Do not use the detector near flammable anesthetic gases, steam or liquid.

**⚠ ATTENTION:**  For safe operation of the device, the user must follow this instruction manual. However, these instructions do not supersede established medical procedures concerning respiratory system examination.

**⚠ ATTENTION:**  Do not replace accessories, consumables without M&B authorization.

## 2.2 Transportation and Storage

**⚠ ATTENTION:**  Put the Meter into the specified storage case during transportation.

## 2.3 Interference Instruction

**⚠ ATTENTION:**  The MSA100 has functions that it does not affect normal operation of other devices, or is not affected by other devices.

## 2.4 Classification

|                                                 |                                                                                                                                                              |
|-------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Type of protection against electric shock       | Internal power device                                                                                                                                        |
| Degree of protection against electric shock     | Type B applied part                                                                                                                                          |
| Degree of protection against liquid penetration | IP22, Protected against solid foreign objects of 12,5 mm Ø and greater and Protection against vertically falling water drops when ENCLOSURE tilted up to 15° |

**⚠ ATTENTION:**  The classification of the electrical shock, fire disaster, machinery and other special risks is done according to EN60601-1.

## 2.5 Safe Operation and Processing Conditions

|                                                                    |                                                                                              |
|--------------------------------------------------------------------|----------------------------------------------------------------------------------------------|
| The sterilization or disinfection method recommend by manufacturer | Not applicable                                                                               |
| Electromagnetic interference                                       | Avoid the using of wireless telephones or other strong interference equipment near the Meter |

|                                       |           |
|---------------------------------------|-----------|
| Work Mode                             | Interval  |
| Electric surgical interference damage | No damage |

M&B Electronic Instruments Co., Ltd does not accept liability or responsibility for incorrect use or operation of the MSA100.

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**⚠ ATTENTION: ⚠ If in doubt, consult your Physician or Healthcare expert**

**⚠ ATTENTION: ⚠ No modification of this equipment is allowed.**

**⚠ ATTENTION: ⚠ Do not modify this equipment without authorization of the manufacturer.**

**⚠ ATTENTION: ⚠ If this equipment is modified, appropriate inspection and testing must be conducted to ensure continued safe use of the equipment.**

---

## 2.6 Standards and Regulation Compliance

EN 60601-1-2006: Medical Electrical Equipment-General Requirements for Safety;

IEC60601-1-2-2004: Medical Electrical Equipment-Safety Requirements-EMC;

ATS Standardizations of spirometry 2005 Revision.

### 3 MAINTENANCE

#### 3.1 Battery Assemblage

Show as figure3-1, slide the cover down, insert two AAA batteries in the shell following symbol inside, and close the cover.

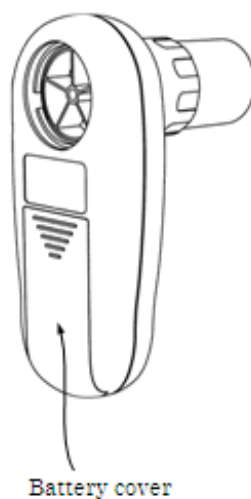


Figure3-1 MSA1000 battery assemble

- 
- ⚠ ATTENTION:** ⚠ If do not use Meter for long time, please take out batteries from battery case to avoid battery leakage.
- ⚠ ATTENTION:** ⚠ Please select batteries with regular factory instead of fake and shoddy batteries.
- 

#### 3.2 Assemble Mouthpiece and Turbine into Main Unit.

Insert mouthpiece to turbine sensor, then the assemblage of mouthpiece and turbine screw clockwise into main unit. See the procedure at figure 3-2.

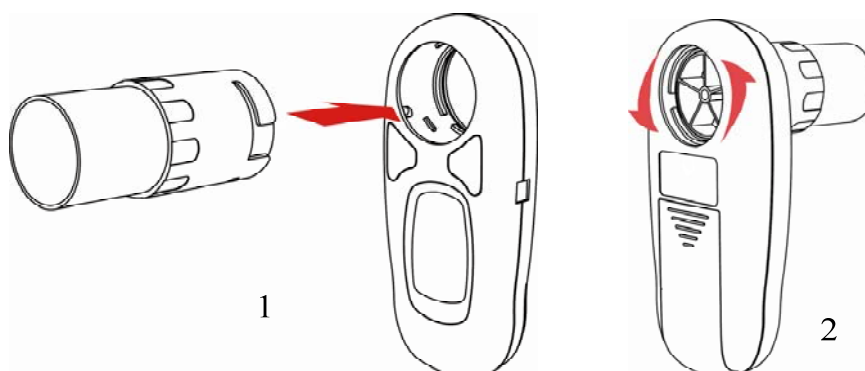


Figure 3-2 Assemble mouth piece and turbine

#### 3.3 Cleaning

**⚠ ATTENTION:** **⊘ Please clean mouthpiece when first time use, prevent from dust because of transport or storage.**

---

The Meter should be cleaned within 30 minutes after each use. Separate mouthpiece and turbine from main body. Disconnect mouthpiece and turbine. Immerse the mouthpiece and turbine in a prepared soap solution. Clean thoroughly by swirling. Thoroughly rinse the mouthpiece with water (distilled water is recommended). Allow the device to air dry.

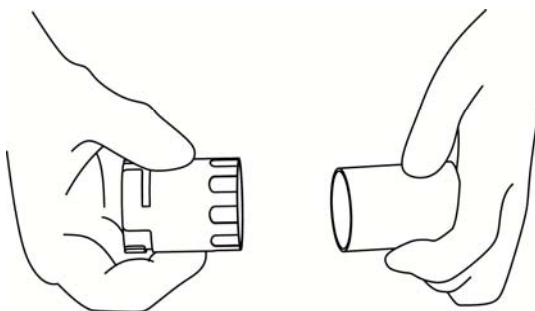


Figure3-3 Disassemble turbine and mouthpiece

**⚠ ATTENTION:** **⊘ Don't use high pressure water or running water to rinse turbine, which maybe lead to damage turbine, and make accuracy deteriorative.**

---

Don't use boiling water to rinse turbine.

When dried, assemble mouthpiece and turbine, and insert it into main unit.

Use clean and damp cloth clean main body of MSA100, but never put main body into water. Show as figure3-4.



Figure3-4 cleaning to main unit

## 4 OPERATION

### 4.1 LCD Screen Display Introduction



Figure4-1 LCD demonstration

Figure4-1 shows all segment of LCD displaying, and the characters and symbols meaning is described below.



: Four rows digit display, indicating individually date, time, measurement value, and record number.

Day : Indicate now or historical measurement record day.

Month : Indicate now or historical measurement record month.

T : Indicate now or historical measurement record time.

Y : Indicate now or historical measurement record year.

AM : Indicate now or historical measurement record time is before 12:00.

PM : Indicate now or historical measurement record time is after 12:00.

PEF : Indicate now or historical measurement PEF value.

FEV1 : Indicate now or historical measurement FEV1 value.



: Symbol of insufficient battery volume

L/min : Unit of PEF value.

L : Unit of FEV1 value.

MR : Records number or ID.



: Indicator to traffic colour outside surface of main unit, the position of arrow means the degree of PEF normal or declined.



: Indicate USB cable has connected, and the records can be read.

## 4.2 First Time Use

Firstly assemble mouthpiece and turbine according section 3.2.

Secondly insert batteries according to section 3.1. Power on MSA100, the main unit enters time setting state.

## 4.3 Time Setting

After new batteries have been inserted, the LCD display is shown as figure4-2. While the year “2012” is blinking, it indicates the year waiting for setting. System default setting is year: 2012, month: 1, day: 1, time 12:00 am o’clock. Assume target year is 2013, setting methods are below.



Figure4-2 Initial display after power on

Press left key or right key to change year. If press left key once, the year displaying decrease 1. If press right key once, the year displaying increase 1. Set 2013, you should press right key once. Then press power/confirm key once turn to next setting, shown as figure4-3. Please note: if you hold down the key more than 2 seconds, it speeds up.

---

**⚠ ATTENTION:** ⌚ If date and time is not set, you can't use to measure. If date and time is not set correctly, your records date maybe wrong later, which will make historical record time incorrect.

---



Figure4-3 year setting

Now the year characters are not blinking, meaning the year has set over. Following the month “1” begins blinking, you should set month. The setting way like month, day, hour and minute, is the same as that of year. When all date and time is set over, the device enters into measure status.

#### **4.4 Power on/Power off**

With the meter off, press power/confirm key once; the meter will power on.

With the meter on, press power/confirm key until the buzzer begin beep, then release the key, the meter will power off. Before the meter switches off, the highest vales of the current measurement session and its related memory position “MR xxx” is displayed.

After power on, the system can keep active status within one minute, then it will power off automatically. If press any key or measure once more, the system will prolong 1 minute to power off.

#### **4.5 Measuring**

When the system power on, the last result is shown, and then the device indicates “READY” for a measurement by two short beeps. Inhale completely and hold your breath for moment. Cover the mouthpiece tightly with your lips. Blow into turbine as hard and as fast as you can. Show as figure4-4. A long beep confirms that the result is recorded. PEF is displayed for about 3 seconds followed by FEV1 and then the monitor is ready for a new measurement which is indicated by two short beeps. Show as figure4-5.

It is recommended to perform three or more measurements sequentially. The device shall memory the best value as the test result.

After each measurement, at first the actual reading is shown in the display and then it switches automatically to the highest reading of your current measurement session.

Store the Meter in a clean and dust free place.

**⚠ ATTENTION:** **❗** Ask your physician (or other licensed health care professional's) to watch you use this peak flow meter before you rely on any measurements. Read all information in this instruction booklet before using.

Contact M&B at 800-810-0520, +86 010 61253747、+86 010 61253716-8020、+86 010 61253716-8001/8002 8AM-5PM Monday – Friday with questions; or contact with M&B service partner or distributor.

**⚠ ATTENTION:** **❗** If you have signs and symptoms such as chest tightness, shortness of breath, coughing or wheezing follow your physician's (or other licensed health care professional's) advice for contacting them no matter what readings you obtain. If you do not get a reading contacts your physician immediately.

**⚠ ATTENTION:** **❗** Do not measure PEF and FEV1 under strong sunlight.



Figure4-4 Peak expire measuring method



Figure4-5 PEF and FEV1 measurement value display

Please note: MSA100 saves the highest PEF reading from switching the device on until

switching the device off.

## 4.6 Important Information for Measuring and Monitoring of Peak Flow Values

It is important to regularly monitor your peak flow values. Doctors generally recommend taking one measurement in the morning and one in the evening, every day normally before inhaling your prescribed drugs. Carry out additional measurement whenever you feel unwell or perceive shortness of breath.

Please note that asthma attacks are indicated in advance by low peak flow values before you feel it! Please contact your doctor in cases such as these. Also do so if you have signs and symptoms such as chest tightness, shortness of breath coughing or wheezing.

Self-measurement means control, not diagnosis or treatment. In any event, please be sure to discuss your measured values with your doctor. Your doctor will also explain which values are normal for you.

You should never alter the dosages of any medication without talking to your doctor.

Please note that the device stores up to 300 measured values with date and time. When the memory is full, shown as figure4-5, erase all records yourself, or visit your doctor in time, let he/she to analyze your data.

Please confirm that date and time settings are always actual.

Do not measure PEF and FEV1 under outdoor strong sunlight.

The performance of the Meter can be affected by extremes of temperature and humidity. Please refer to “technical specifications” for details.

\* Table4-1 Normal PEF values for Males (Caucasian-American)

| Age     | Height (cm) |     |     |     |     |     |     |     |     |
|---------|-------------|-----|-----|-----|-----|-----|-----|-----|-----|
| (Years) | 120         | 130 | 140 | 150 | 160 | 170 | 180 | 190 | 200 |
| 8       | 171         | 208 | 249 | 292 | 339 | 388 | 441 | 496 | 554 |
| 10      | 185         | 222 | 262 | 306 | 352 | 402 | 454 | 510 | 568 |
| 15      | 246         | 283 | 324 | 367 | 414 | 463 | 516 | 571 | 629 |
| 20      | 347         | 384 | 425 | 468 | 515 | 564 | 616 | 672 | 730 |
| 25      | 354         | 392 | 432 | 475 | 522 | 571 | 624 | 679 | 738 |
| 30      | 357         | 395 | 435 | 479 | 525 | 575 | 627 | 682 | 741 |
| 35      | 357         | 394 | 435 | 478 | 525 | 574 | 626 | 682 | 740 |
| 40      | 352         | 390 | 430 | 474 | 520 | 570 | 622 | 677 | 736 |
| 45      | 344         | 382 | 422 | 465 | 512 | 561 | 614 | 669 | 727 |
| 50      | 332         | 369 | 410 | 453 | 500 | 549 | 601 | 657 | 715 |

|    |     |     |     |     |     |     |     |     |     |
|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 55 | 316 | 353 | 394 | 437 | 483 | 533 | 585 | 641 | 699 |
| 60 | 296 | 333 | 373 | 417 | 463 | 513 | 565 | 621 | 679 |
| 65 | 272 | 309 | 349 | 393 | 439 | 489 | 541 | 597 | 655 |
| 70 | 244 | 281 | 322 | 365 | 411 | 461 | 513 | 569 | 627 |
| 75 | 212 | 249 | 290 | 333 | 380 | 429 | 482 | 537 | 595 |
| 80 | 176 | 214 | 254 | 298 | 344 | 393 | 446 | 501 | 560 |
| 85 | 137 | 174 | 215 | 258 | 304 | 354 | 406 | 462 | 520 |
| 90 | 93  | 131 | 171 | 215 | 261 | 310 | 363 | 418 | 477 |

\* Table4-2 Normal PEF value for Females (Caucasian-American)

| Age     | Height(cm) |     |     |     |     |     |     |     |     |
|---------|------------|-----|-----|-----|-----|-----|-----|-----|-----|
| (Years) | 120        | 130 | 140 | 150 | 160 | 170 | 180 | 190 | 200 |
| 8       | 170        | 198 | 228 | 261 | 295 | 332 | 371 | 413 | 456 |
| 10      | 207        | 235 | 265 | 297 | 332 | 369 | 408 | 449 | 493 |
| 15      | 262        | 290 | 320 | 353 | 387 | 424 | 463 | 505 | 548 |
| 20      | 275        | 303 | 333 | 365 | 400 | 437 | 476 | 517 | 561 |
| 25      | 282        | 310 | 340 | 372 | 407 | 444 | 483 | 524 | 568 |
| 30      | 286        | 313 | 344 | 376 | 411 | 448 | 487 | 528 | 572 |
| 35      | 286        | 314 | 344 | 377 | 411 | 448 | 487 | 529 | 572 |
| 40      | 284        | 312 | 342 | 374 | 409 | 446 | 485 | 526 | 570 |
| 45      | 278        | 306 | 336 | 369 | 403 | 440 | 479 | 521 | 564 |
| 50      | 270        | 298 | 328 | 360 | 395 | 432 | 471 | 512 | 556 |
| 55      | 258        | 286 | 316 | 349 | 383 | 420 | 459 | 501 | 544 |
| 60      | 243        | 271 | 301 | 334 | 368 | 405 | 444 | 486 | 529 |
| 65      | 225        | 253 | 283 | 316 | 351 | 387 | 427 | 468 | 511 |
| 70      | 204        | 232 | 263 | 295 | 330 | 366 | 406 | 447 | 490 |
| 75      | 180        | 208 | 238 | 271 | 305 | 342 | 381 | 423 | 466 |
| 80      | 153        | 181 | 211 | 244 | 278 | 315 | 354 | 396 | 439 |
| 85      | 123        | 151 | 181 | 213 | 248 | 285 | 324 | 365 | 409 |
| 90      | 90         | 118 | 148 | 180 | 215 | 252 | 291 | 332 | 376 |

\**Spirometric Reference Values from a Sample of the General U.S. Population*, John L. Hankinson, John R. Odencrantz, and Kathleen B. Fedan, et. al., Division of Respiratory Disease Studies, National Institute for Occupational Safety and Health, Centers for Disease Control and Prevention, Morgantown, West Virginia, 1999. The Third National Health And Nutrition Examination Survey (NHANES III).



Figure4-5 Memory is full

## 4.7 Simple Assessment (Traffic Light Scheme)

Using green, yellow and red traffic light to express the degree of your illness is a straight way. Green indicates illness is under control, don't require higher medication dosage. Yellow indicates you must caution, if your measured values frequently be located in this area, increase your medication dosage as discussed with your physician. Red indicates it is dangerous. Act as discussed with your physician or seek emergency medical treatment.

Simple assessment settings need to consult with your doctors (or other licensed health care professional's). The general setting method is below.

(1) Measure your personal best value using MSA100, which is the highest value you achieve under optimum conditions (free of symptoms, feeling well). Or choose NHANES III or other effective prediction to calculate a normal value, it is to be as a best value.

(2) Press and hold Power Key for a long time, while install the battery. Do not loosen Power Key, until you can see predicted value of PEF blinked. It is traffic light scheme basic value or prediction value.

(3) Then use Right Key or Left Key to increase or decrease value, enter your best value or "normal PEF value" shown as Table4,

(4) Press Power Key once again, then display "OK", setting successes.

(5) The green area lower limit usually reaches up to 80% of the predicted value, the yellow area lower limit usually reaches up to 50% of the predicted value, the percent is not allowed to edit, and it is default in the Meter.

## 4.8 Records Playback

When the system enters into measuring status, press key left or right, you can watch historical records. If you keep pressing the button you can move quickly through the records. At the same time record number will refresh with increasing or decreasing number. The records contain measured date, time, PEF value, FEV1 value and position in memory. Press power/confirm key once or wait the current record display over, the system will enters into measuring state.



Figure4-6 Records playback

### 4.9 Delete records

In measuring status press left and right key for five seconds long, and all records will be deleted. The hint after deleted is shown as figure 4-7.



Figure4-7 All records has deleted

### 4.10 Data Transmission

MSA100 can transmit measured records to PC via USB. All records could be playback and statistically analyzed. When MSA100 is connected with PC, MSA100 displays “”.

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 **ATTENTION:**  **This function is optional, you may ask distributor for detail.**

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## 5 TROUBLESHOOTING

| Message                                                                             | Cause                                                                       | Remedy                     |
|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|----------------------------|
|  | The PEF result is higher than 900L/min, or FEV1 result is higher than 9.99L | this is a very good result |

|                                                                                   |                                                                                               |                                                                                                                                   |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
|  | Means records address exceeds limit, or record date and time is error, or software is failure | Restart system                                                                                                                    |
|  | Records do not exist                                                                          | no records                                                                                                                        |
|  | Memory is full                                                                                | It is better to delete records, or new record is not stored                                                                       |
|  | battery insufficient                                                                          | It is better to change new batteries                                                                                              |
| NO display on screen                                                              | Battery is low, or battery pole is reversed.                                                  | Change new batteries, and note pole direction                                                                                     |
| Measuring value error                                                             |                                                                                               | Inspect whether the leaf of turbine is run freely. And the leaf is dirty. Or consult whether the value is normal with your doctor |

Other question please contact with M&B service partner or distributor.

## 6 GUIDANCE AND MANUFACTURE'S DECLARATIONS

### Electromagnetic Emissions

The MSA100 peak flow meter is intended for use in the electromagnetic environment specified below. The customer or the user of the device should ensure that it is used in such an environment.

| Emissions test           | Compliance | Electromagnetic environment – guidance                                                                                                                                                                   |
|--------------------------|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| RF emissions<br>CISPR 11 | Group 1    | The MSA100 peak flow meter detector uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment. |
| RF emissions<br>CISPR 11 | Class B    | The MSA100 peak flow meter detector is suitable for use in all establishments, other than domestic establishments and power supply is internal.                                                          |

### Electromagnetic Immunity

The MSA100 peak flow meter detector is intended for use in the electromagnetic environment specified below. The customer or the user of the device should ensure that it is used in such an environment.

| Immunity test                                                  | IEC 60601 test level                                                                                                 | Compliance level                                                                                                      | Electromagnetic environment–guidance                                                                                                                                                                    |
|----------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Electrostatic discharge (ESD)<br><br>IEC 61000-4-2             | ±2 kV contact<br>±4 kV contact<br>±6 kV contact<br>±8 kV contact<br>±2 kV air<br>±4kV air<br>±8 kV air<br>±15 kV air | ±2 kV contact<br>±4 kV contact<br>±6 kV contact<br>±8 kV contact<br>±2 kV air<br>±4 kV air<br>±8 kV air<br>±15 kV air | Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30 %.                                                          |
| Power frequency (50/60 Hz) magnetic field<br><br>IEC 61000-4-8 | 10 A/m                                                                                                               | 10A/m                                                                                                                 | Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.                                                               |
| Radiated RF IEC 61000-4-3                                      | 3V/m<br>80 MHz to 2.5 GHz                                                                                            | 3 V/m                                                                                                                 | $d = 2.3 \cdot \sqrt{P}$ 800 MHz to 2,5 GHz<br>where $P$ is the maximum output power rating of the transmitter in watts (W) and $d$ is the recommended separation distance in meters (m) <sup>b</sup> . |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |  |                                                                                                                                                                                                                                                                                                                                                                          |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |  | Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey, <sup>a</sup> should be less than the compliance level in each frequency range. <sup>b</sup><br>Interference may occur in the vicinity of equipment marked with the following symbol:<br> |
| <p>a Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which MSA100 peak flow meter detector is used exceeds the applicable RF compliance level above, MSA100 peak flow meter detector should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating MSA100 peak flow meter detector.</p> <p>b Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.</p> |  |  |                                                                                                                                                                                                                                                                                                                                                                          |

## EMC Declaration

With many electronic devices such as microwave, TV, wireless router, PC's, and mobiles, medical devices in use may be susceptible to electromagnetic interference from these devices. This may result in incorrect operation of the medical device and create a potentially unsafe situation. Medical devices should be kept distance 1m from those electronic devices.

In order to regulate the requirements for EMC with the aim to prevent unsafe product situations, the EN60601-1-2 standard has been implemented.

This standard defines the levels of immunity to electromagnetic interferences as well as maximum levels of electromagnetic emissions for medical devices.

Medical devices manufactured by M&B conform to this EN60601-1-2 standard for both immunity and emissions.

The medical devices should not be used adjacent to or stacked with other equipment. If adjacent or stacked use is unavoidable, the medical device should be seen to operate normally as it should in this situation.

## FCC Declaration

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.

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

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.

## 7 TECHNICAL SPECIFICATION

MSA100 Peak Flow Meter is a hand hold pulmonary function measuring medical device that measures your maximum possible exhalation which is called peak expiratory flow (PEF) and forced expiratory volume in 1 second (FEV1). The parameters are displayed on the LCD screen. MSA100 also can record measurements up to 300 pieces, and supports USB connection. When measurement records add up to maximum or other patient would use, you can transfer the records to PC via USB, then a software help to save and track for long time.

### General

|                        |                                                   |
|------------------------|---------------------------------------------------|
| Sensor type            | Turbine                                           |
| Measurement parameters | FEV1/PEF                                          |
| Memory size            | 300                                               |
| BTPS                   | PEF and FEV1 results displayed at BTPS conditions |

### Accuracy

Meet ATS 2005 Revision accuracy requirement

|                 |                |                   |                    |
|-----------------|----------------|-------------------|--------------------|
| Volume range    | 0.01L~9.99L    | Air flow range    | 50 L/min ~900L/min |
| Volume accuracy | ±0.050L or ±3% | Air flow accuracy | ±10% or ±20L/min   |

### Resolution

|                   |       |                     |        |
|-------------------|-------|---------------------|--------|
| Volume resolution | 0.01L | Air flow resolution | 1L/min |
|-------------------|-------|---------------------|--------|

### Resistance to flow

|                          |                |
|--------------------------|----------------|
| Back pressure @ 660L/min | < 0.11 KPa/sec |
| Back pressure @ 900L/min | < 0.15 KPa/sec |

### Repeatability

|      |                 |
|------|-----------------|
| PEF  | ±5% or ±10L/min |
| FEV1 | ±3% or ±0.05L   |

### Display screen

|      |            |
|------|------------|
| Size | 1.8 inches |
| Type | LCD        |

### Control

|          |                                   |
|----------|-----------------------------------|
| Standard | power/confirm key, left/right key |
|----------|-----------------------------------|

### Environment specification

|                       |                                                                          |
|-----------------------|--------------------------------------------------------------------------|
| Power source          | AAA1.5×2 batteries                                                       |
| Design                | Interval, ordinary device                                                |
| Battery work time     | Maximum one year                                                         |
| Connection            | Where fitted, USB for PC connection. Require a USB 'A' to 'USB' mini 'B' |
| Operation Temperature | 10°C~40°C                                                                |
| Humidity              | 25%~85%                                                                  |

|             |                                       |
|-------------|---------------------------------------|
| Atmosphere  | 860hPa～1060hPa                        |
| Storage     | -10℃～55℃<br>15%～93%<br>500hPa～1060hPa |
| Temperature |                                       |
| Humidity    |                                       |
| Atmosphere  |                                       |

## Zoning

|                        |                  |
|------------------------|------------------|
| Green/Yellow threshold | 80% of reference |
| Green/Yellow threshold | 50% of reference |

## Physical specification

|           |                                         |
|-----------|-----------------------------------------|
| Height    | 12.6 centimeter                         |
| Wide      | 5.4 centimeter                          |
| Thickness | 2.8 centimeter                          |
| Weight    | 120g (contain batteries and mouthpiece) |

## Maintenance warranty

|          |                                                                                |
|----------|--------------------------------------------------------------------------------|
| Standard | One year                                                                       |
| Option   | Provide other options.<br>The detail please contact with M&B and distributors. |