



User Manual Rev. 1.7

Issued on: 09.10.2020  
Approved on: 09.10.2020

Thank you for choosing a product from **MIR**  
MEDICAL INTERNATIONAL RESEARCH

**WARNING** 

**The paper mouthpiece, the nose clip and the disposable turbine with mouthpiece in the equipment should be considered disposable products.**

**Before using your MiniSpir Light ...**

- Read this manual carefully, plus all labels and other product information supplied.
- Set the device configuration (date, time, predicted values, language etc.) as described in the Software WinspiroLIGHT Manual.
- Check PC system requirements for compatibility with the device (RAM: 512 Mb minimum, 1024 Mb preferred; Operating system: Windows 2000 – XP Windows Vista (32bit/64bit)- Windows 7 (32bit/64bit); Windows 10 (32bit/64bit); Minimum disk space: 500 Mb; CPU Pentium IV-class PC 1 GHz; display resolution 1024x768 or higher.
- **MiniSpir Light** should only be connected to a computer manufactured in compliance with EN 60950.

**WARNING** 

**The winspiroLIGHT PC software supplied with the device MUST be installed correctly to the PC before connecting MiniSpir Light to the PC. At the end of the installation, connect the device to the PC and the hardware will be "recognised" by the PC. The device can then be used with the winspiroLIGHT software.**

**Keep the original packaging!**

In the event that your device requires attention then always use the original packaging to return it to the distributor or the manufacturer.

In such an event then please follow these guidelines:

- Return the complete device in the original packaging, and
- The transport (plus any customs or taxes) costs must be prepaid.

Manufacturer's address

**MIR SRL:**

Via del Maggiolino, 125  
00155 ROME (ITALY)  
Tel + 39 0622754777  
Web site: [www.spirometry.com](http://www.spirometry.com)

Fax + 39 0622754785  
Email: [mir@spirometry.com](mailto:mir@spirometry.com)

**MIR USA, Inc.**

5462 S. Westridge Drive  
New Berlin, WI 53151 - USA  
Tel + 1 (262) 565 – 6797  
Web site: [www.spirometry.com](http://www.spirometry.com)

Fax + 1 (262) 364 – 2030  
Email: [mirusa@spirometry.com](mailto:mirusa@spirometry.com)

**MIR has a policy of continuous product development and improvement, and the manufacturer therefore reserves the right to modify and to update the information contained in this User's Manual as required Any suggestions and or comments regarding this product should be sent via email to: [mir@spirometry.com](mailto:mir@spirometry.com). Thank you.**

**MIR accepts no responsibility for any loss or damage caused by the User of the device due to the use of this Manual and/or due to an incorrect use of the product.**

**Copying this manual in whole or in part is strictly forbidden.**

**FEDERAL LAW RESTRICTS THIS DEVICE TO SALE BY OR ON THE ORDER OF A PHYSICIAN**

## INDEX

1.	INTRODUCTION.....	4
1.1	Intended Use.....	4
1.1.1	User Category.....	4
1.1.2	Ability and experience required.....	4
1.1.3	Operating environment.....	4
1.1.4	Who can or must make the installation.....	4
1.1.5	Subject effect on the use of the device.....	4
1.1.6	Limitations of use - Contraindications.....	4
1.2	Important safety warnings.....	4
1.2.1	Danger of cross-contamination.....	5
1.2.2	Turbine.....	5
1.2.3	USB Connection Cable.....	6
1.2.4	Device.....	6
1.2.5	Warnings for use in electromagnetic environments.....	6
1.3	Unforeseen errors.....	6
1.4	Labels and symbols.....	7
1.4.1	Identification label.....	7
	Warning symbol for the WEEE.....	7
1.4.2	(ESD) Electrostatic discharge sensitivity symbol.....	7
1.5	Product description.....	8
1.6	Technical features.....	9
1.6.1	Features of the spirometer.....	9
1.6.2	Other features.....	10
2.	FUNCTIONING OF THE MiniSpir Light.....	10
2.1	Connection to PC.....	10
2.2	Using the MiniSpir Light.....	10
2.3	Spirometry Testing.....	10
2.4	Spirometry test interpretation.....	11
3.	DATA TRANSMISSION.....	12
3.1	Transmission with USB cable.....	12
3.2	Upgrade Internal software.....	12
4.	MAINTENANCE.....	12
5.	PROBLEM SOLVING.....	12
	LIMITED WARRANTY CONDITIONS.....	13

## 1. INTRODUCTION

### 1.1 Intended Use

**MiniSpir Light** spirometer is intended to be used either by a physician, respiratory therapist or technician. The device is intended to test lung function and can make:

- spirometry testing in people of all ages, excluding infants and neonates

It can be used in hospital setting, physician's office, factory, pharmacy.

#### 1.1.1 User Category

**MiniSpir Light** calculates a series of parameters relating to human respiratory function.

The product is therefore intended for use by a doctor or by a trained paramedic or technician under the supervision of a doctor.

#### 1.1.2 Ability and experience required

The correct use of the device, the interpretation of the results and the maintenance of the device, with particular attention to disinfection (cross-contamination risk), all require qualified personnel.

#### WARNING

**The manufacturer cannot be held responsible for any damage caused by the user of the device failing to follow the instructions and warnings contained in this manual.**

#### 1.1.3 Operating environment

**MiniSpir Light** has been designed for use in hospital setting, physician's office, factory, pharmacy.

The instrument is not intended for use in an operating theatre nor in the presence of inflammable liquids or detergents, nor in the presence of inflammable anaesthetic gases, oxygen or nitrogen.

The instrument is not designed to be used in direct air currents (e.g. wind), sources of heat or cold, direct sun rays or other sources of light or energy, dust, sand or any other chemical substances.

The user is responsible for ensuring that the device is stored and used in appropriate environmental conditions as specified in paragraph 1.6.2.

#### WARNING

**If the device is exposed to unsuitable environmental conditions, this could cause the device to malfunction and to give incorrect results.**

#### 1.1.4 Who can or must make the installation

The device requires installation by qualified personnel.

#### 1.1.5 Subject effect on the use of the device

A spirometry test should only be carried out when the subject is at rest and in good health, and thus in a suitable condition for the test. A spirometry test requires the **collaboration** of the subject since the subject must make a complete forced expiration, in order to have a meaningful test result.

#### 1.1.6 Limitations of use - Contraindications

An analysis of the results of a spirometry test is not by itself sufficient to make a correct diagnosis of the subject's clinical condition. A detailed clinical history of the subject is also required together with the results of any other test(s) suggested by a doctor.

Test comments, a test interpretation and suggested courses of treatment must be given by a doctor.

A spirometry test requires the collaboration of the subject. The results depend on the person's capability to inspire and to expire all air completely and as fast as possible. If these fundamental conditions are not respected then the results obtained during spirometry testing will not be considered accurate, and therefore the test results are "not acceptable".

The **acceptability** of a test is the responsibility of the user. Special attention should be given to testing elderly subjects, children and people with disabilities.

The device should never be used when it is possible or probable that the validity of the results may be compromised due to any such external factors.

## 1.2 Important safety warnings

**MiniSpir Light** has been examined by an independent laboratory which has certified the conformity of the device to the Safety Standards **IEC 60601-1** and guarantees the EMC Requirements within the limits laid down in the Standard **IEC 60601-1-2**.

**MiniSpir Light** is thoroughly tested during its production and therefore the product complies with the safety requirements and quality standards laid down by the Council Directive 93/42/EEC for **MEDICAL DEVICES**.

After removing the device from its packaging, check that there is no visible damage. In case of damage do not use the device and return it to the manufacturer for replacement.

**WARNING** 

The safety and the correct performance of the device can only be assured if the user of the device respects all of the relevant safety rules and regulations.

The manufacturer cannot be held responsible for damage caused by the failure of the user to follow these instructions correctly.

The device must be used according with the indications given by the manufacturer in the User Manual with particular attention to § Intended Use utilizing only original spare parts and accessories. Use of non original parts such as the turbine flow sensor and oximetry sensor or other accessories may cause errors in measurement and/or compromise the correct functioning of the device, and is therefore not permitted.

In particular, the use of cables other than those specified by the manufacturer could cause increased emissions or lower electromagnetic immunity from the device and result in improper operation.

In the event of any incident or accident of any kind resulting from the use of the device, the user is required to inform the manufacturer without delay, according with Directive 93/42/EEC on Medical Devices.

**1.2.1 Danger of cross-contamination**

One type of turbine sensor can be used with the device: the single-patient disposable. A mouthpiece is required in order to connect a subject to the spirometer.

In order to avoid exposing the subject to the hazard of cross-contamination, the disposable flow sensor must always be changed before each subject,. The use of an anti bacterial filter is at the discretion of the doctor.

**1.2.2 Turbine**

Disposable turbine

It is important to use a new turbine for every new patient. The characteristics, accuracy and the hygiene of the disposable turbine can only be guaranteed if it has been stored beforehand in its original sealed packaging. The disposable turbine is made of plastic and its disposal after use should adhere to the local authority guidelines / norms.

Do not expose the turbine to a direct jet of water or air, and avoid contact with high temperature liquids.

Do not allow dust or foreign bodies to enter the turbine sensor, in order to avoid incorrect functioning and possible damage. The presence of any impurities (such as hair, sputum, threads etc.) within the body of the turbine sensor may seriously compromise the accuracy of the measurements.

**Notes about calibration of turbine****WARNING** 

The turbine flow sensor does not require calibration. If a calibration must be made then the following guidelines should be carefully noted.

Calibration can be made using a siring a calibration syringe ad making a FVC test.

In line with the publication "Standardised Lung Function Testing" of the European Respiratory Society (Vol 6, Supplement 16, March 1993), the air expired from the mouth is at a temperature of circa 33/34 °C.

The expired flow and volume, to be converted to BTPS conditions (37 °C) must be increased by 2.6% - this is derived from the BTPS factor of 1.026 at a temperature of 33°C, which represents a correction of 2.6%. In practice the BTPS factor for the expired flow and volumes is therefore constant and equal to 1.026.

For the inspired volumes and flows, the BTPS factor depends upon the ambient temperature as the air inspired is at ambient temperature.

For instance at an ambient temperature of 20°C with relative humidity at 50%, the BTPS factor is 1.102, a correction of +10.2%.

The correction of the inspired volumes and flows is made automatically as the machine has an internal temperature sensor; the BTPS values are thus calculated.

If a 3L syringe is used to make the calibration and if the MiniSpir Light is calibrated correctly then the FVC (syringe) value will be:

$3.00 \text{ (FVC)} \times 1.026 \text{ (BTPS)} = 3.08 \text{ L (FVC at BTPS)}$ .

If the ambient temperature is 20°C, the FIVC (syringe) value will be:

$3.00 \text{ (FIVC)} \times 1.102 \text{ (BTPS)} = 3.31 \text{ L (FIVC at BTPS)}$ .

The user must be aware that the volume of the syringe shown by the machine is converted to BTPS conditions, so that the "increase" of the results with respect to the expected values does not constitute an error.

For instance, if the calibration procedure is carried out with measured data:

FVC = 3.08 L and FIVC = 3.31 L at an ambient temperature of 20°C the resulting correction factor becomes:

EXPIRATION	.00%
INSPIRATION	.00%

This does not represent an error, but is a logical consequence of the explanation detailed above.

### 1.2.3 USB Connection Cable

Incorrect use or application of the USB cable may produce inaccurate measurements, which will show very inaccurate values of the patient's condition. Carefully inspect each cable before use.

Do not use cables that appear to be or are damaged. If a new cable is required, contact your local distributor.

Use only cables supplied by MIR, specifically designed to be used with **MiniSpir Light**. The use of other types of cables can lead to inaccurate measurements.

### 1.2.4 Device

#### WARNING

The maintenance operations detailed in this manual must be carried out to the letter. If these instructions are not followed this can cause measurement errors and/or an incorrect test interpretation.

Any modifications, adjustments, repairs or reconfiguration must be made by the manufacturer or by personnel authorised by the manufacturer. In case of problems, never attempt to make a repair oneself. The set-up of configurable parameters should only be made by qualified personnel. However, an incorrect set up of the parameters does not put the patient at risk.

If the PC connected to MiniSpir Light is used in the area containing the patient, it is necessary that the PC complies with the EN 60601-1 Standard (ref. EN 60601-1-1 Standard).

For the disposal of the MiniSpir Light, the accessories, plastic consumable materials (mouthpieces), use only the appropriate containers or return all such parts to the seller of the instrument or to a recycling center. All applicable local regulations must be followed.

If any of these rules are not followed then MIR will decline all responsibility for any direct or indirect damages, however caused.

### 1.2.5 Warnings for use in electromagnetic environments

Due to the increasing number of electronic devices (computers, cordless phones, cell phones, etc.) medical devices may be subject to electromagnetic interference caused by other equipment.

Such electromagnetic interference could cause the medical device to malfunction, such as a lower measurement accuracy than stated, and create a potentially dangerous situation.

MiniSpir Light complies with the EN 60601-1-2:2015 standard on electromagnetic compatibility (EMC for electromedical devices) both in terms of immunity and emissions.

For the correct operation of the device, however, it is necessary not to use MiniSpir Light near other devices (computers, cordless phones, cell phones, etc.) that generate strong magnetic fields. Keep these devices at a minimum distance of 30 centimeters. If it is necessary to use it at shorter distances, MiniSpir Light and the other devices must be kept under observation to verify that they work normally.

**Note:** The emissions characteristics of this equipment make it suitable for use in industrial areas and hospitals (IEC/CISPR 11 Class A). If it is used in a residential environment (for which IEC/CISPR 11 Class B is normally required) this equipment might not offer adequate protection to radio-frequency communication services. The user might need to take mitigation measures, such as relocating or re-orienting the equipment.

### 1.3 Unforeseen errors

If any problems should arise with the device, a message indicating the nature of the problem will appear on the screen of the PC, together with a warning "beep".

Errors in measurement or in interpretation can also be caused by:

- use by non-qualified or non-trained personnel, lacking ability or experience
- user error
- use of the instrument outside the guidelines described in this User's Manual
- use of the instrument even when some operational anomalies are encountered
- non-authorized servicing of the instrument.

## 1.4 Labels and symbols

### 1.4.1 Identification label



SYMBOL	DESCRIPTION
Model:	Product name
SN	Device serial number
	Manufacturer symbol
	This product is certified to conform to the Class IIa requirements of the 93/42/EEC medical device directive.
	In accordance with the <b>IEC 60601-1</b> Standard, this product and its component parts are of <b>type BF</b> and therefore protected against the dangers of direct and indirect contact with electricity.
	Class II equipment symbol: as per IEC60601-1, the product complies safety requirements of Class II equipment
IPX1	Information on protection against ingress of liquids. The label indicates the degree of protection against ingress of liquids (IPX1). The device is protected against vertically falling drops of water
	Warning symbol for the WEEE As laid down in the European Directive 2012/19/EEC requirements regarding the disposal of electrical and electronic devices (WEEE), at the end of its useful life this device must not be thrown away together with normal domestic waste as it contains materials which would cause damage to the environment and/or represent a health risk. Instead it must be delivered to a WEEE authorised collection center, where the device will then be disposed of correctly. An alternative is to return the device without charge to the dealer or distributor, when a new equivalent device is purchased. Due to the materials used in the manufacturing of the device, disposing it as a normal waste product could cause harm to the environment and/or health. Failure to observe these regulations can lead to prosecution.
	The (ESD) symbol required by the international standard is used in the vicinity of any connector which has not undergone electrostatic discharge testing.
Rx ONLY	Symbol for FDA regulation: use the device under the prescription of the physician
	Instruction for use symbol. Refer to instruction manual. Read this manual carefully before using the medical device.
	Manufacturing date of the device
	Temperature limits: indicates the temperature limits to which the medical device can be safely exposed
	Humidity limitation: indicates the range of humidity to which the medical device can be safely exposed
	Pressure limitation: indicates the range of pressure to which the medical device can be safely exposed

### 1.4.2 (ESD) Electrostatic discharge sensitivity symbol

#### WARNING

**Pins of connectors identified with the ESD warning symbol should not be touched and the connections should not be made to these connectors unless ESD precautionary procedures are used.**

Precautionary procedures are the following:

- Environmental procedures as: air conditioning, humidification, conductive floor coverings, non-synthetic clothing
- User procedures as: discharging one's body to a large metal object, using wrist strap connected to earth.

It is recommended that all staff involved receive an explanation of the ESD warning symbol and training in ESD precautionary procedures.

the electrostatic discharge is defined as an electric charge at rest. It is the sudden flow of electricity between two objects caused by contact, an electrical short, or dielectric breakdown. ESD can be caused by a buildup of static electricity by tribocharging, or by electrostatic induction. At lower relative humidity, as the environment is drier, charge generation will increase significantly. Common plastics generally will create the greatest static charges.

Typical electrostatic voltage values:

Walking across a carpet	1.500 – 35.000 volts
Walking over untreated vinyl floor	250 – 12.000 volts
Vinyl envelope used for work instructions	600 – 7.000 volts
Worker at a bench	700 – 6.000 volts

If two items are at different electrostatic charge levels, as they approach one another, a spark or Electrostatic Discharge (ESD) can occur. This rapid, spontaneous transfer of electrostatic charge can generate heat and melt circuitry in electronic components. A latent defect can occur when an ESD sensitive item is exposed to an ESD event and is partially degraded. It may continue to perform its intended function, so may not be detected by normal inspection. Intermittent or permanent failures may occur at a later time.

Static dissipative material will allow the transfer of charge to ground or to other conductive objects. The transfer of charge from a static dissipative material will generally take longer than from a conductive material of equivalent size. Some well known insulators are common plastics, and glass. An insulator will hold the charge and cannot be grounded and conduct the charge away.

Both conductors and insulators may become charged with static electricity and discharge. Grounding is a very effective ESD control tool, however, only conductors (conductive or dissipative) can be grounded.

The fundamental ESD control principles are:

- Ground all conductors including people
- Remove insulators, substitute with ESD protective versions
- neutralize with ionizers
- ESDS outside the EPA (ESD protected area) to be in packaging having ESD shielding property

## 1.5 Product description

**MiniSpir Light** is a spirometer, and is connected to a Personal Computer using a USB cable.



The device measures a range of respiratory parameters,.

The main features of this multipurpose **MiniSpir Light** make it is easy to use and versatile.

### Spirometry function

**MiniSpir Light** calculates 10 functional respiratory parameters, as well as the parameter comparison after the administration of a drug (PRE/POST) for a bronchodilator test or for a bronchial challenge test. A comparison of data is made between POST (after-drug) and PRE (before drug administration). The Pre test data relates to percentage variations between the measured results and the predicted values based on the anthropometric data inserted. The POST session is available only on the **MiniSpir Light BD** version.

The flow and volume measurement sensor is a digital turbine, based on the infrared interruption principal, which ensures accuracy in time as required from a professional device.

The special features of this kind of sensor are listed below:

- Accurate measurement even at very low flow rates (end of expiration)
- Not affected by gas humidity nor density
- Shockproof and unbreakable



- Inexpensive to replace.

The turbine flow measurement sensors, used on **MiniSpir** ensure high precision in measurements and have the great advantage of requiring no periodic calibration (however, the turbines can be calibrated if required by the doctor).



**DISPOSABLE TURBINE**

In order to maintain the characteristics the turbines must always be substituted between patients.

For a correct interpretation of a spirometry test, the measured values must be compared either to the so-called **normal or predicted values** which are calculated from the anthropometric details of the patient or, alternatively, to the personal best values from the clinical history of the subject.

The personal best values can vary considerably from the predicted values, which are taken from “healthy” subjects.

**MiniSpir Light** is connected to a PC through a USB port. Data measured by **MiniSpir Light** are transferred to the PC in real-time. The Windows “winspiroLIGHT” software allows to view the spirometric test results (flow/volume curves, spirometry parameters) plus the related subject detail.

The data measured by **MiniSpir Light** and arranged by the software are available for interpretation by specialised personnel. The software gives an interpretation of each spirometry test by assigning a “traffic light” code and by comparing the previous values of the same subject or the reference values of the subject’s group. For further details see the online manual of the WinspiroLIGHT Software.

**MiniSpir Light** is able to make FVC, VC & IVC tests, calculates an index of test acceptability (quality control) plus reproducibility of the spirometry tests carried out. The automatic test interpretation follows the latest 11 level ATS (American Thoracic Society) classification. Each test can be repeated as required. The best parameters are always available for review. The normal (predicted) values can be selected from several normal “sets”. For example, within the European Union the majority of doctors use the ERS (European Respiratory Society) predicted values. For the configuration of parameters and storing tests, see the online manual of the WinspiroLIGHT Software.

## 1.6 Technical features

There follows a comprehensive description of the main features of the device.

### 1.6.1 Features of the spirometer

This device meets the requirements of the following standard:

- ATS Standardization of Spirometry 2005, 2019 update
- ISO 23747: 2015
- ISO 26782: 2009

#### Measured parameters:

SYMBOL	DESCRIPTION	m.u.
FVC	Forced Vital Capacity	L
FEV1	Volume expired in the 1 <sup>st</sup> second of the test	L
FEV6	Volume expired in the initial 6 seconds of the test	L
FEV1%	FEV1/FVC x100	%
PEF	Peak Expiratory Flow	L/min
FEF2575	Flow ratio at 25% and at 75%	L/s
FIVC	Forced inspiratory volume	L
ELA	Estimated lung age	years
EVC	Slow vital capacity (expiratory)	L
IVC	Slow inspiratory vital capacity	L

<b>Flow/volume measurement system</b>	Bi-directional digital turbine
<b>Temperature sensor</b>	semiconductor (0-45°C)
<b>Measurement principle</b>	Infrared interruption
<b>Volume range</b>	10 L
<b>Flow range</b>	± 16 L/s
<b>Volume accuracy (ATS 2019)</b>	± 2.5% or 50 mL
<b>Flow accuracy</b>	± 5% or 200 mL/s
<b>Dynamic resistance at 12 L/s</b>	<0.5 cmH <sub>2</sub> O

### 1.6.2 Other features

<b>Interface</b>	USB
<b>Power supply</b>	USB connection
<b>Dimensions</b>	127x52x15 142x49.7x26mm
<b>Weight</b>	65 grams
<b>Type of electrical protection</b>	Class II
<b>Grade of electrical protection</b>	BF
<b>Grade of protection against water ingress</b>	IPX1
<b>Level of safety in the presence of inflammable anaesthetic gas, oxygen or nitrogen</b>	Not suitable
<b>Conditions of use</b>	Device for continuous use
<b>Storage conditions</b>	Temperature: MIN -20 °C, MAX + 60 °C Humidity :MIN 10% RH; MAX 95%RH Atmospheric pressure: 50kPa, 106 kPa
<b>Transport condition</b>	Temperature: MIN -20 °C, MAX + 60 °C Humidity :MIN 10% RH; MAX 95%RH Atmospheric pressure: 50kPa, 106 kPa
<b>Operating conditions</b>	Temperature: MIN + 10 °C, MAX + 40 °C; Humidity: MIN 10% RH; MAX 95%RH Atmospheric pressure: 70kPa, 106 kPa
<b>Applied norms</b>	IEC 60601-1:2005 + A1:2012 (Electrical Safety) EN IEC 60601-1-2:2015 (EMC) ATS/ERS Guidelines: 2005, 2019 update ISO 26782: 2009 ISO 23747: 2015 EN ISO 14971: 2019 ISO 10993-1: 2018 2011/65/UE Directive EN ISO 15223:2016 IEC 60601-1-6: 2010+Amd2013
<b>Essential performances (compliant with IEC 60601-1:2005+A1:2012)</b>	Error of displayed numeric value: Flow measurement percentage error < ± 5%
<b>Emission limits</b>	CISPR 11 Group 1 Class B
<b>Electrostatic discharge protection</b>	8kV contact, 15kV air
<b>Magnetic field immunity</b>	30 A/m
<b>Radio Frequency Immunity</b>	3V/m @ 80-2700 MHz

MIR will make available on request circuit diagrams, component part lists, descriptions, calibration instructions, or other information that will assist service personnel to repair those part of the device that are designated by MIR as repairable by service personnel.

## 2. FUNCTIONING OF THE MiniSpir Light

### 2.1 Connection to PC

**WARNING** 

**Before connecting MiniSpir Light to a PC, the winspiroLIGHT software must be installed on the PC in order to interface it with the device.**

To connect the device to the PC, it is sufficient to connect the standard USB socket of the device to one of the USB ports of the PC.

When initially making a connection, the PC will, either make an automatic driver installation or request some information. To avoid errors in this phase please read the winspiroLIGHT User Manual very carefully.

To control the proper connection between the device and the PC check that the led on the device is lit.

### 2.2 Using the MiniSpir Light

For correct use of the device and for setup of data required for the interpretation of the results (initial setup, turbine calibration, patient data management, viewing previous data and interpretation of results) see the winspiroLIGHT software manual.

### 2.3 Spirometry Testing

**WARNING** 

**The device must only be used by qualified personnel with complete knowledge of spirometry; this is important for the correct execution of the tests, for the acceptability of measured parameters as well as for the correct interpretation of results.**

For correctly carrying out a spirometry test, it is strongly recommended to carefully follow the instructions as described below.

- Fit the nose clip onto the nose of the subject to ensure that air cannot escape through the nostrils.
- Hold **MiniSpir Light** in one hand as you would a cell phone. The side with the **ID** label should be in the hand of the user.
- Insert the mouthpiece well into the mouth beyond the teeth, being carefully to ensure that air cannot escape from the sides of the mouth.
- It is suggested to make testing in a standing position and during an expiration lean forward, in order to help the expiratory action with a compression of the abdomen.

#### WARNING

**Do not touch the USB cable during a test to avoid interfering with the transfer of data to the PC or stopping a test too soon.**  
**Please note it is indispensable for an accurate spirometry that all air must be expired from lungs. It is important to stress that the turbine must be changed at the end of each test.**

After 6 seconds from the initial forced expiratory **MiniSpir Light** emits a continuous beep. This is useful to the doctor to understand if the patient has reached the minimum expiry time pursuant to the requirements as set forth by the major international associations of pneumology.

## 2.4 Spirometry test interpretation

The interpretation of these indices %, according to the ATS standards, generates a series of messages which correspond to possible levels of obstruction or restriction plus one level of normal spirometry, as shown in the following table:

- normal
- mild
- moderate
- moderately severe
- severe
- very severe

Through an analysis applied to some of the indices and parameters calculated in the FVC test, **MiniSpir Light** produces a variety of **quality control comments** useful to understand the reliability of the test made.

This control quality check assigns a letter for the current session as described below:

#### PRE Test

A = At least two acceptable manoeuvres, with the highest two FEV1 values matching to within 100 mL and the largest two FEV6 values within 100 mL.

B= At least two acceptable manoeuvres, with the FEV1 values matching to within 101 to 150 mL

C= At least two acceptable manoeuvres, with FEV1 values matching to within 151 to 200 mL

D= only one acceptable manoeuvres, or more than one, but the FEV1 values not matching to within 200 mL (with no interpretation).

F= No acceptable manoeuvres (with no interpretation).

#### POST Test

A = two acceptable (1) FEV1 values matching within 100 mL

B= two acceptable (1) FEV1 values matching within 200 mL

C= two acceptable (1) FEV1 values that do not match within 200 mL

D= only one acceptable (1) FEV1 manoeuvre

F= No acceptable (1) FEV1 manoeuvres

Acceptable manoeuvre means: good start and satisfactory exhalation (duration and flow)

Where several *comments* related to the single test are calculated, **MiniSpir Light** will only show the most important to facilitate the test interpretation.

#### ERROR IN Vext and PEF

If the extrapolated volume Vext is greater than 500 mL or greater than 5% of the FVC, or if the PEFT (time to peak flow) is greater than 200 ms, then the following comment is shown:

#### REPEAT TEST AND BLOW FASTER FET error

If FET is less than the minimum (6 seconds) the message appears:

**EXPIRY TIME INSUFFICIENT <6s**

#### FLOW ERROR

If the last flow point of the F/V curve is greater than 200 mL/s, this indicates that the expiration was not complete and thus the following comment is shown:

## BLOW OUT ALL AIR IN LUNGS

Between two tests, **MiniSpir Light** evaluates the repeatability of the following parameters:

If FVC is > 1.0 L then:

FEV1 repeatable when the difference between the two largest FEV1 is ≤ 150 mL;

FVC repeatable when the difference between the two largest FVC is ≤ 150 mL;

if FVC is ≤ 1.0 L then:

FEV1 repeatable when the difference between the two largest FEV1 is ≤ 100 mL;

FVC repeatable when the difference between the two largest FVC is ≤ 100 mL;

### 3. DATA TRANSMISSION

#### WARNING

**Read the instructions carefully before starting the transmission of data taking due care in ensuring that all the information has been properly understood.**

#### 3.1 Transmission with USB cable

All data in the **MiniSpir Light** is transferred through a USB cable connection. Refer to Paragraph 2.1 of this Manual to connect the device to a PC. The data measured by **MiniSpir Light** during a spirometry test are sent to the PC in digital form and managed by the winspiroLIGHT software.

#### WARNING

**Do not disconnect MiniSpir Light from the PC during a test. Before to disconnect MiniSpir Light from the PC close winspiroLIGHT software. To disconnect MiniSpir Light remove the USB cable from the PC connector. For more details read the winspiroLIGHT user manual.**

#### 3.2 Upgrade Internal software

**MiniSpir Light** software can be upgraded when connected to a PC via USB. Upgrades can be downloaded by registering on [www.spirometry.com](http://www.spirometry.com). For further information on upgrading software see the winspiroLIGHT software manual.

### 4. MAINTENANCE

#### WARNING

**No part can be subjected to maintenance during use.**

**MiniSpir Light** is an instrument that requires very limited maintenance. The only operations to perform periodically is the

- Changing the single-patient disposable turbine at each test

The maintenance operations set forth in the User's Manual must be carried out carefully. Failing to observe the instructions contained in the manual may cause errors in measurement or in the interpretation of measured values.

Modifications, adjustments, repairs, and reconfiguration must be carried out by the manufacturer or authorised persons.

In case problems arise do not attempt to personally repair the unit.

The setting of configuration parameters must be carried out by qualified personnel. In any case the risks pertaining to incorrect settings do not constitute a hazard for the patient.

### 5. PROBLEM SOLVING

PROBLEM	MESSAGE	POSSIBLE CAUSES	REMEDY
<b>MiniSpir Light does not connect with the PC</b>	\	The USB cable is not correctly connected	Check the correct connection of the USB cable side PC and side device.
	\	The driver doesn't work correctly	Check the presence of the device in the list of USB devices connected. Try to remove and connect the device.
<b>Spirometry data at the end of the test are not acceptable</b>	\	The turbine don't rotate correctly	use a new turbine
	\	The test is performed in a wrong way	Repeat the test following the indications on the screen

## LIMITED WARRANTY CONDITIONS

**MiniSpir Light**, together with its standard accessories is guaranteed for a period of 12 months if intended for professional use (doctors, hospitals, etc.).

The warranty is effective from the date of purchase contained in the relevant sales invoice or proof of purchase.

The instrument must be checked at the time of purchase, or upon delivery, and any claims must be made immediately in writing to the manufacturer.

This warranty covers the repair or the replacement (at the discretion of the manufacturer) of the product or of the defective parts without charge for the parts or for the labour.

All batteries and other consumable parts are specifically excluded from the terms of this guarantee.

This warranty is not valid, at the discretion of the manufacturer, in the following cases:

- If the fault is due to an improper installation or operation of the machine, or if the installation does not conform to the current safety norms in the country of installation.
- If the product is utilised differently from the use described in the Users Manual.
- If any alteration, adjustment, modification or repair has been carried out by personnel not authorised by MIR.
- If the fault is caused by lack of or incorrect routine maintenance of the machine.
- If the machine has been dropped, damaged or subjected to physical or electrical stress.
- If the fault is caused by the mains or by another product to which the instrument has been connected.
- If the serial number of the instrument is missing, tampered with and/or not clearly legible.

The repair or replacement described in this warranty is supplied for goods returned at the customers' expense to our certified service centres. For details of these centres please contact your local supplier of the spirometer or contact the manufacturer directly.

The customer is responsible for the transportation and for all transport and customs charges as well as for delivery charges of the goods both to and from the service centre.

Any instrument or accessory returned must be accompanied by a clear and detailed explanation of the defect or problem found. If units are to be returned to the manufacturer then written or verbal permission must be received before any instruments are returned to MIR.

MIR Medical International Research, reserves the right to modify the instrument if required, and a description of any modification made will be sent along with the returned goods.