

**User Manual**



User Manual Rev. 2.0

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

The original packaging contains the device with the followings accessories:

<b>Accessories market with spirobank G</b>	<b>Code</b>
spirobank G bag	672690
spirobank G device	910575
spirobank G User Manual	980205
USB connection cable	532365
1 x 9V battery mod. 6LR61-PP3	970095
CD winspiroPRO	920100
1 Nose clip	910320
3 Paper mouthpieces*	910300
3 disposable turbine sensors*	910001
1 Reusable turbine sensor	910002

\* **accessories for single use only; all other accessories are reusable**

#### **Before using your spirobank G ...**

- Read this manual carefully, plus all labels and other product information supplied.
- If not fitted, install the operating battery taking care to connect the “+” and “-” battery poles correctly, as shown in the battery compartment.
- Set the device configuration as required (date, time, predicted values, device language etc.) as described in Paragraph 2.4.

#### **WARNING**

**The winspiroPRO PC software supplied with the device MUST be installed correctly to the PC before connecting spirobank G 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 winspiroPRO 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 manufacturer.

In this case, 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:

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**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 instructions contained in this Manual and/or due to an incorrect use of the product.**

**Note that due to printing limitations the screenshots shown in this manual may differ from the display of the machine and/or from the keyboard icons.**

**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**

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## 1. INTRODUCTION

### 1.1 Intended Use

Indications for Use: The Spirobank G spirometer is intended to be used by a physician or by a patient under the instruction of a physician or paramedic.

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 any setting.

#### 1.1.1 User Category

The **spirobank G** spirometer calculates a series of parameters relating to human respiratory function.

Typically the doctor “prescribes” a spirometry test and is responsible for analysing and controlling the results obtained.

#### 1.1.2 Ability and experience required

The correct use of the device, the interpretation of the results and the maintenance of the device all require qualified personnel. In the event that the device is operated by the patient, then sufficient training must first be given to the patient by the doctor or by the trained paramedic under the supervision of the doctor.

### 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.**

**If the user of the device is a person considered to be cognitively impaired, then the operation of the device must be made under the supervision and responsibility of whoever is legally charged with the supervision of this person.**

#### 1.1.3 Operating environment

**spirobank G** has been designed for use in a doctor’s office, in a hospital or directly by the patient during day-to-day activities for the monitoring of physical conditions. All information necessary for the proper use of the device in electromagnetic environments (as required by the EN 60601-1-2 Standard) is available from the manufacturer.

Used at home, at work, at school or during sports, day by day the device records data and functional respiratory parameters for a period of weeks or months, assisting the patient in making a better assessment of his own health.

The procedures for using the device at home are described according to the type of test to be made; the display will show all instructions (messages, suggestions etc.) step-by-step, which allows the subject to correctly perform tests and obtain correct results, to be analysed by the doctor.

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 and/or the doctor are responsible for ensuring that the device is stored and used in appropriate environmental conditions; in this regard reference is made to the specifics described in paragraph 1.6.3 below.

**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. Normally the doctor configures the instrument before giving it to the patient for use at home.

#### **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 suitable testing conditions. 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.

Any symptoms that the subject has at the time of the test must be carefully considered before a spirometry test is made. The user is responsible to assess both the mental and the physical capacity of the subject in order to make a correct test, and the user, in the evaluation of test results, must also assess the degree of collaboration of each test carried out.

A spirometry test requires the full 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 handicapped people.

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

**spirobank G** has been examined by an independent laboratory which has certified the conformity of the device to the European Safety Standards EN 601-1 and guarantees the EMC Requirements within the limits laid down in the European Standard EN 60601-1-2.

**spirobank G** is continually controlled during its production and therefore the product conforms to the established security levels 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, return it to the manufacturer for repair.

### 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 correctly to follow these instructions.**

**The device must be used only and exclusively as a spirometer following the indications given by the manufacturer with particular attention to the paragraph on INTENDED USE, and utilizing only original spare parts and accessories. Use of non-original parts such as the turbine flow sensor or other accessories may cause errors in measurement and/or compromise the correct functioning of the device, and is therefore not permitted.**

**The device should not be used beyond the declared life span. The life span is strictly related to the life of the internal lithium backup battery (CR2032) and in normal conditions this should be around 10 years. The device constantly monitors the state of charge of this battery and a message informs the user when the battery is discharged. Contact Technical Service to have this battery changed.**

**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, this procedure is laid down in Article.9 of the European Regulations No. 46/1997, which implemented the EC Directive No. 93/42.**

### 1.2.1 Danger of cross-contamination

Two different types of turbine sensors can be used with the device, one is reusable and one is single-patient disposable. A disposable mouthpiece is required in order to connect a subject to the spirometer. In order to avoid exposing the subject to the critical danger of cross-contamination, the reusable flow sensor must always be cleaned before each spirometry test, and a new disposable mouthpiece must always be used for each subject. The use of an anti-bacterial filter is at the discretion of the doctor. If a single-patient disposable turbine is used, then a new one must be used for each patient.

### 1.2.2 Turbine

#### WARNING





Disposable turbine

If you are going to perform the spirometry test with a disposable turbine it is important to use a new turbine for each new patient. The characteristics, accuracy and the hygiene of the disposable turbine can only be guaranteed if it has been conserved beforehand in its original sealed packaging. The disposable turbine is made of plastic and its disposal after use should adhere to the local regulations and norms in force.



Reusable turbine

The correct functioning of the re-usable turbine can only be guaranteed if it has been cleaned in the correct manner and is free from foreign bodies which could alter its movement. If the turbine has not been cleaned sufficiently this could cause cross-contamination from one patient to another. Periodic cleaning should only be done when the instrument is for personal use and will only be used by one patient. The cleaning of the turbine should be performed according to the instructions contained in the User's Manual.

The following information applies to both turbine models.

The turbine must never be held under a jet of water or air and must never come into contact with high temperature fluids.

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.

### 1.2.3 Mouthpiece

Any disposable mouthpieces included with the device are supplied only as a guide to the correct type and dimensions of the mouthpiece required for this device, they are clean but not sterile. To purchase appropriate mouthpieces, generally either paper or plastic, but in any case single use/disposable, we suggest that you contact your local distributor who supplied the spirometer.

#### WARNING

**Use a bio-compatible mouthpiece to avoid any problems to the patient; unsuitable materials could cause a bad functioning of the instrument, and therefore the test results could be incorrect.**

The user is responsible for obtaining the correct type of mouthpieces for the device. Those required are a standard type with an outside diameter of 30 mm, they are commonly used and in general easily procured.

**To avoid environmental contamination caused by the disposal of used mouthpieces, the user must follow all the relevant local regulations.**

#### 1.2.4 Device

#### WARNING

The maintenance operations detailed in this manual must be fully and accurately carried out. 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. 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.

High-frequency emissions from “electronic” devices may interfere with the correct operation of the instrument. For this reason, certain minimum clearances (a few metres) should be observed when high-frequency appliances such as a TV, radio, portable phone, etc. and other electronic units are operated at the same time in the same room.

The instrument may give inaccurate readings if operated in the presence of strong electromagnetic sources, such as electrosurgical equipment, or in the presence of computed tomography (CT) equipment.

If the PC and/or the printer connected to spirobank G come into contact with the area containing patient data, ref. directive EN 60601-1-1, it is necessary that they conform to the directive EN 60601-1.

For the recycling of the spirobank G, the accessories, any plastic consumable materials (mouthpieces) as well as the battery, use only the appropriate containers or return all such parts to the dealer or to a recycling centre. 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.

Use only the battery type indicated in the § Technical specifications.

Remove the battery from the device if it is not used for a long period (several months).

The instrument may be powered through a PC by a USB cable. By this means, the device works both on line with the PC, or individually powered by the PC.

Keep the device out of reach of children and of any person with mental handicap.

#### 1.3 Unforeseen errors

In case device internal memory data are damaged, when the device is switched on, the following message appears:

**Error on RAM memory**  
**Recovery data**  
**Please wait**

If data have been successfully recovered, the device completes the standard switch on process, otherwise please contact an authorised technical assistance point or the manufacturer.

In the case of a problem with the device, a message indicating the nature of the problem will appear on the screen, together with a warning “beep”.

Operation of the device beyond its declared life (see § 1.6 Technical Specifications) could provoke a loss of data in the memory of the device (SRAM memory).

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 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

SN A23-048.00000  
REF **spirobank G**  
**MIR** via del Maggiolino 125  
00155 Roma, Italy  
    
**0476 Rx ONLY**  
FCC ID:TUKMIR024

The label shows:

- Serial number of the device
- Product name
- Name and address of the manufacturer
- CE mark in compliance with the Directive 93/42 EEC.
- Electrical safety symbol
- Warning symbol for the WEEE
- prescription use label
- indication about FCC

### 1.4.2 CE mark for medical devices

 **0476**

This product is certified to conform to the Class II requirements of the 93/42/EEC medical device directive.

#### 1.4.3 Electrical safety symbol



In accordance with the **IEC 60601-1** Standard, this product and its component parts are of **type BF** and therefore protected against the dangers of direct and indirect contact with electricity.

#### 1.4.4 Warning symbol for the USB port



For connection to other devices such as PC.

Use only the serial cable supplied by the manufacturer and observe the safety regulations of **IEC 60601-1-1**.

#### 1.4.5 Warning symbol for the WEEE



As laid down in the European Directive 2002/96/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 centre, 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.

#### 1.4.6 FCC Warnings

This device 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.

**CAUTION** 

**Exposure to Radio Frequency Radiation**  
**This device must not be co-located or operating in conjunction with any other antenna or transmitter.**

Labels and symbols are displayed on the device like shown in the following images:



**1.4.7 Product description**

**spirobank G** is a pocket spirometer. It can operate in stand alone mode and it can be connected to a PC or to a printer using any one of several available methods: USB, Bluetooth.



**spirobank G** is specifically designed to measure a range of respiratory parameters. A quality control check is carried out internally on the measured parameters and the device has an internal memory sufficient for over 6000 spirometry tests.

**spirobank G** is a powerful and compact measurement device, intended for use by a respiratory specialist or by a suitably trained generalist. The spirometer calculates up to 30 functional respiratory parameters providing the pharmacodynamic effects, i.e. the data 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 flow and volume measurement sensor is a digital turbine, based on the infrared interruption principle. This principle ensures the accuracy and the reproducibility of the measurements, without requiring a periodic calibration.

The features of this kind of sensor are listed below:

- Accurate measurement even at very low flow rates (end of expiration)
- Not influenced by gas humidity nor density
- Shockproof and unbreakable
- Inexpensive to replace.

The turbine flow measurement sensor is available both in reusable and in single-patient disposable versions.



**REUSEABLE TURBINE**



**DISPOSABLE TURBINE**

The following precautions must be observed to ensure that the characteristics of the turbine remain unaltered over time:

- for the disposable turbine: must always be substituted between patients.
- for the reusable turbine: always clean the turbine between patients, to ensure the maximum level of hygiene and safety for the patient.

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.

**spirobank G** can also be connected to a PC (or to another computerised system) to configure the system. All spirometric test results plus the related subject details stored inside the device can be transferred from the device to the PC and then viewed on the PC (Flow/volume curves, spirometry parameters).

The connection to the PC is made through the USB port or the Bluetooth.

**spirobank G** gives an automatic interpretation of each spirometry test carried out, and assigns a "traffic light" feedback (green, yellow or red) for a rapid reading of the interpretation.

**spirobank G** is able to make FVC, VC, MVV and breathing profile tests, and calculates an index of test acceptability (quality control) plus the 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.

The device has two batteries:

- Main power: 9V battery (1 battery is required)
- Memory back up: lithium battery type CR2032 of 3V. The battery life is about 10 years, depending on the use of the device

## 1.5 Technical specifications

A comprehensive description of the main features of the device, the flow and volume measurement turbine follows:

### 1.5.1 Features of the spirometer

#### Measured parameters:

SYMBOL	DESCRIPTION	Units
*FVC	Best FVC	L
*FEV1	Best FEV1	L
*PEF	Best PEF	L/s
FVC	Forced Vital Capacity	L
FEV1	Volume expired in the 1 <sup>st</sup> second of the test	L
FEV1/FVC	FEV1/FVC x 100	%
FEV1/VC	FEV1 / best between EVC and IVC x 100	%
PEF	Peak expiratory flow	L/s
FEF2575	Average flow between 25% and 75% of the FVC	L/s
FEF25	Forced Expiratory Flow at 25% of FVC	L/s
FEF50	Forced Expiratory Flow at 50% of FVC	L/s
FEF75	Forced Expiratory Flow at 75% of FVC	L/s
FEV3	Volume expired in the initial 3 seconds of the test	L
FEV3/FVC	FEV3/FVC x 100	%
FEV6	Volume expired in the initial 6 seconds of the test	L
FEV6%	FEV1/FEV6 x 100	%
FET	Forced expiratory time	s
EVol	Extrapolated volume	mL
FIVC	Forced inspiratory volume	L
FIV1	Volume inspired in the 1 <sup>st</sup> second of the test	L
FIV1/FIVC	FIV 1 %	%
PIF	Peak inspiratory flow	L/s
MVVcal	Maximum voluntary ventilation calculated on FEV1	L/s
VC	Slow vital capacity (expiratory)	L
EVC	Slow expiratory vital capacity	L
IVC	Slow inspiratory vital capacity	L
IC	Inspiratory capacity (max between EVC and IVC - ERV)	L

ERV	Expiratory reserve volume	L
TV	Tidal volume	L
VE	Ventilation per minute, at rest	L/min
RR	Respiratory frequency	Breath/min
t <sub>i</sub>	Average time of inspiration, at rest	s
t <sub>E</sub>	Average time of expiration, at rest	s
TV/t <sub>i</sub>	Average flow of inspiration, at rest	L/min
t <sub>i</sub> /T <sub>tot</sub>	$t_E/(t_i+t_E)$	\
MVV	Maximum voluntary ventilation	L/min
ELA	Estimated lung age	year

\* = best values

<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</b>	± 3% 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/L/s

### 1.5.2 Other features

<b>Memory</b>	Memory capacity for over 6000 spirometric tests The precise number depends on the individual configuration, so it cannot be determined more closely
<b>Display</b>	graphic LCD type SFTN, 128x48 Pixel
<b>Keyboard</b>	Membrane keyboard with 5 keys
<b>Interface</b>	USB, Bluetooth
<b>Duration of the CR2032 3V lithium battery (memory backup)</b>	Circa 10 years, under normal conditions of use
<b>Power supply</b>	1 battery 9V DC (type PP3), or through USB connection
<b>Dimensions</b>	162x49x34 mm
<b>Weight</b>	160 grams (including battery)
<b>Type of electrical protection</b>	Class II device
<b>Type of electrical protection</b>	BF
<b>Grade of protection against water ingress</b>	IPX1 device, protected against water drops
<b>Safety level in the presence of inflammable anaesthetic gas, oxygen or nitrogen</b>	Device not suitable
<b>Conditions of use</b>	Device for continuous use
<b>Storage conditions</b>	Temperature: MIN -20 °C, MAX + 60 °C

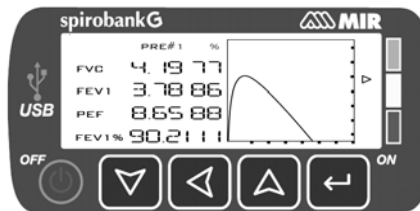


<b>Operating conditions</b>	Humidity :MIN 10% RH; MAX 95%RH
	Temperature: MIN + 10 °C, MAX + 40 °C; Humidity: MIN 10% RH; MAX 95%RH
<b>Applied norms</b>	Electrical Safety Standard IEC 60601-1 Electro Magnetic Compatibility IEC 60601-1-2

## 2. FUNCTIONING OF THE SPIROBANK G

### 2.1 Keyboard

The **spirobank G** keyboard is composed of 5 keys:



Key functions are as followed:

1		Off
2		esc/ok previous page OSD key
3		Scroll left OSD key
4		Scroll up OSD key
5		On/Scroll down OSD key

#### Switching on spirobank G

To switch on **spirobank G** press and then release.














#### Switching off spirobank G









To switch off **spirobank G** press for at least two seconds.

**CONFIRM:** to confirm and pass to the next phase, use or


#### Symbols and Icons


The icons used in the various function screens and their meanings are shown in the following table:

ICON	DESCRIPTION
	To access the set up (Service Menu) of <b>spirobank G</b>
	To manage or enter new patient data from the main screen
	To enter new patient data
POST BD	To carry out a bronchodilator test
	To make the test following the administration of a bronchodilator
ABCD	To modify data of the current subject
TEST	To carry out a spirometry test
	To access to the previous tests
	To access to transmission data area
<b>M</b>	To search for tests made
	Visualize tests for current subject
	To view best test of the current subject
	To view the second best test of the current subject
	To view the third best test of the current subject
ID #	To search test by subject ID code
././.	To search test from date and onwards (partial memory)
▽△	To scroll through files on memory
	To select male patient
	To select female patient
	To carry out an FVC test
VC MVV	To carry out a VC or MVV test

	To carry out a VC test
	To carry out an MVV test
	To display previous tests in memory
	To display next test in memory
	Visualize data for a test in archive
	To print data in memory (through Bluetooth connection)
	To transfer data through a Bluetooth connection
	To exit from the selected screen and return to the main screen

**WARNING** 

IF no key is pressed the instrument after 1 minute will 'beep' and if no key is pressed after a further 10 seconds it will automatically switch off. If spirobank G is powered by a USB connection to a PC, the aforementioned function is disabled and the device is switched off using .

The instrument can be switched off at any time by pressing and holding the  key.

## 2.2 Battery Level

The symbol




shown in the second screen when the unit is turned on indicates that the battery is charged. The following symbol indicates Low Battery:

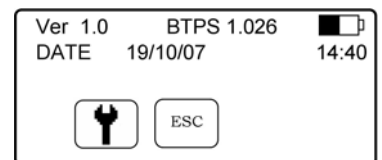




If the battery is discharged the following message appears:


**BATTERY DISCHARGED**

## 2.3 Information

Switch on **spirobank G** by pressing . The display will show:





- Version 1.0 (version of firmware ie internal software)
- Power source (USB or battery symbol)
- BTPS (Body Temperature Pressure Saturated)
- Current date and time
-  icon (Access to the Service Menu)
-  icon (Return to the main screen)

Press  to go to the second screen.

The second screen will show:

- ATS/ERS Standard
- Subjects in memory (no. of registered patients)
- Spiro (no. of spirometry tests made)
- Available memory (% value of free memory)

Standard	ATS/ERS	
Patients in memory		8
Spirometry test		17
		99%
MEMORY AVAILABLE		

If there is no information or test data in memory, i.e. the memory is empty, then all data is shown as 0 (null).



#### WARNING

**When the free memory is not sufficient to create a new record, the device shows the following message:**

**Archive full**

**It is not possible to create new patients until the archive is cancelled (see paragraph 2.4); download the test archive to the PC before proceeding.**

#### 2.4 Service menu

Switch on **spirobank G** by pressing and holding . Press  to access the service menu. The "Service Menu" screen contains the following fields:

- Select Language (English default)
- Turbine Calibration
- Select Predicted
- Delete Test Data
- Change Date/Time
- Date Format
- Units Format
- Select Turbine
- Select Standard

- Bluetooth Settings
- Info Firmware

Select the required option using  $\nabla$  or  $\triangle$  and the  $\blacktriangleright$  symbol on the left of the screen; press  $\leftarrow$  to access options; select the required setup using the  $\nabla$  or  $\triangle$ , then press  $\leftarrow$  to return to the Service Menu, press  $\triangleleft$  to return without modifications.

**Select Language**

Press  $\leftarrow$  to access the Menu, use  $\nabla$  or  $\triangle$  to select the required language and press  $\leftarrow$  to save the change and return to the Service Menu.

**Turbine Calibration**

Insert the following password to access the calibration function:



For the correct use of this function, please see Paragraph 2.4.1.

**Select Predicted Values**

Enter Menu with  $\leftarrow$ , then use  $\nabla$  or  $\triangle$  to select the required value and press  $\leftarrow$  again to return to the Service Menu.

Adult	Paediatric
ERS	Knudson
Knudson	Knudson
USA	Knudson
ERS	Zapletal
MC-Barcelona	Zapletal

**Delete Memory**

Enter Menu with  $\leftarrow$ , then enter the password



if the password inserted in correct, the following message appears:

**Test data has been cancelled**





**Change Date/Time**

In the date and time setting, the  $\blacktriangleleft$  arrow indicates the field to modify. Use  $\nabla$  or  $\triangle$  to modify the selected option; use  $\leftarrow$  to pass to the the following option. Lastly, press  $\leftarrow$  to return to the Service Menu. To return to the Service Menu display without making any changes press  $\triangleleft$ .





**Date Format**

Use  $\nabla$  or  $\triangle$  to select the required format and  $\leftarrow$  to enter and return to the Service Menu.





**Units Format**

Access with  and select imperial or metric as required with  or . Press  again to return to the Service Menu.

#### **Turbine Setup**

Access with  and select the turbine in use (disposable or reusable) with  or . Press  again to return to the Service Menu.








#### **Select Standard**

Access with  and select the required standard using  or . Press  to return to the Service Menu.

#### **WARNING**

**With the standard NAHNES III is not possible to select or to modify the predicted values.**

#### **Bluetooth Setting**

Access with  to search for available devices, select "Search Device" and then press ; **spirobank G** will start to search for Bluetooth devices in the area; when one or more devices are found the screen will display the names of the device(s) found, press  to set the device as printer or PC-Online, select one of the two options and then press . On the "Bluetooth Setup" screen all devices entered on the "printer list" and on the "PC-Online list" can be checked. A device can be set as default by accessing the list with  and then selecting the device, (to which **spirobank G** will automatically connect) or deleted from the list (press  on the bottom to confirm the deletion, or  to go back and to **not** delete the device).


#### **WARNING**


**To connect the instrument to a PC via Bluetooth key (PC-Online function) the key must first be setup as the default device in the list PC Online. In this case the instrument will function in the "Device" mode.  
When connected to a printer the instrument is set up as "Master".**

#### **Info Firmware**

Access through  to view the version number of the following components, where available:






- **spirobank G**
- Bluetooth

After approximately 10 seconds **spirobank G** automatically displays the Service Menu, otherwise press .


Having set the parameters as required from the Service Menu press  to access the second screen, and then the following is shown:

Which indicates:

- Patient ID code\* and ethnic group
- Birth date (dd/mm/yyyy)
- Height (cm)
- Weight (kg)
- Sex (S)
- Function icons\*\*

ID#: 0014		CAUCASIAN		
Birth date	cm	Kg	S	
04 /11 / 1967	182	70		
				VC MVV

\* the ID code is created automatically when new patient data is entered and is progressive.

\*\* the icon "VC-MVV" is not shown when the standard NAHNES III is selected. The symbol  is shown only in the POST phase.


### 2.4.1 Turbine Calibration


#### WARNING

**The turbine flow sensor does not require calibration but needs only a regular cleaning. If a calibration must be made then the following guidelines should be carefully noted.  
Calibration can be made only on the reusable turbine.**

Calibration of the turbine is performed using a calibration syringe to make an FVC test for the expired parameters and an FIVC test for the inspired parameters.




Before the calibration procedure, make a FVC test using a calibration syringe (for example 3 litres) and it is vital to make a complete expiratory and inspiratory phase.

To access the calibration function, select "Turbine Calibration" from the Service Menu with the horizontal scroll key and then press . The following screen appears:

SYRINGE	FVC	FIVC
300 	308	333
	0%	0%
FOR FACTORY CALIBRATION INSERT FVC = 0		


The Old FVC and the Old FIVC values now shown are from the previous calibration.

The values in % indicate the correction factor. These are pre-set to 0 by default.

Use  or  to set the desired values, use  to go to the following value.

If the difference in percentage between the expected value and the measured value is greater than 10% then it is not possible to continue the calibration procedure, this means that the turbine is damaged or requires cleaning.

To clarify: using a 3 litres syringe, the expected FVC value is 3.08 L, the expected FIVC instead is in function of the ambient temperature.

Press  to turn to the service menu without applying any calibration factor.

If % FVC and FIVC are more than 10%, the device cannot correct such a value; in this case:

- Check the correct functioning of the **spirobank G** with a new turbine and/or
- Clean the turbine.

To erase the calibration in use and reset to the factory calibration, input 0 in the New FVC and New FIVC fields.

#### Note

Each time a calibration is made, the new correction factors are added to the previous correction factor. Therefore, before making a new calibration make sure to delete the calibration in use as described above.  
For an accurate and reliable calibration, the syringe volume must be at least 3 L.

#### WARNING

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 spirobank G 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.




## 2.5 Subject Data








Switch on **spirobank G** by pressing , or if already switched on, press  ( icon); to access the "PATIENT DATA MANAGEMENT" screen, the following table describes the functions and icons.

Icon	Key	Description
		To enter new patient data
ESC		Go to the main screen
		To modify data of current subject
POST BD		To make a bronchodilator test (i.e. make a test after drug administration with defined dosage; to carry out this test, a base PRE test is required, i.e. a test without drugs assumption)

### To enter new patient data

From the "Patient Data Management" menu press  to access the data input screen.

### First screen (date of birth, weight, height, sex)

Use  or  to select date of birth, use  to set month, repeat to set year; continue setting data by entering patient height, weight and sex using the same  key. The arrow  shown to the right of the field indicates the numerical value that is being changed. After this operation use  to go to the following screen; or  to return to the previous data.

### Second screen (ethnic group)



Set an ethnic group: this function allows the correction of the predicted values for a subject with the ethnic group to which he or she belongs. The function "without correction" can also be used.

ATS/ERS Standard		NAHNES III Standard
Group	% correc.	
Without correction	100%	Caucasian
Caucasian	100%	African-American
Oriental	100%	Mexican-American
Hong Kong Chinese	100%	Others
Japanese	89%	
Polynesian	90%	
North Indian	90%	
South Indian	87%	
Pakistan	90%	
African Descent	87%	

For ATS/ERS standards, the correction is applied to the predicted values of the following parameters:

FVC, FEV1, FEV3, FEV6, VC



For NAHNES III standards, the correction is based on several theoretical formulas (as described in the publication).

press  to complete the setting of the parameters, the main screen then appears. In the event of an error during the setting of patient data press  to return to the previous screen.

To interrupt data input press , which then goes back to the main screen.






Once the patient data is set then the ID code appears in the upper left of the main screen; this code is associated to the new subject.

### Modifying patient data



In the "Patient Data Management" menu press  which corresponds to the  icon. Modify data in the following screens by using the keys as described for entering new patient data.







To return to the main screen without changing any data press .


### POST BD Test

Use  to set the spirometry test in "post" mode, i.e. after bronchodilation. On the next screen use  to select either a PRE or POST test, using respectively  or . Once entered, the  icon will appear on the upper right of the main screen for POST testing of the subject. For more information about the POST test, please see paragraph 2.8.7.

### 2.6 Displaying data from memory

From the main screen press  ( icon), to check data of the relevant patient or to search for another patient's data; the following options are available:

KEY	ICON	FUNCTION
		To send the last spirometry test to a printer
	ESC	To return to the main screen
		Display the last spirometry tests of the selected patient
	<b>M</b>	Access data in memory

Enter the search menu () to display data based on four different methods:

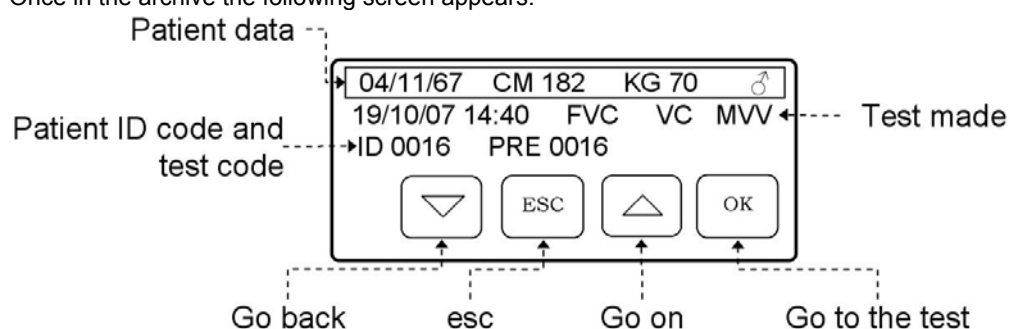
KEY	ICON	FUNCTION
▽	ID #	Search by ID Code
◀	ESC	Return to the main screen
▲	././.	Display files from a date onwards (partial memory)
↶	▽△	Display files from beginning to end (complete memory)

**Search by ID Code:** enter the ID Code of the patient required then ↶ to access the data.

**Search for date:** enter test date of the required file; then press ↶ to access test data. The data will be shown starting from the date entered up to the most recent file in memory.

**Full Memory:** to show test data in alphabetical order. The last data are marked by a double beep, then the data shown restarts from the first one recorded.

Press ◀ to return to the main screen without searching. Once in the archive the following screen appears:



**WARNING** ⚠

The ID code is automatically associated by the device when the patient data are entered; the test code is like the patient ID for the first test made on the patient. The following tests on the same patient are then identified sequentially.

To show data of the selected test press ↶ twice

Choosing a test with ↶ (OK icon) the following screen appears:



At this stage it is possible to:

- Print selected test data via the Bluetooth connection by pressing ( icon);
- Scroll through the list of data in memory pressing ( icon)
- Show all results of the selected test, pressing ( icon) and then using and or to return to the main screen;
- Make a new test on the selected subject pressing ( icon); a new screen is shown with the following message:

Press OK to make NEW Test on the selected subject

Press to confirm, otherwise to return to the list of data in memory;

## 2.7 Online operating mode (connected to a PC)

This operating mode is comparable to a laboratory spirometer, connected to a PC the device operates in real time. Connect the unit to a PC using the USB cable or the Bluetooth system. **spirobank G** thus acts as an intelligent sensor for flow and volume measurement while the PC controls its functions, including the switching on and off of the unit.

Connected to a portable PC, **spirobank G** can carry out epidemiologic studies in work environments, school settings etc.

The PC software also allows the latest bronchial challenge test protocols, with the graph of the FEV1 dose-response and time-response curves.

The Bluetooth connection allows for real time spirometry testing and downloading of test results to a PC. To enable this connection the winspiroPRO software must be setup to run with the RS 232 serial connection.

### WARNING

**Note that when using spirobank G in online mode, if a turbine (disposable or reusable) is setup then the same turbine will remain by default the next time the device is used in stand-alone mode. Thus pay attention to the setting of the turbine.**

## 2.8 Spirometry Testing

To make a correct spirometry test we recommend to follow carefully the following instructions:

- Insert the mouthpiece into the protruding part of the turbine, by at least 0.5 cm;
- Fit the nose clip onto the nose of the subject to ensure that air cannot escape through the nostrils;
- Hold **spirobank G** at either end in two hands. The display should be facing the user;
- Insert the mouthpiece well into the mouth beyond the teeth, being careful 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 to lean forward, to help the expiratory action with a compression of the abdomen.

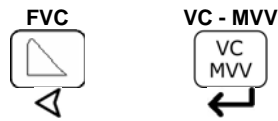
**WARNING** ⚠


**Do not touch the keys during a test to avoid switching off the machine or stopping a test too soon.**


The tests available with **spirobank G** are:

FVC    Forced Vital Capacity  
 VC     Slow Vital Capacity  
 MVV    Maximum Voluntary Ventilation

On the main screen, select as follows:




Press  to access the FVC test.

Press  to access a new screen and then select either VC or MVV:



The device displays the information regarding the turbine selected in the initial setting (reusable or single-patient disposable), and then the relevant test information follows.

Or press  to turn to the main screen.

**WARNING** ⚠

**With standard NAHNES III it is not possible to make VC or MVV tests**

**WARNING** ⚠

**A test is always memorised together with the details of the current patient. To make a test on a patient previously inserted then you must firstly recall the patient from the memory, see the final part of paragraph 2.6 for details.**

### 2.8.1 FVC Test

The phases as described on the screen must be followed, specifically:

EXPIRE quickly  
INSPIRE slowly

It is possible (and may be helpful) to start the test by breathing for a few moments at rest. When ready to start *inspire slowly as much air as possible* (made easier by holding arms wide apart) and then *make a complete expiration as fast as possible*. Then with the mouthpiece still held firmly in the mouth, complete the cycle by inspiring again as quickly as possible. This final inspiration may be left out if the inspiratory parameters (FVC, FIV1, FIV1%, PIF) are not of interest.

The optional initial inspiration phase can also be performed before inserting the mouthpiece in the mouth.


After inspiring slowly and deeply, the following expiration must be made with the maximum effort by expiring all of the air as fast as possible.

After 6 seconds of expiration the instrument will emit a continuous beep, this helps the user to understand when the minimum expiry time has been reached.

#### WARNING

**For accurate spirometry testing it is indispensable that all of the air contained in the lungs is expired.**

The test may be repeated several times by repeating the cycle without taking the mouthpiece out of the mouth, in which case **spirobank G** recognises the best test (FVC+FEV1) and will automatically show the results of this best test.

At end of the test press  as shown on the screen.

During testing **spirobank G** emits "beeps", the frequency of which is directly proportional to the inspired and expired air velocity. This is useful to the doctor to understand when the velocity of the air is approaching zero, and therefore the patient has almost exhausted all of the inspired or expired volume.

In the maintenance section an explanation is given as to how this feature can also function as a very simple check system for the correct operation of the mobile "rotor" of the turbine.


For the FVC test to be judged as acceptable, besides breathing as deeply as possible, it is also required that the forced expiratory time (FET) is sufficiently long to allow for the complete expiration of all air contained in the lungs.

Six seconds from the start of the forced expiratory test, **spirobank G** emits a continuous beep. This is useful to the doctor to understand if the patient has reached the minimum expiry time, as per the requirements of the major international pneumology associations.

## 2.8.2 VC Test

### Ventilatory Profile

The Slow Vital Capacity test can be started by carrying out several complete breaths at rest. After three or four such breaths a *beep* will sound to confirm that the ventilatory profile has been measured and now you can proceed to carry out the VC or IVC test.

At end of the test press  as shown in the screen.

### Expiratory Slow Vital Capacity: VC

After the beep inspire slowly as much air as possible and then expire slowly as much air as possible.

### Inspiratory Slow Vital Capacity: IVC


After the beep expire slowly as much air as possible and then inspire slowly as much air as possible.

To end the test press .

To carry out this test correctly, follow the indications shown on the display.

## 2.8.3 MVV Test

Start the test by carrying out a series of forced inspirations and expirations with the maximum possible amplitude. The suggested frequency is 30 breaths/min.

The test will terminate automatically after 12 seconds. At end of the test press .

### WARNING

**It is important that the disposable mouthpiece and turbine are changed at the end of each test.**

## 2.8.4 Reading messages

A series of measured parameters, based on the international reference standards are shown at the end of each test. A series of test messages are displayed, followed by the measured parameters.

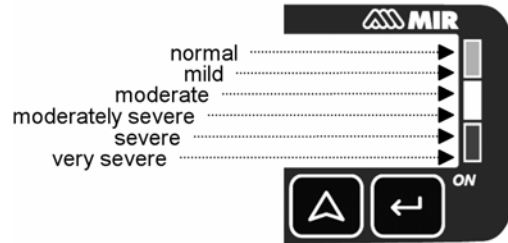
A description of these messages and the parameters now follow in the order in which they appear.

If no key is pressed for circa 6 seconds then the unit moves automatically to the next message or parameter.

## 2.8.5 Spirometry test interpretation

Spirometry test interpretation is based on the Forced Vital Capacity (FVC) test and is based on the ATS standard. For a faster comprehension this interpretation is illustrated by a traffic light code (green, yellow, red). For each test made, an arrow on the right of the screen indicates the worst level of interpretation of the test session.

The connection between the traffic light colour and the test interpretation is shown below:



Through an analysis applied to some of the indices and parameters calculated in the FVC test, **spirobank G** 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, **spirobank G** 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 300 ms, then the following comment is shown:

**INITIAL EXPIRATION TOO SLOW**

#### FET error

If FET is under the predicted threshold the following 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, **spirobank G** evaluates the repeatability of the following parameters:

PEF            repeatable when the difference between the two largest PEF is  $\leq 0.67$  L/s;  
VC             repeatable when the difference between the two largest VC is  $\leq 150$  mL;

If FVC is  $> 1.0$  L then:

FEV1          repeatable when the difference between the two largest FEV1 is  $\leq 150$  mL;  
FVC            repeatable when the difference between the two largest FVC is  $\leq 150$  mL;

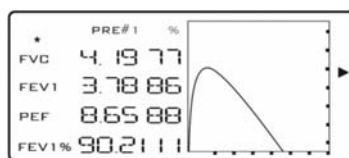
if FVC is  $\leq 1.0$  L then:

FEV1          repeatable when the difference between the two largest FEV1 is  $\leq 100$  mL;  
FVC            repeatable when the difference between the two largest FVC is  $\leq 100$  mL;

## 2.8.6 Viewing the spirometric parameters

### I° case: ATS/ERS standard

Following an FVC test, the spirometry test results are shown. The first screen displays the main parameters \*FVC, \*FEV1, \*PEF, \*FEV1%, the percentage of the predicted values (or of the PRE values in the case of a POST phase), the Flow/Volume curve plus a traffic light summary of the test interpretation (in the upper right), as illustrated below.



\*= best values

In case of "repeatability" a symbol ® is shown in the graphic area

The following screens show other values compared to the predicted values (or to the PRE values if is a POST phase).

Parameters shown:

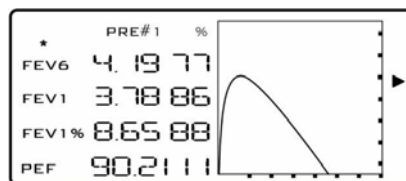
FVC, FEV1, FEV1/FVC, FEV1/VC, PEF, FEF2575, FEF25, FEF50, FEF75, FEV3, FEV3/FVC, FEV6, FEV6%, FET, EVol, FIVC, FIV1, FIV1/FIVC, PIF, MVVcal, VC, EVC, IVC, IC, ERV, TV, VE, RR, ti, te, TV/ti, ti/Ttot, MVV, ELA.

\*= best values

### II° case: NAHNES III standard

Following an FVC test, the spirometry test results are shown. The first screen displays the main parameters \*FEV6, \*FEV1, \*FEV1/FEV6%, \*PEF, the percentage of the predicted

values (or to the PRE values in the case of a POST phase), the Flow/Volume curve plus a traffic light summary of the test interpretation (in the upper right ), as illustrated below.



\*= best values

In case of "repeatability" a symbol ® is shown in the graphic area

The following screens show other values compared to the predicted values (or to the PRE values if is a POST phase).

Parameters shown:

FEV6, FEV1, FEV1/FEV6%, FEF2575, FVC, FEV1/FVC

\*= best values

## 2.8.7 POST test, after administration of drug

### WARNING ⚠

**To carry out a POST test it is necessary to have carried out at least one PRE FVC test on the patient on the same day; it is not possible to do a POST test on the PRE VC or MVV tests; it is however possible to do a POST VC or MVV test if the archive already contains at least one PRE FVC test carried out on the same day.**

To carry out a POST test please refer to paragraph 2.5.

Before carrying out the test it is necessary to indicate the drug dosage administered in order to have a reference when controlling the results of the measured parameters.

The results allow the confrontation of the spirometry parameters calculated in the POST test against the best results obtained in the PRE test already present in the patient archive for that session\* (\*session refers to tests carried out on that day). It is not possible to carry out a POST test on a patient if the patient archive only contains PRE tests carried out on previous days. When the results are displayed it is possible to see the variation between the PRE and POST values (shown in column headed CHG)

To exit the POST session insert a new patient or recall a patient from the archive, (see paragraph 2.6).

### WARNING ⚠

**If a new dose is set after a POST test then the device creates a new test session, still POST. A new test code ID is allocated. The interpretation is not based on the previous sessions with different drug doses; only the new test is utilized for the interpretation.**

### 3 DATA TRANSMISSION

#### WARNING

Read the instructions carefully before starting data transmission, taking care to ensure that all the information has been properly understood.









#### 3.1 Data Transmission via Bluetooth for printing

#### WARNING



Printing is possible only if the printer has a Bluetooth connection; alternatively an USB adaptor can be installed on the printer in order to enable a Bluetooth connection.

The printer used must be in the list of printers accepted by the device. To have a copy of the updated list please contact the manufacturer or send an email to the following address: [mir@spirometry.com](mailto:mir@spirometry.com)

The Bluetooth system enables **spirobank G** to transfer test data directly to a Bluetooth enabled printer. Proceed as follows:

- From the main screen select the test to be printed with .
- On the next screen press  ( icon)
- Press  ( icon)
- Choose one of the tests of the relevant patient using ,  or .

Tests stored in memory can also be printed. Use the search method as described in Paragraph 2.6 to select and print out relevant tests.

- On the test screen press  and then .
- **spirobank G** will carry out the connection.
- At the end of transmission **spirobank G** will show “CONNECTION COMPLETED”, and return automatically to the main screen.

To interrupt the Bluetooth connection during transmission press ESC to return to the main screen.

Where no printer has been set up, a message will appear to search for devices. After the device has been set up it will automatically be enabled for printing data.

#### 3.2 Connection to a PC through USB port or via Bluetooth

#### WARNING

Before connecting **spirobank G** via USB or Bluetooth to a PC, **winspiroPro** must be installed to interface with the device.

It is important prior to initiating the following procedure to know the version of the operating system installed on the PC used for the connection (from control panel click on “System”, where the operating system installed on the PC can be checked).

**If winspiroPRO is already installed on the PC then a new installation is not required.**

When using a Bluetooth connection, the instrument can be used for on-line spirometry testing & internal memory downloading. Correct use of the Bluetooth connection implies the use of a Bluetooth key connected to the PC.

To make the connection, insert the mini USB connector supplied with **spirobank G** as shown in the picture and attach the other connector to the USB port of the PC.

When making an initial connection, the PC will (depending on the version of the operating system) either make an automatic driver installation or request some information. To avoid errors in this phase please read the winspiroPRO User Manual very carefully.

To check the connection between the device and the PC, ensure that the led on the device is illuminated.



### 3.3 Upgrade Internal software

**spirobank G** software can be upgraded when connected to a PC. Upgrades can be downloaded by registering on [www.spirometry.com](http://www.spirometry.com). For further information on upgrading software see the “winspiroPro” software manual.

**WARNING** ⚠

**This function is only applicable via USB connection.**

## 4 MAINTENANCE

**spirobank G** is an instrument that requires very little maintenance. The operations to perform periodically are:

- Cleaning and controlling of the reusable turbine.
- Changing the disposable turbine before each test.
- Changing the battery.

The maintenance operations described in this User Manual must be carried out carefully. Failing to observe the instructions may cause errors in measurement or in the interpretation of the measured values.

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

In case of problems do not attempt to repair the unit.

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

### 4.1 Cleaning and controlling the reusable turbine

The turbine utilized by **spirobank G** belongs to one of two categories: disposable or reusable. These both guarantee precise measurements and have the great advantage of requiring no periodic calibration. In order to maintain the characteristics of the turbine a simple cleaning is required prior to each use (**only for the reusable turbine**). Cleaning of the disposable turbine is not required, as it is supplied clean in a sealed plastic bag. It must be disposed of after use.

**WARNING** 

**It is good practice to control from time to time that dirt or foreign bodies are not deposited inside the turbine, such as threads or hair. Any such deposits could brake or block the rotation of the turbine blade and thus compromise the measurement accuracy.**

**Verify the free movement of the turbine.**

- Switch on **spirobank G** as if to make a spirometry test (for example **FVC**)
- Hold **spirobank G** in one hand and move it gently from side to side so that air passes through the turbine
- If the rotor within the turbine is turning correctly then you will hear a regular **beep** that indicates that the turbine is moving within the specific low flow range indicated by the beeping
- If moving the turbine from side to side at a constant velocity, the regular beeps or no beeps at all are heard, then proceed with the cleaning of the turbine.

To clean the **reusable** turbine, first remove it by pulling it gently from the **spirobank G** turning it anti-clockwise and pulling lightly. It can be helpful to push it gently from underneath with one finger.

Immerse the turbine in a cold detergent solution and move it within the liquid to remove any impurities which may be deposited inside. Leave the turbine immersed for the time specified in the instructions of the solution.

**To avoid any kind of damage to the reusable turbine please do not use any alcoholic or oily substances, do not immerse the turbine in hot water or hot solution.  
Never place the turbine under a direct jet of water or any other liquid. Where no cleaning solutions are available it is however indispensable to clean the turbine in clean water.  
MIR suggest the use of Perasafe, manufactured by Dupont, which has been tested with positive results on all MIR sensors.**

Rinse the turbine by immersing it in clean water (**not hot**).

Shake off the excess water from the turbine and leave it to dry, standing it vertically on a dry surface.

Once the turbine has been cleaned insert the turbine in its place and follow the instructions indicated by the closed lock symbol printed on the plastic casing of the **spirobank G**. To insert the turbine correctly push it and then turn it clockwise until reaching the stop, which ensures that the turbine has been blocked inside the casing.

To ensure the turbine is functioning correctly repeat the controls described above; if it doesn't work correctly, replace with another one.

**If the disposable turbine is used do not clean it but change it after each test.**

#### 4.2 Changing the Batteries

If the message "**BATTERY DISCHARGED**" appears on the **spirobank G** display, or if the instrument does not switch on, then the battery must be changed as follows:

- Remove the battery cover by pressing and pushing it away from the device.
- Disconnect and remove the battery.
- Replace with a new battery, ensuring the connector is correctly connected.
- Close the battery compartment by replacing the back cover and sliding it towards the inside of the device.

**WARNING** 

**Use only 9 V type PP3 battery or equivalent. When inserting the battery in the battery slot, take care to connect the "+" and "-" as shown inside (see figure below).**



The device also has an internal lithium battery for the RAM memory and the average life is approximately 10 years. If the display shows the following message:

#### **Warning change lithium battery**

Call a service centre or the manufacturer for replacement.

### 5 PROBLEM SOLVING

A list of problems follow that may arise when working with the **spirobank G**. Diagnostic messages are also shown on the display to indicate the type of malfunction:

## 5.1 Causes and Solutions

- **spirobank G does not switch on**  
Check that battery is correctly inserted in the compartment on the back of the instrument. If it is correctly positioned then replace it with new one.
- **During operation the machine switches itself off and on again**  
Change the battery.
- **At the end of spirometry testing the test data is incorrect**  
Clean the turbine and then control it; use a new turbine.
- **All data in memory lost due to an unforeseeable event**  
All data in memory has been deleted. Contact the technical service centre.

### WARNING

Before contacting the centre for technical assistance, please download the test memory from the device to the PC using the Winspiro PRO software. This procedure is necessary as the test data could be lost whilst repairing the device and could also be of a confidential nature and therefore subject to laws on data privacy.



srl MEDICAL INTERNATIONAL RESEARCH  
Via del Maggiolino 125, 00155 Roma - ITALY

**Declaration of CE Conformity**

Quality Management System according to the requirements of Annex II of the Medical Device Directive 93/42/EEC implemented by the Legislative Decree 46 dated 24/02/97

*Notified Body* CERMET No. 0476 - *Certificate* No. MED – 9826

**MIR srl Medical International Research, declares that the Device subject of this declaration together with its standard accessories conforms to the requirements of the Council Directive 93/42/EEC Annex I.**

<i>Device Description</i>	<b>Spirometer</b>
<i>Device Name</i>	<b>spirobank G</b>
<i>Classification</i>	<b>Ila</b>
<i>This Device is marked</i>	<b>CE0476</b>

**Any modifications to the Device which are not authorised by MIR will invalidate this Declaration**

**Rome 01 / 01/ 2007**

Simon Fowler  
Sales Manager

Carmine Cerullo  
Quality Manager

Rev.0 – Mod. PO-10DDC\_spirobank G



## LIMITED WARRANTY CONDITIONS

**spirobank G**, together with its standard accessories is guaranteed for a period of:

- 12 months if intended for professional use (doctors, hospitals, etc.)
- 24 months if the product has been purchased directly by the end user.

The warranty is effective from the date of purchase shown on the relevant sales invoice or proof of purchase.

The warranty is effective from date of sale which must be shown on 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 User's Manual.
- If any alteration, adjustment, modification or repair has been carried out by personnel not authorised by the manufacturer.
- 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 a 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.

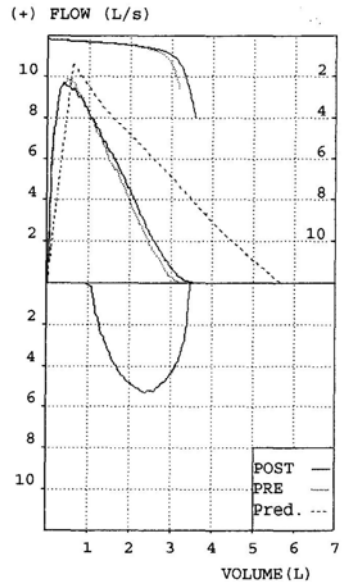
The customer is responsible for the transportation and for all transport and customs charges as well as for delivery charges of the goods both to and from the service centre.

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.

# ANNEX 1 SPIROMETRY TEST REPORT EXAMPLES

Test Date 21/10/06 11:12 BTPS 1.078 Standard ERS / ATS  
 Name Cc Z ID# 12  
 Birth Date 04/11/1967 Age 38 Height cm 182 Weight kg 70 Sex M  
 PRE File N° 13 POST File N° 12 Predicted MC-BARCELONA



Parameter	POST	PRE	CHG
*FVC	3.55	3.22	+ 10
*FEV1	3.13	2.98	+ 5
*PEF	9.74	10.00	- 3
FVC	3.55	3.22	+ 10
FEV1	3.13	2.98	+ 5
FEV1/FVC	88.2	92.5	- 5
PEF	9.74	10.00	- 3
F2575	6.19	5.00	+ 24
FEF25	8.98	8.97	-
FEF50	6.38	5.60	+ 14
FEF75	3.37	2.13	+ 58
FEV3	3.48	3.22	+ 8
FEV3/FVC	98.0	100.0	- 2
FEV6	3.55	3.22	+ 10
FEV1/FEV6	88.2	92.5	- 5
FET	3.40	2.39	+ 42
EVol	90	600	- 85
FIVC	2.48	-	-
FIV1	2.41	-	-
FIV1/FIVC	97.2	-	-
PIF	5.33	-	-
#MVV	109.6	104.3	+ 5

\* = Best Value  
 # = Calculated Value

INTERPRETATION: Possible Moderate Restriction  
 POST: No significant Bronchodilatation  
 POST: FEF2575 + 24 % CHG

QUALITY CONTROL GRADE: D


REPEATABILITY : None

Made by spirobank G ver 1.t Signature \_\_\_\_\_

**ANNEX 3 INFORMATION FOR CORRECT USE IN AN ELECTROMAGNETIC ENVIRONMENT**

<b>Guidance and manufacturer's declaration – electromagnetic emissions</b>		
The <b>spirobank G</b> is intended for use in the electromagnetic environment specified below. The customer or the user of the Spirobank G should assure that it is used in such an environment.		
<b>Emissions test</b>	<b>Compliance</b>	<b>Electromagnetic environment – guidance</b>
RF emissions CISPR 11	Group 1	The <b>spirobank G</b> 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 CISPR 11	Class B	
Harmonic emissions IEC 61000-3-2	Not applicable	
Voltage fluctuations/ flicker emissions IEC 61000-3-3	Not applicable	

Guidance and manufacturer's declaration – electromagnetic immunity			
The <b>spirobank G</b> is intended for use in the electromagnetic environment specified below. The customer or the user of the <b>spirobank G</b> should assure that it is used in such an environment.			
Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment – guidance
Electrostatic discharge (ESD) IEC 61000-4-2	±6 kV contact ±8 kV air	±6 kV contact ±8 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 %.
Electrical fast transient/burst IEC 61000-4-4	±1 kV for input/output lines		Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	±1 kV differential mode ±2 kV common mode	Not Applicable	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	<5 % <i>UT</i> (>95 % dip in <i>UT</i> ) for 0,5 cycle  40 % <i>UT</i> (60 % dip in <i>UT</i> ) for 5 cycles  70 % <i>UT</i> (30 % dip in <i>UT</i> ) for 25 cycles  <5 % <i>UT</i> (>95 % dip in <i>UT</i> ) for 5 sec	Not Applicable	
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.
Conducted RF IEC 61000-4-6	3 Vrms 150 kHz to 80 MHz	[3] V	Portable and mobile RF communications equipment should be used no closer to any part of the <b>spirobank G</b> , including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. <b>Recommended separation distance</b> $d = \left[ \frac{3,5}{3} \right] \sqrt{P}$ $d = \left[ \frac{3,5}{3} \right] \sqrt{P} \text{ 80 MHz to 800 GHz}$ $d = \left[ \frac{7}{3} \right] \sqrt{P} \text{ 800 MHz to 2,5 GHz}$
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2,5 GHz	[3] V/m	where <i>P</i> is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and <i>d</i> is the recommended separation

		<p>distance in metres (m).</p> <p>Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey, should be less than the compliance level in each frequency range.</p> <p>Interference may occur in the vicinity of equipment marked with the following symbol:</p> 
<p>NOTE <math>U_T</math> is the a.c. mains voltage prior to application of the test level.</p>		
<p>NOTE 1 At 80 MHz and 800 MHz, the higher frequency range applies.</p>		
<p>NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.</p>		
<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 the <b>spirobank G</b> is used exceeds the applicable RF compliance level above, the <b>spirobank G</b> should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the <b>spirobank G</b>.</p> <p>b) Over the frequency range 150 kHz to 80 MHz, field strengths should be less than [3] V/m.</p>		

**Recommended separation distances between  
portable and mobile RF communications equipment and the spirobank G**

The **spirobank G** is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the **spirobank G** can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the **spirobank G** as recommended below, according to the maximum output power of the communications equipment.

Rated maximum output power of transmitter W	Separation distance according to frequency of transmitter m		
	150 kHz to 80 MHz $d = \left[ \frac{3.5}{3} \right] \sqrt{P}$	80 MHz to 800 MHz $d = \left[ \frac{3.5}{3} \right] \sqrt{P}$	800 MHz to 2,5 GHz $d = \left[ \frac{7}{3} \right] \sqrt{P}$
0.01	0.12	0.24	0.24
0.1	0.37	0.37	0.74
1	1.17	1.17	2.34
10	5.28	5.28	1.056
100	11.66	11.66	23.32

For transmitters rated at a maximum output power not listed above, the recommended separation distance  $d$  in metres (m) can be estimated using the equation applicable to the frequency of the transmitter, where  $P$  is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

NOTE 1 At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.