



CareFusion

# MicroRPM (Respiratory Pressure Meter)

Operating Manual – English

Operating Manual – CareFusion USA

Manuel d'utilisation - Français

Handleiding - Nederlands

Руководство пользователя - Русский





# Contents

|     |                                                   |    |
|-----|---------------------------------------------------|----|
| I.  | Introduction – English.....                       | 4  |
|     | Contents .....                                    | 5  |
|     | Puma PC Software.....                             | 6  |
|     | Operation – Mouth Pressures .....                 | 7  |
|     | PImax (MIP) Test .....                            | 8  |
|     | PEmax (MEP) Test .....                            | 8  |
|     | Operation – SNIP .....                            | 10 |
|     | SNIP Test.....                                    | 11 |
|     | Battery .....                                     | 12 |
|     | Cleaning .....                                    | 12 |
|     | Calibration .....                                 | 12 |
|     | Servicing.....                                    | 14 |
|     | Consumables and Acessories .....                  | 15 |
|     | Symbols.....                                      | 16 |
|     | Environment.....                                  | 16 |
|     | Specifications .....                              | 16 |
| II. | Introduction – CareFusion USA .....               | 18 |
|     | Package Contents.....                             | 19 |
|     | Puma PC Software.....                             | 20 |
|     | Operation – Mouth Pressures .....                 | 21 |
|     | Operation – Sniff Nasal Inspiratory Pressure..... | 23 |
|     | Battery Low Voltage Indication.....               | 24 |
|     | PC Connection .....                               | 24 |
|     | Cleaning .....                                    | 25 |
|     | Calibration .....                                 | 25 |
|     | Servicing.....                                    | 27 |
|     | Consumables/ Supporting Products .....            | 27 |
|     | Symbols.....                                      | 28 |
|     | Environment.....                                  | 28 |
|     | Specifications .....                              | 28 |

|                                                          |    |
|----------------------------------------------------------|----|
| III. Introduction – Français .....                       | 29 |
| Contenu De L’emballage .....                             | 30 |
| Le logiciel PUMA.....                                    | 32 |
| Mode D’emploi – Pressions Buccales .....                 | 33 |
| Mode D’emploi – Pression Inspiratoire Sniff Nasale ..... | 35 |
| Témoin Du Niveau De Charge De La Pile .....              | 37 |
| Connexion Au PC.....                                     | 37 |
| Nettoyage .....                                          | 37 |
| Etalonnage .....                                         | 38 |
| Entretien .....                                          | 40 |
| Pièces De Rechange / Accessoires .....                   | 40 |
| Symboles .....                                           | 41 |
| Environnement .....                                      | 41 |
| Spécifications .....                                     | 42 |
| IV. Introductie - Nederlands .....                       | 43 |
| Inhoud .....                                             | 44 |
| PUMA PC Software.....                                    | 45 |
| Bediening – Mondruk .....                                | 46 |
| PImax (MIP) Test .....                                   | 46 |
| PEmax (MEP) Test .....                                   | 47 |
| Bedienung – SNIP (Sniff Nasal Inspiratory Pressure.....  | 48 |
| SNIP Test.....                                           | 49 |
| Batterij .....                                           | 50 |
| Reiniging.....                                           | 51 |
| Kalibratie .....                                         | 51 |
| Service .....                                            | 53 |
| Verbruiksgoederen en accessoires.....                    | 53 |
| Symbolen.....                                            | 54 |
| Bedrijfsomgeving .....                                   | 54 |
| Specificaties .....                                      | 55 |

|     |                                                        |    |
|-----|--------------------------------------------------------|----|
| V.  | Введение - Русский .....                               | 56 |
|     | Стандартные принадлежности.....                        | 57 |
|     | PUMA PC Software.....                                  | 58 |
|     | Работа прибора – давление в полости рта .....          | 59 |
|     | Работа прибора – назальное инспираторное давление..... | 61 |
|     | Индикация снижения заряда батареи .....                | 62 |
|     | Подключение к ПК .....                                 | 62 |
|     | Очистка.....                                           | 63 |
|     | Калибровка .....                                       | 63 |
|     | Сервис .....                                           | 65 |
|     | Дополнительные принадлежности / Расходный материал...  | 65 |
|     | Символы.....                                           | 66 |
|     | Окружающая среда .....                                 | 66 |
|     | Технические характеристики .....                       | 67 |
| VI. | Customer Contact Information .....                     | 68 |



# MicroRPM

## (Respiratory Pressure Meter)

### Operating manual

#### **I. Introduction - English**

The respiratory pressure meter is a hand held instrument designed for rapid assessment of inspiratory and expiratory muscle strength. The unit can measure the maximum inspiratory and expiratory mouth pressures, MIP and MEP, and the Sniff Nasal Inspiratory Pressure, SNIP. The result of each measurement is presented in units of cmH<sub>2</sub>O gauge pressure on the liquid crystal display screen.

The unit is easy to operate, battery powered, and is supplied with all the necessary attachments required for immediate use.

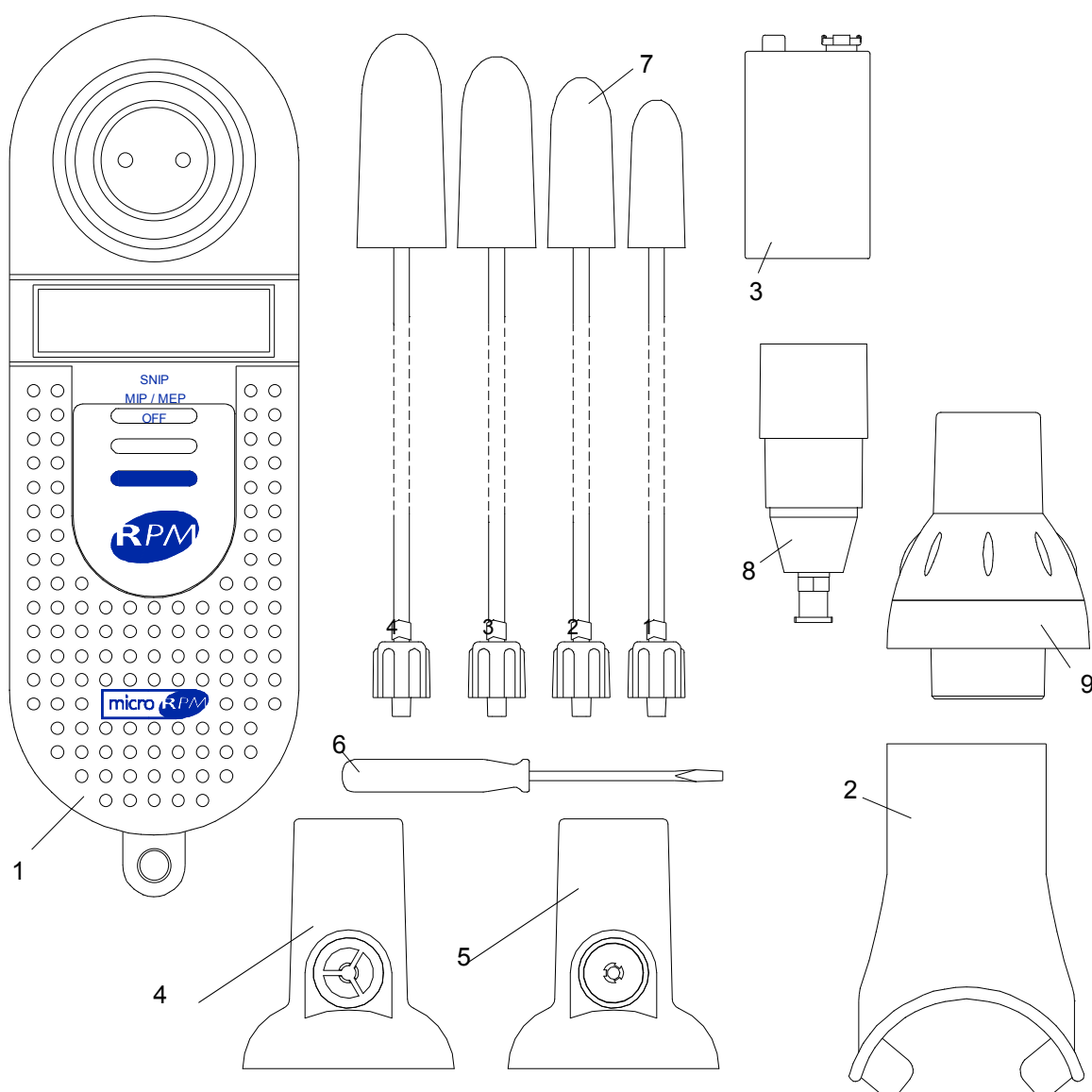
The functionality of the unit may be greatly increased when connected to a PC running PUMA software. This application has many advanced features including:

- Real time display of pressure/time curves
- Overlay of successive curves
- Predicted values
- Patient database
- Incentive display
- Manoeuvre quality check
- Manoeuvre variability measurement

# Contents

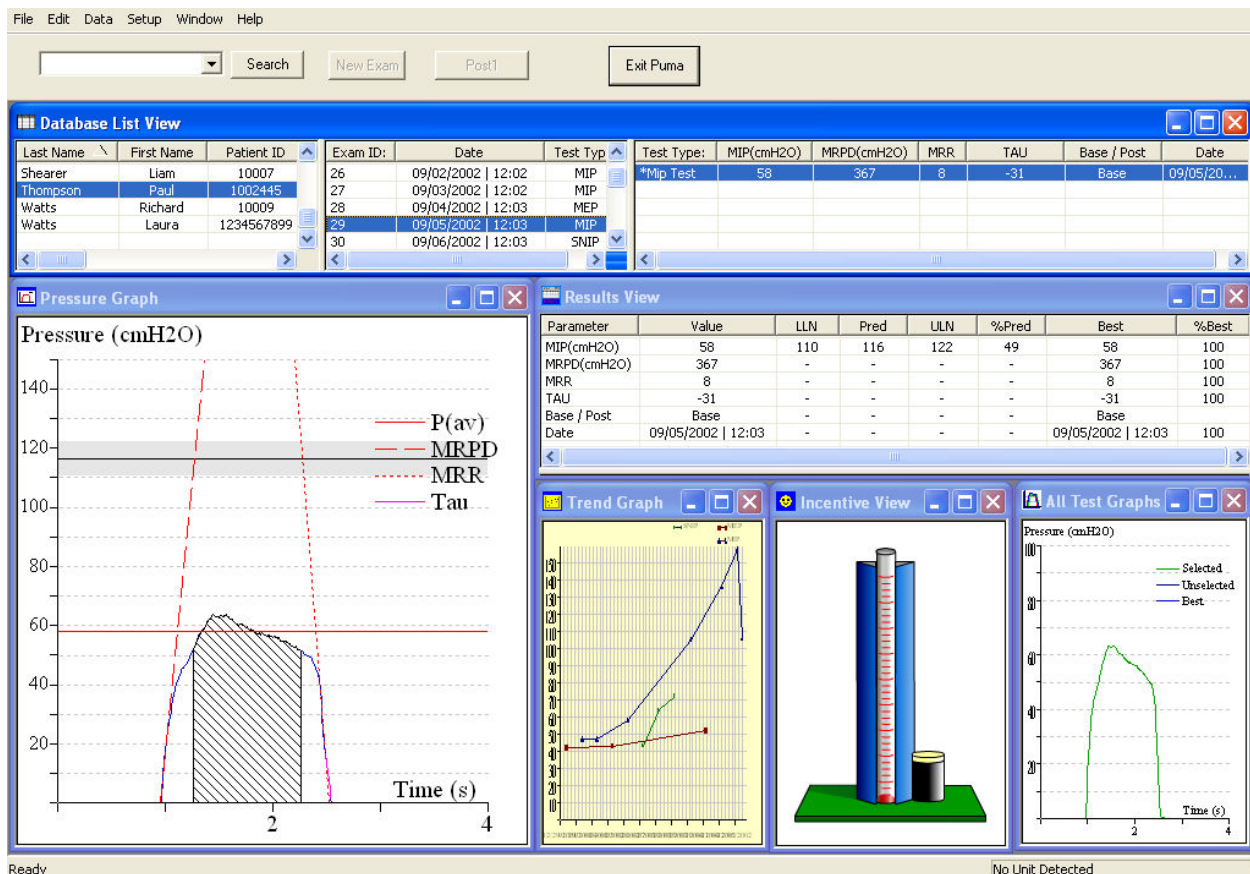
The MicroRPM is supplied as follows:

- |                                        |                          |
|----------------------------------------|--------------------------|
| 1. MicroRPM Microcomputer Unit         |                          |
| 2. Rubber Flanged Mouthpiece           | Cat. No. 36-MTH6400      |
| 3. Alkaline PP3 battery                | Cat. No. 36-BAT1002      |
| 4. Expiratory Pressure Valve Assembly  | Cat. No. 36-ASS1221      |
| 5. Inspiratory Pressure Valve Assembly | Cat. No. 36-ASS1222      |
| 6. Calibration Screwdriver             | Cat. No. 36-MEC1299      |
| 7. Nasal Probes Size 1-4               |                          |
| 8. Nasal Probe Adapter                 | Cat. No. 36-ASS1091      |
| 9. Mouth Pressure Bacterial Filters    | Cat. No. 36-FIL6050 (50) |





# PUMA PC Software



The functionality of the portable MicroRPM is greatly increased when connected to the PUMA PC Software, via an RS232 cable to the Serial Port on the side of the unit.

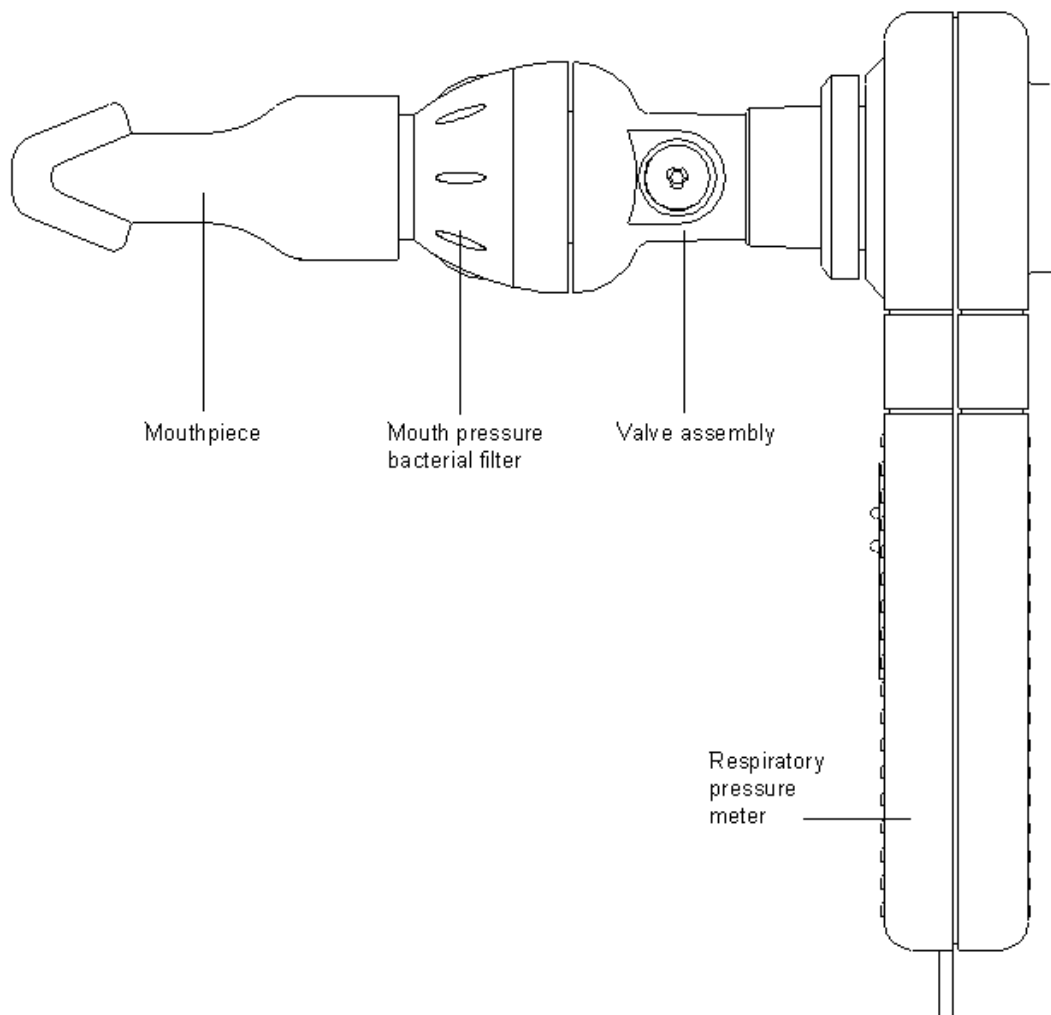
PUMA PC Software is available as a free download from [www.carefusion.com/micromedical](http://www.carefusion.com/micromedical). Please contact Technical Services for installation instructions and system requirements.

The PUMA PC Software is a unique, user friendly multi windows platform for the performance, storage and analysis of the respiratory muscle strength measurements of P<sub>Imax</sub> or MIP (Maximum Inspiratory Pressure), P<sub>Emax</sub> or MEP (Maximum Expiratory Pressure) and SNIP (Sniff Nasal Inspiratory Pressure). In addition, PUMA PC Software offers the user features such as live graphical displays, predicted values, printing formats, incentives, trends, post medication or exercise comparisons and additional fatigue indicators.

## Operation – Mouth Pressures ( $P_{I\max}/MIP + P_{E\max}/MEP$ )

Insert the battery into the compartment at the rear of the MicroRPM.

Fit the required Pressure Valve Assembly ('Inspiratory' for  $P_{I\max}$  (MIP), 'Expiratory' for  $P_{E\max}$  (MEP)) into the MicroRPM; insert a new Bacterial Filter into the Pressure Valve Assembly and then the Rubber Flanged Mouthpiece onto the Bacterial Filter, as shown below.



## **PImax (MIP) Test**

Slide the MicroRPM switch from 'Off' to 'MIP/MEP', whilst applying no pressure to the mouthpiece. Rotating segments will be displayed whilst the unit performs an auto-zero function.

When the MicroRPM is ready a 'beep' will be heard and '0' displayed.

To perform the test instruct the subject to insert the mouthpiece into the mouth, ensuring the flange is positioned over the gums and inside the lips, whilst the 'bite blocks' are between the teeth.

The subject should then exhale to RV (Residual Volume), lungs empty, then perform a 'Mueller' manoeuvre, a forced inhalation against the MicroRPM with as much effort as possible for as long as possible (minimum 2 seconds).

The display will report the result, the maximum average inspiratory pressure sustained over a 1 second period of the test, in centimetres of water (cmH<sub>2</sub>O). Ideally, the subject should repeat this test 3 times to ascertain a best value.

## **PEmax (MEP) Test**

Slide the MicroRPM switch from 'Off' to 'MIP/MEP', whilst applying no pressure to the mouthpiece. Rotating segments will be displayed whilst the unit performs an auto-zero function.

When the MicroRPM is ready a 'beep' will be heard and '0' displayed.

To perform the test instruct the subject to insert the mouthpiece into the mouth, ensuring the flange is positioned over the gums and inside the lips, whilst the 'bite blocks' are between the teeth.

The subject should then inhale to TLC (Total Lung Capacity), lungs full, then perform a 'Valsalva' manoeuvre, a forced exhalation against the MicroRPM with as much effort as possible for as long as possible (minimum 2 seconds).

The display will report the result, the maximum average expiratory pressure sustained over a 1 second period of the test, in cmH<sub>2</sub>O. Ideally, the subject should repeat this test 3 times to ascertain a best value.

To repeat either the P<sub>I</sub>max or P<sub>E</sub>max tests the MicroRPM must firstly be returned to the 'Off' position.

---

For more information on these procedures, and for interactive presentations and video demonstrations, go to our dedicated website:

**[WWW.RESPIRATORYMUSCLES.COM](http://WWW.RESPIRATORYMUSCLES.COM)**

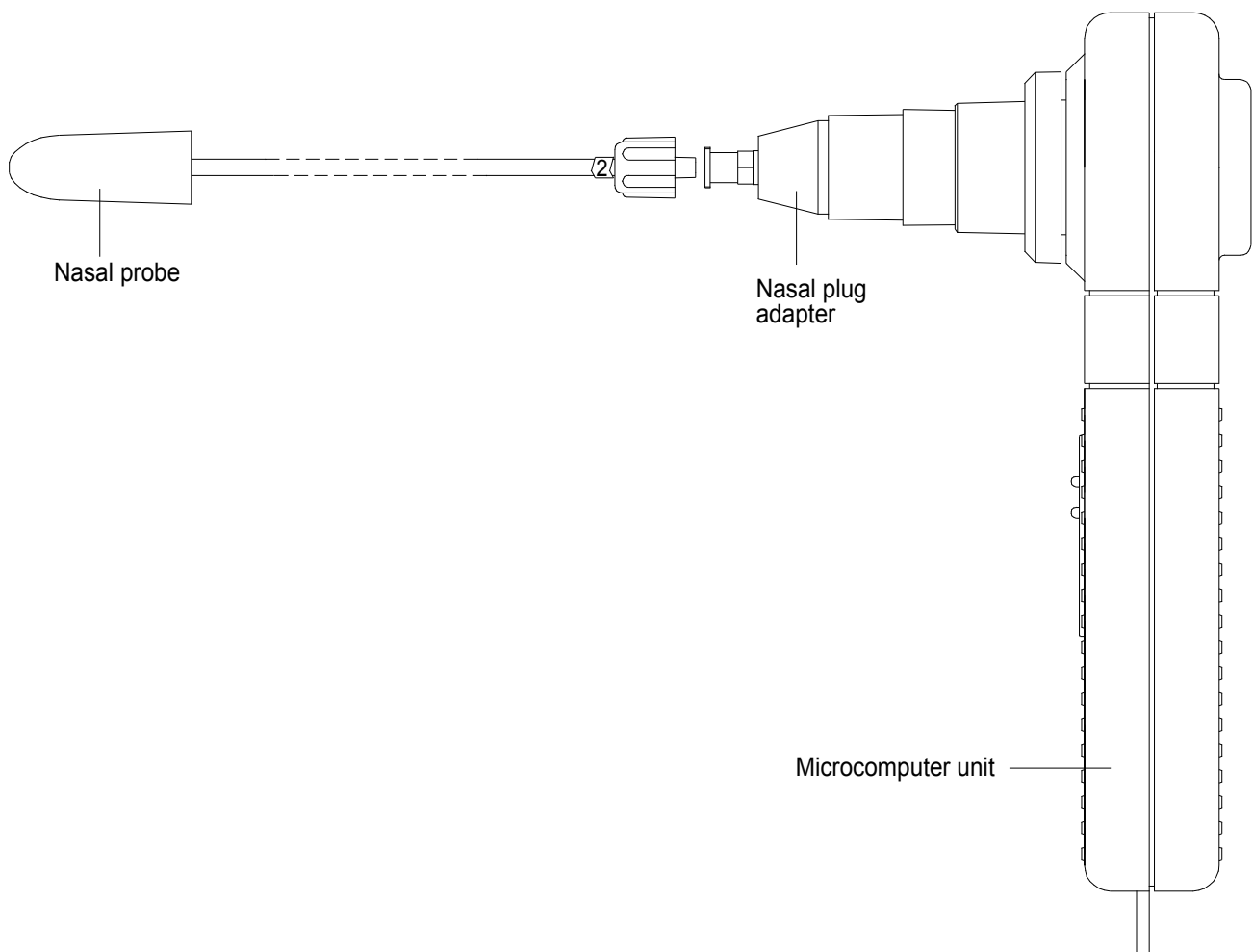
---

## Operation – SNIP (Sniff Nasal Inspiratory Pressure)

Insert the battery into the rear of the MicroRPM.

Fit the Nasal Probe Adapter into the MicroRPM and then attach the correct size Nasal Probe, as shown below.

The correct size (1-4) can be ascertained by fitting a Nasal Probe to the unit, then firmly inserting the Nasal Probe into a nostril. Instruct the subject to block the open nostril with a finger and then to attempt a sniff. The correct Nasal Probe size has been selected once there is no leakage around the Nasal Probe.



## SNIP Test

Slide the MicroRPM switch from 'Off' to 'SNIP', whilst applying no pressure to the Nasal Probe. Rotating segments will be displayed whilst the unit performs an auto-zero function.

When the MicroRPM is ready a 'beep' will be heard and '0' displayed.

To perform the test, instruct the subject to insert the chosen Nasal Probe firmly into a nostril, whilst ensuring the other nostril remains open throughout the test.

The subject should then breathe normally and at the end of a normal tidal expiration, FRC (Functional Residual Capacity), be instructed to perform a short, sharp voluntary sniffing manoeuvre with as much effort as possible.

The display will report the result, the peak inspiratory nasal pressure, in cmH<sub>2</sub>O.

On subsequent tests the MicroRPM will continue to display the highest SNIP value, overwriting previous values. Ideally, the subject should repeat this test 10-15 times to ascertain the highest value.

---

For more information on these procedures, and for interactive presentations and video demonstrations, go to our dedicated website:

**[WWW.RESPIRATORYMUSCLES.COM](http://WWW.RESPIRATORYMUSCLES.COM)**

---

## Battery

The battery level is automatically checked when the unit is switched on.

When the battery is low 'bAt' will be displayed before the auto-zero procedure. The MicroRPM may be used when this occurs, but the battery should be replaced as soon as possible.

When the battery is completely exhausted the unit will beep twice and turn itself off immediately.

**Note:** If the MicroRPM is not to be used for long periods the battery should be removed to prevent damage by a possible leak.

## Cleaning

The MicroRPM unit requires no routine maintenance and is protected from contamination by the Bacterial Filter (36-FIL6050).

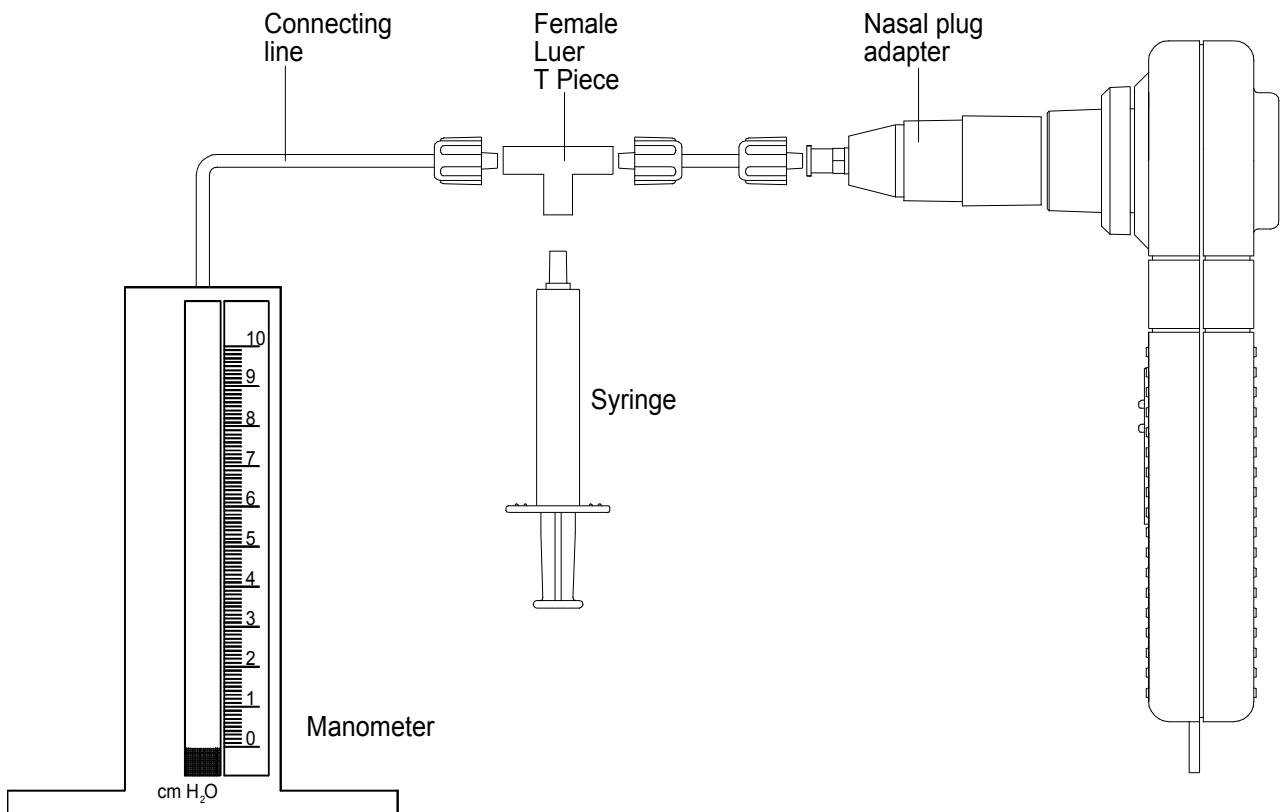
The Rubber Flanged Mouthpiece (36-MTH6400) and Nasal Probes, however, may be immersed in a cold sterilising solution such as PeraSafe (36-SSC5000A). Rinse thoroughly and leave to dry before reassembly.

The Nasal Probes can additionally be dried with a flow of air provided by the CareFusion Nasal Probe Pump (36-MEC1219).

## Calibration

The calibration is factory set and should remain stable indefinitely.

The calibration may be checked and altered, however, by connecting the device via the Pressure Calibration Kit (36-ASS1234) to a Water Manometer, as shown below:

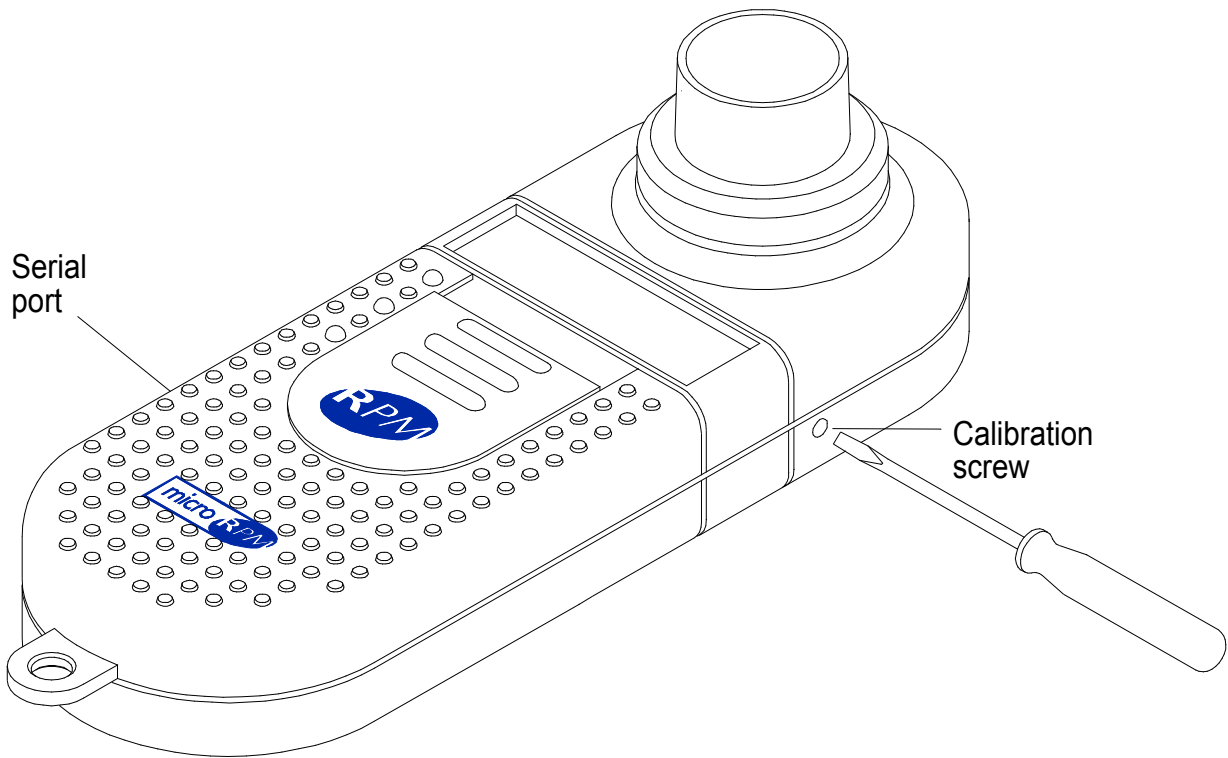


Slide the MicroRPM switch from 'Off' to 'SNIP' whilst applying no pressure to the unit.

Gently fill the syringe until negative pressure of between 200 and 300cmH<sub>2</sub>O is read on the Water Manometer. Check that the reading on the MicroRPM is within 3% of this reading.

**Please Note:** Calibration can only be adjusted in a positive direction, as the MicroRPM measures the highest peak value. Therefore, if the reading was greater than that on the Water Manometer, the calibration screw must be turned anti-clockwise first, before calibration is attempted.





To calibrate the MicroRPM, connect to the Water Manometer as before, filling the syringe to obtain the required negative pressure. To change the calibration, slowly turn the calibration screw in a clockwise direction until the same value is displayed on the MicroRPM.

## Servicing

If your unit requires service or repair please see page 68 for contact details.

A full service manual including circuit diagrams and parts list is available on request.

## Consumables and Accessories

| Cat. No.    | Description                                                       |
|-------------|-------------------------------------------------------------------|
| 36-FIL6050  | Bacterial Filters (50 per box)                                    |
| 36-MTH6400  | Rubber Flanged Mouthpiece                                         |
| 36-ASS1221  | Expiratory Pressure Valve Assembly                                |
| 36-ASS1222  | Inspiratory Pressure Valve Assembly                               |
| 36-NPROBE01 | Extra Small Nasal Probes (10 per box)                             |
| 36-NPROBE02 | Small Nasal Probes (10 per box)                                   |
| 36-NPROBE03 | Medium Nasal Probes (10 per box)                                  |
| 36-NPROBE04 | Large Nasal Probes (10 per box)                                   |
| 36-ASS1091  | Nasal Probe Adapter                                               |
| 36-MEC1299  | Calibration Screwdriver                                           |
| 36-BAT1002  | Alkaline PP3 Battery                                              |
| 36-SSC5000A | PeraSafe Sterilising Powder – 81g<br>(Makes 5 litres of solution) |
| 36-ASS1234  | Pressure Calibration Kit                                          |

## Caution

- Pulmonary filters are single patient use. If used on more than one patient there is a risk of cross-infection. Repeat use may increase air resistance and lead to an incorrect measurement.

## Symbols



Type B device



In accordance with Directive 93/42/EEC



Disposal in compliance with WEEE

## Environment

This instrument complies with directive EN60601-1-2 electromagnetic compatibility but can be affected by cellular phones and by electromagnetic interference exceeding levels specified in EN 50082-1:1992

## Specifications

|                             |                           |
|-----------------------------|---------------------------|
| Operating Pressure:         | +/- 300cmH <sub>2</sub> O |
| Burst Pressure:             | +/- 700cmH <sub>2</sub> O |
| Accuracy:                   | +/-3%                     |
| Resolution:                 | 1cmH <sub>2</sub> O       |
| Power Supply:               | Single 9v PP3             |
| Dimensions:                 | 170 x 60 x 26mm           |
| Weight (unit with battery): | 175g                      |
| Weight (in carry case) :    | 750g                      |
| Operating Temperature :     | 0 - 40 °C                 |
| Operating Humidity:         | 30% - 90% RH              |
| Storage Temperature:        | -20 - +70 ° C             |
| Storage Humidity:           | 10% - 90% RH              |





# MicroRPM

## (Respiratory Pressure Meter)

### Operating manual

Federal (USA) law restricts this device to sale by or on the order of a physician or licensed practitioner.

CareFusion,  
22745 Savi Ranch Parkway,  
Yorba Linda  
CA 92887-4668  
USA

## II. Introduction – CareFusion USA

The respiratory pressure meter is a hand held instrument designed for rapid assessment of inspiratory and expiratory muscle strength. The unit can measure the maximum inspiratory and expiratory mouth pressures, MIP and MEP, and the Sniff Nasal Inspiratory Pressure, SNIP. The result of each measurement is presented in units of cmH<sub>2</sub>O gauge pressure on the liquid crystal display screen.

The unit is easy to operate, battery powered, and is supplied with all the necessary attachments required for immediate use.

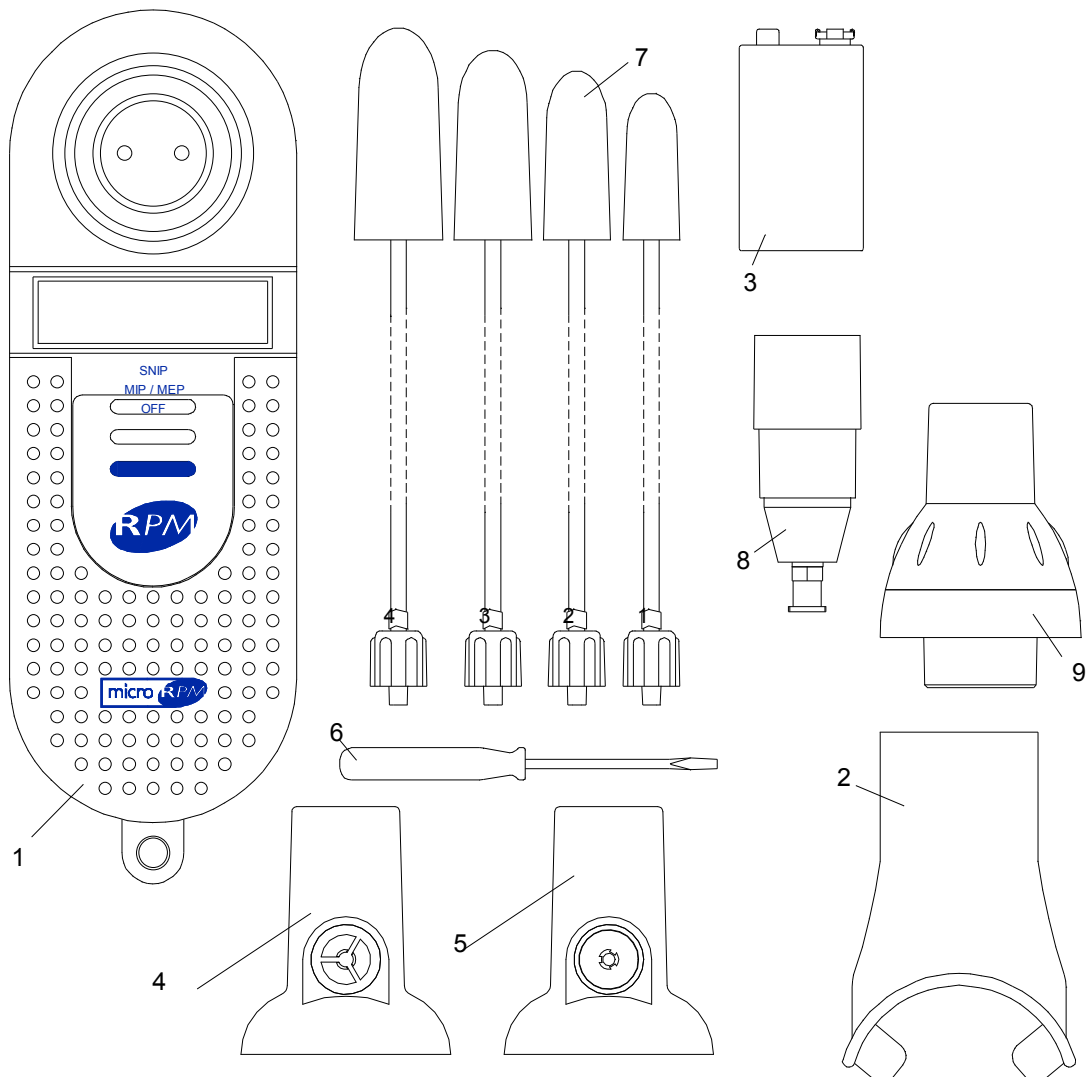
The functionality of the unit may be greatly increased when connected to a PC running PUMA software. This application has many advanced features including:

- Real time display of pressure/time curves
- Overlay of successive curves
- Predicted values
- Patient database
- Incentive display
- Manoeuvre quality check
- Manoeuvre variability measurement

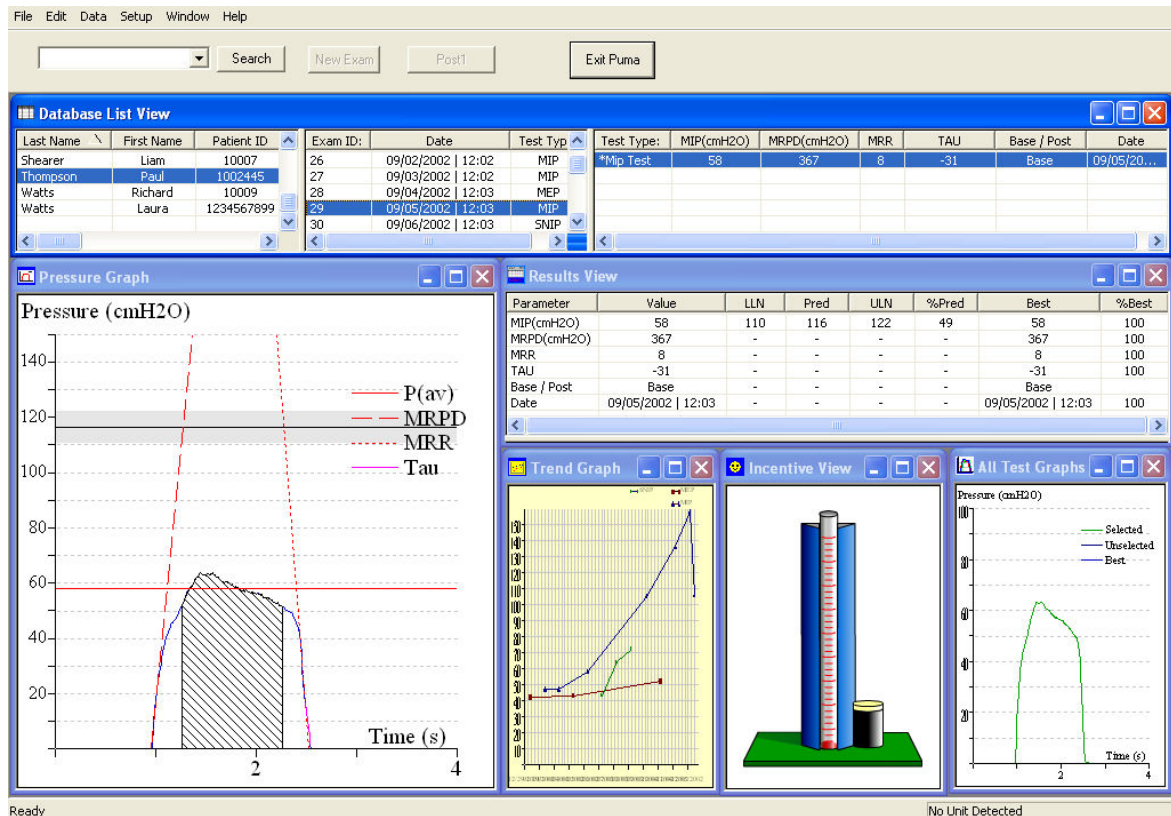
## Package Contents

The respiratory pressure meter is supplied with the following items:-

1. Microcomputer unit
2. Rubber mouthpiece
3. Alkaline PP3 battery
4. Expiration pressure valve assembly
5. Inspiration pressure valve assembly
6. Calibration screwdriver
7. Nasal probe sizes 1 to 4
8. Nasal probe adapter
9. Mouth pressure bacterial filters



## PUMA PC Software



The functionality of the portable MicroRPM is greatly increased when connected to the PUMA PC Software, via an RS232 cable to the Serial Port on the side of the unit.

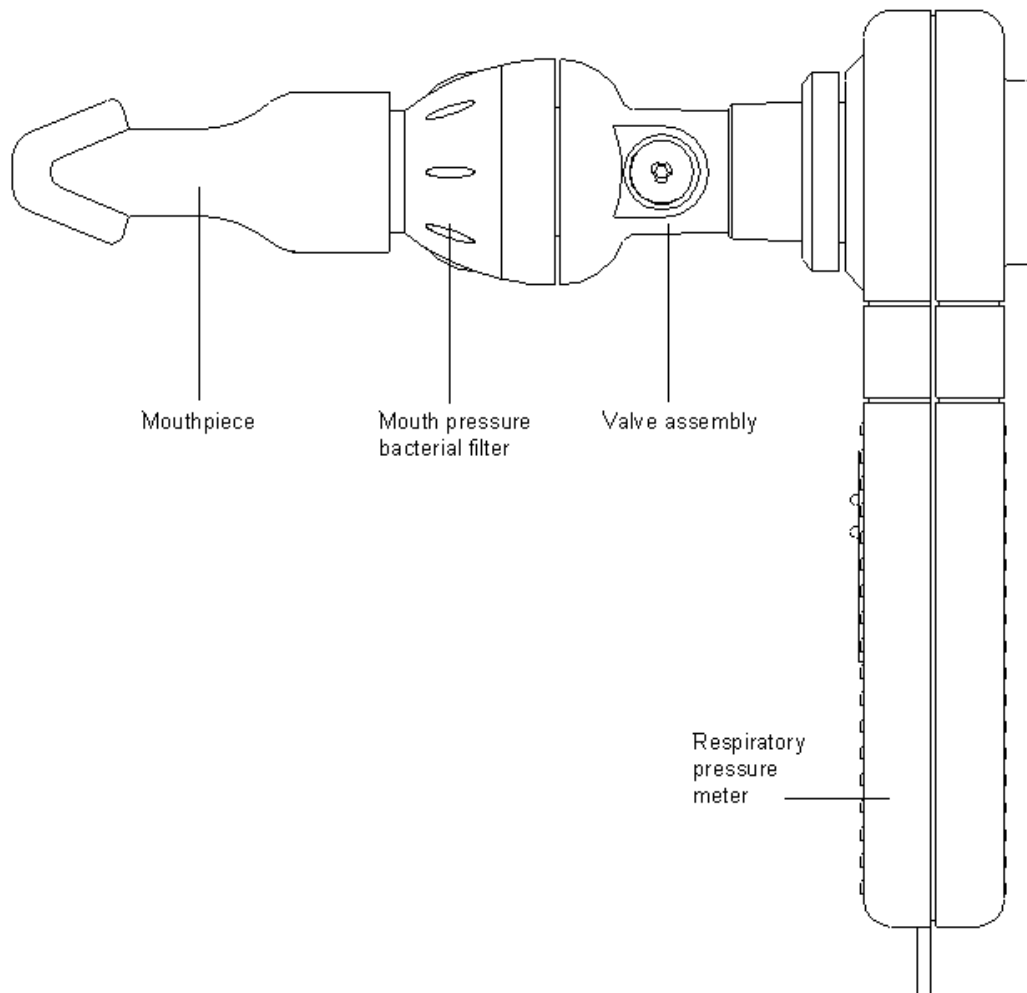
PUMA PC Software is available as a free download from [www.carefusion.com/micromedical](http://www.carefusion.com/micromedical). Please contact Technical Services for installation instructions and system requirements.

The PUMA PC Software is a unique, user friendly multi windows platform for the performance, storage and analysis of the respiratory muscle strength measurements of P<sub>Imax</sub> or MIP (Maximum Inspiratory Pressure), P<sub>Emax</sub> or MEP (Maximum Expiratory Pressure) and SNIP (Sniff Nasal Inspiratory Pressure). In addition, PUMA PC Software offers the user features such as live graphical displays, predicted values, printing formats, incentives, trends, post medication or exercise comparisons and additional fatigue indicators.



## Operation – Mouth Pressures

Insert the battery into the battery compartment at the rear of the unit, fit the flanged rubber mouthpiece over the required valve assembly and insert into the respiratory pressure meter as shown below:



Two valve assemblies are provided. The one marked expiration pressure allows the patient to inspire fully through the valve, which then closes during expiration to allow the meter to measure the maximum expired pressure averaged over one second.

The valve marked inspiratory pressure works in the exact opposite manner.

To measure the maximum expiratory pressure (PE<sub>max</sub>), slide the switch from the "off" position to the MIP/MEP position. Rotating

segments will be displayed whilst the unit performs an auto-zero function. During this time there should be no applied pressure.

When the unit is ready for use 0 will be displayed.

To perform an expiratory pressure test instruct the subject to insert the mouthpiece into the mouth ensuring that the flange is positioned over the gums and inside the lips and that the "bite blocks" are between the teeth. They should then inhale to TLC (total lung capacity) and then exhale with as much effort as possible through the controlled leak of the meter for at least 2 seconds. The reading displayed is the maximum average expiratory pressure over 1 second.

For an accurate measurement it is important that there are no leaks in the system other than the small controlled leak of the instrument. This leak prevents the generation of a false high reading generated by closure of the glottis and compression of air in the mouth using the facial muscles.

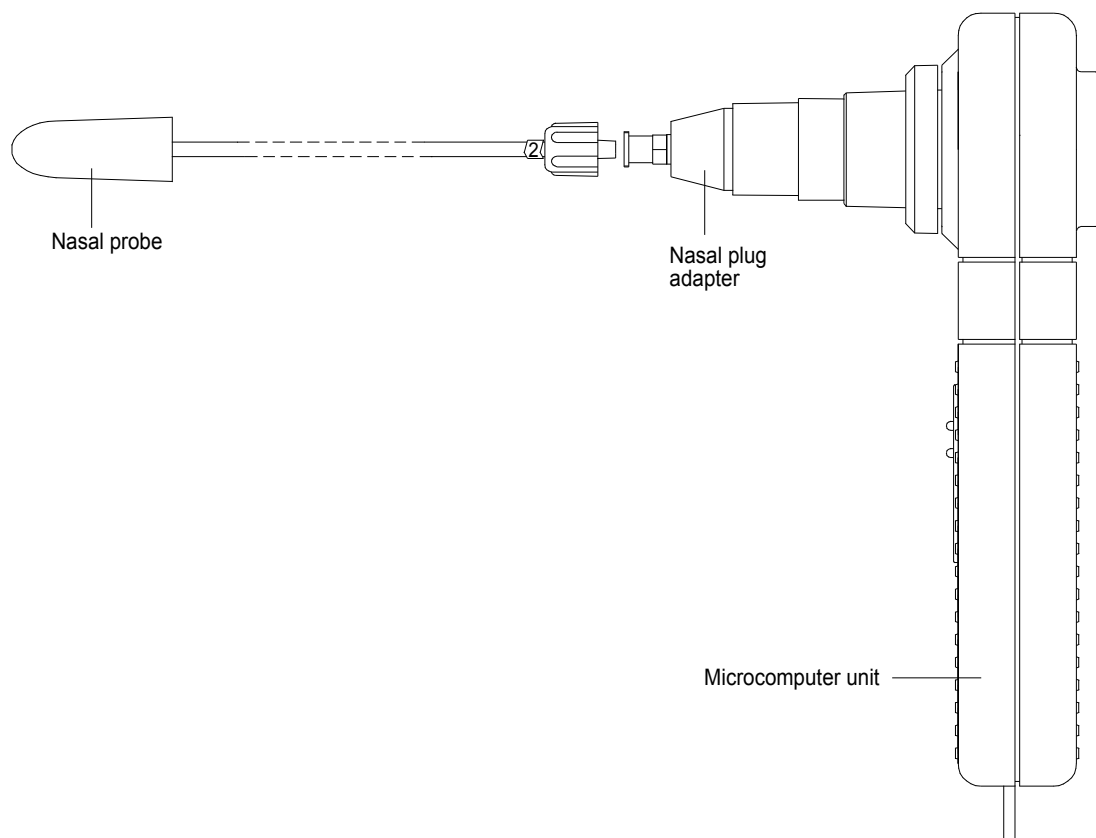
Before repeating the measurement, or before performing an inspiratory manoeuvre, the instrument must be reset by sliding the switch to the "off" position.

To measure the maximum inspiratory pressure (P<sub>I</sub>max) follow the above procedure but with the valve marked inspiratory pressure connected. Slide the switch on the face of the meter from 'off' position to the MIP/MEP position and instruct the subject to exhale to RV (residual volume) through the mouthpiece and then to inhale with as much effort as possible for at least 2 seconds.

The reading displayed is the maximum average inspiratory pressure that was sustained over 1 second.

## Operation – Sniff Nasal Inspiratory Pressure

Before commencing a test the correct size of nasal probe to be used must be ascertained. The unit is supplied with four sizes designed to cover a wide range of nostrils. Select the size that appears to be the most appropriate, connect it to the unit as shown below, and ask the subject to insert the probe firmly into a nostril. Once fitted the subject should close the other nostril with a finger and try to inhale through the probe to check the sealing. When the correct size has been selected proceed as follows: Insert the battery into the battery compartment at the rear of the unit, fit the selected probe as shown below:



To measure the maximum sniff inspiratory pressure, slide the switch from the "off" position to the SNIP position. Rotating segments will be displayed whilst the unit performs an auto-zero function.

During this time there should be no applied pressure.

When the unit is ready for use 0 will be displayed.

To perform a SNIP test instruct the subject to insert the nasal probe into a nostril such that a good seal is made. After a normal expiration they should inhale with as much effort as possible through the free nostril with the mouth closed. The manoeuvre is performed from functional residual volume (FRC). The reading displayed is the peak inspiratory nasal pressure.

Before repeating the measurement, the instrument must be reset by sliding the switch to the "off" position.

## **Battery Low Voltage Indication**

The battery level is checked when the unit is switched on.

When the battery is nearly exhausted 'bAt' is displayed before the auto-zero procedure begins. The unit may be used when this occurs provided the test is performed immediately. The battery should be replaced as soon as possible.

When the battery is completely exhausted the unit will beep twice and turn itself off immediately after turning on.

**Note:** If the respiratory pressure meter is not used for long periods, the battery should be removed to prevent damage to the instrument by possible leakage.

## **PC Connection**

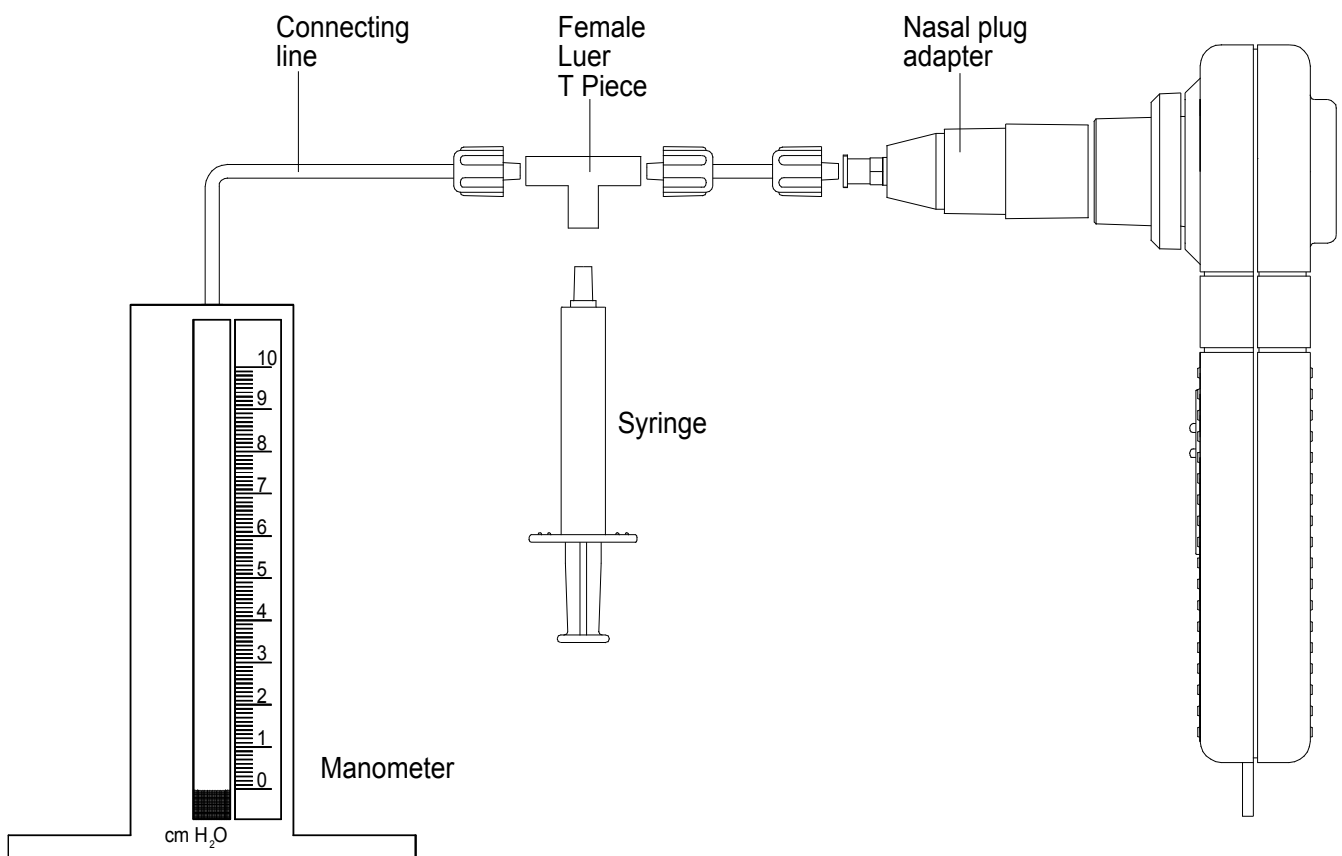
The respiratory pressure meter may be connected to a computer running PUMA software via the RS232 serial port on the left hand side of the unit.

## Cleaning

The respiratory pressure meter requires no routine maintenance or servicing and is protected from contamination by the bacterial filter supplied. However the mouthpiece and nasal probes may be immersed in cold sterilising solutions such as PeraSafe for a period not exceeding 15 minutes. Rinse with distilled water, drain, and allow to dry before reassembly. A flow of air through the nasal probe connecting tube may be introduced to shorten the drying time. CareFusion can supply a pump for this purpose – see Consumables/Supporting products, page 27. PeraSafe is available from CareFusion in convenient 81g, plastic containers.

## Calibration

Calibration is factory set and should remain stable indefinitely. However, calibration may be checked by connecting the device to a manometer as shown below:



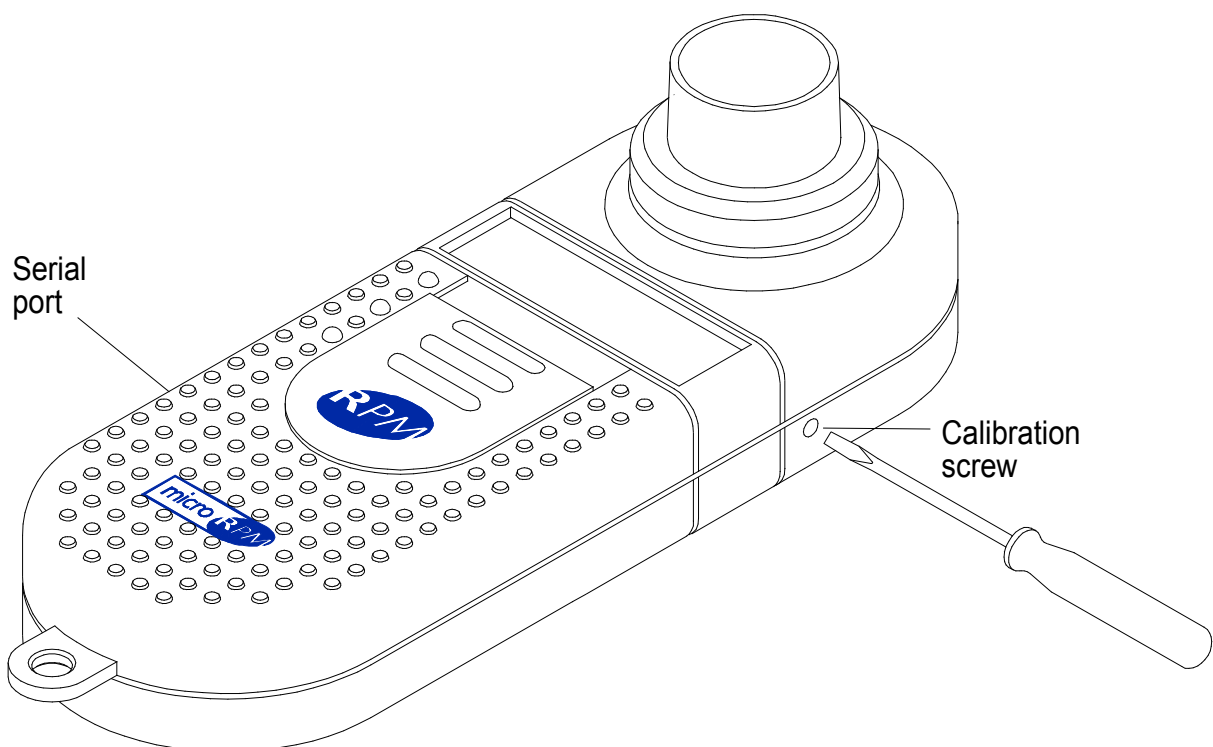
Turn the respiratory pressure meter on to the SNIP position.

Very slowly fill the syringe until a negative pressure of between 200 and 300cm is obtained on the manometer.

Check that the reading on the respiratory pressure meter is within 3% of the manometer reading.

If adjustment is required then the following procedure must be followed.

The calibration may only be adjusted in a positive direction as the meter monitors the peak pressure value. Therefore if the respiratory pressure meter reading was greater than the manometer reading the calibration screw must be turned anti-clockwise a few turns before calibration is attempted.



Connect the respiratory pressure meter to the manometer as previously shown. Fill the syringe to obtain the required negative

pressure and then turn the calibration screw slowly in a clockwise direction until the same value is displayed on the meter.

## Servicing

If your unit requires service or repair please see page 68 for contact details.

A full service manual including circuit diagrams and parts list is available on request.

## Consumables / Supporting Products

### Description

Expiratory Pressure Valve Assembly

Inspiratory Pressure Valve Assembly

Bacterial Filters (50 per box)

Extra Small Nasal Probes (10 per box)

Small Nasal Probes (10 per box)

Medium Nasal Probes (10 per box)

Large Nasal Probes (10 per box)

Nasal Probe Adapter

Calibration Screwdriver

Alkaline PP3 Battery

PeraSafe Sterilising Powder – 81g

(Makes 5 litres of solution)

Pressure Calibration Kit

To place an order for consumables/supporting products or for general enquiries please contact CareFusion or contact your local CareFusion dealer.

**For US Customer Care:** Toll Free 1-800-231-2466, phone 1-714-283-2228

## Caution

- Pulmonary filters are single patient use. If used on more than one patient there is a risk of cross-infection. Repeat use may increase air resistance and lead to an incorrect measurement.

## Symbols



Type B device

## Environment

This instrument complies with directive EN60601-1-2 electromagnetic compatibility but can be affected by cellular phones and by electromagnetic interference exceeding levels specified in EN 50082-1:1992

## Specifications

|                             |                           |
|-----------------------------|---------------------------|
| Operating Pressure:         | +/- 300cmH <sub>2</sub> O |
| Burst Pressure:             | +/- 700cmH <sub>2</sub> O |
| Accuracy:                   | +/-3%                     |
| Resolution:                 | 1cmH <sub>2</sub> O       |
| Power Supply:               | Single 9v PP3             |
| Dimensions:                 | 170 x 60 x 26mm           |
| Weight (unit with battery): | 175g.                     |
| Weight (in carry case) :    | 750g                      |
| Operating Temperature :     | 0 - 40 °C                 |
| Operating Humidity:         | 30% - 90% RH              |
| Storage Temperature:        | -20 - +70 °C              |
| Storage Humidity:           | 10% - 90% RH              |



# MicroRPM

## (Analyseur de Pression Respiratoire)

### Manuel d'utilisation

### **III. Introduction - Français**

L'analyseur CareFusion est un instrument portable conçu pour évaluer rapidement le niveau de force musculaire inspiratoire et expiratoire. L'appareil mesure les pressions buccales inspiratoires et expiratoires maximum, (PImax et PEmax), et la pression inspiratoire sniff nasale (SNIP). Le résultat de chaque analyse est présenté sous forme d'unités de pression manométrique en cmH<sub>2</sub>O sur l'écran d'affichage à cristaux liquides.

L'appareil est facile à utiliser, alimenté sur piles et il est livré avec tous les accessoires nécessaires à son utilisation immédiate.

La fonctionnalité de l'appareil peut être largement améliorée en le branchant sur un PC équipé du programme logiciel PUMA. Cette application présente de nombreuses caractéristiques innovantes, dont:

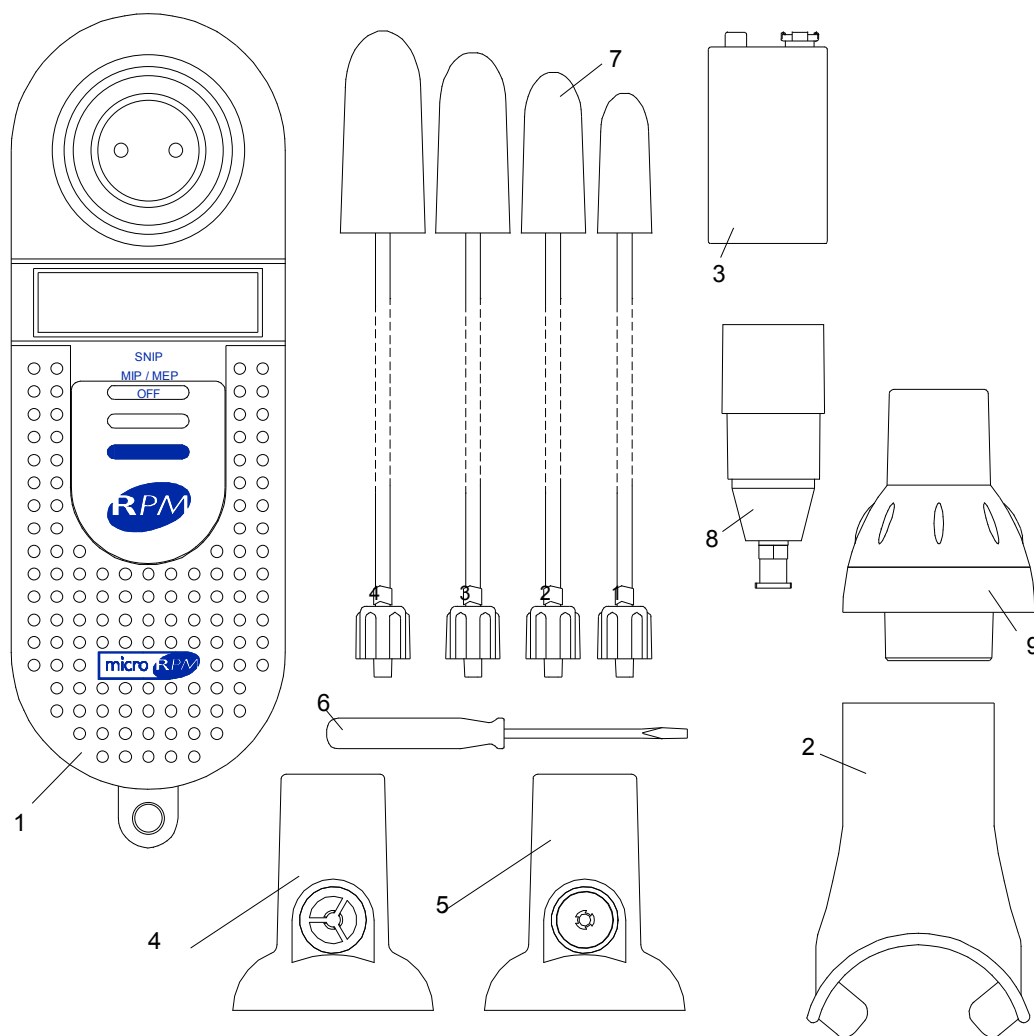
- Affichage en temps réel de la pression/ des courbes de temps
- Superposition des courbes successives
- Valeurs prédites
- Base de données patients
- Image d'écran stimulant l'effort du sujet

- Vitesse maximale de développement de pression, MRPD
- Vitesse maximale de relaxation, MRR
- Contrôle de qualité du test
- Mesure de la variabilité du test

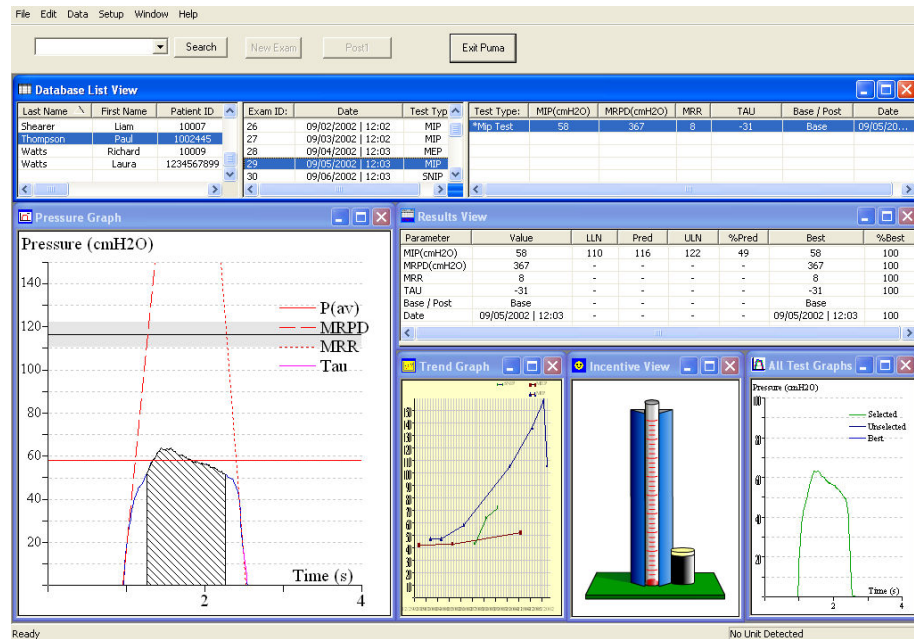
## Contenu De L'emballage

L'analyseur MicroRPM de CareFusion est livré avec les pièces suivantes:

1. Unité Centrale MicroRPM
2. Embout buccal caoutchouté, N° d'article 36-MTH6400
3. Pile alcaline PP3, N° d'article 36-BAT1002
4. Valve de pression expiratoire, N° d'article 36-ASS1221
5. Valve de pression inspiratoire, N° d'article 36-ASS1222
6. Tournevis d'étalonnage, N° d'article 36-MEC1299
7. Sondes nasales de calibre 1 à 4,
8. Raccord de sonde nasale N° d'article 36-ASS1091
9. Filtres anti-bactériens de pression buccale, N° d'article 36-FIL6050 (50 unités)



## Le logiciel PUMA



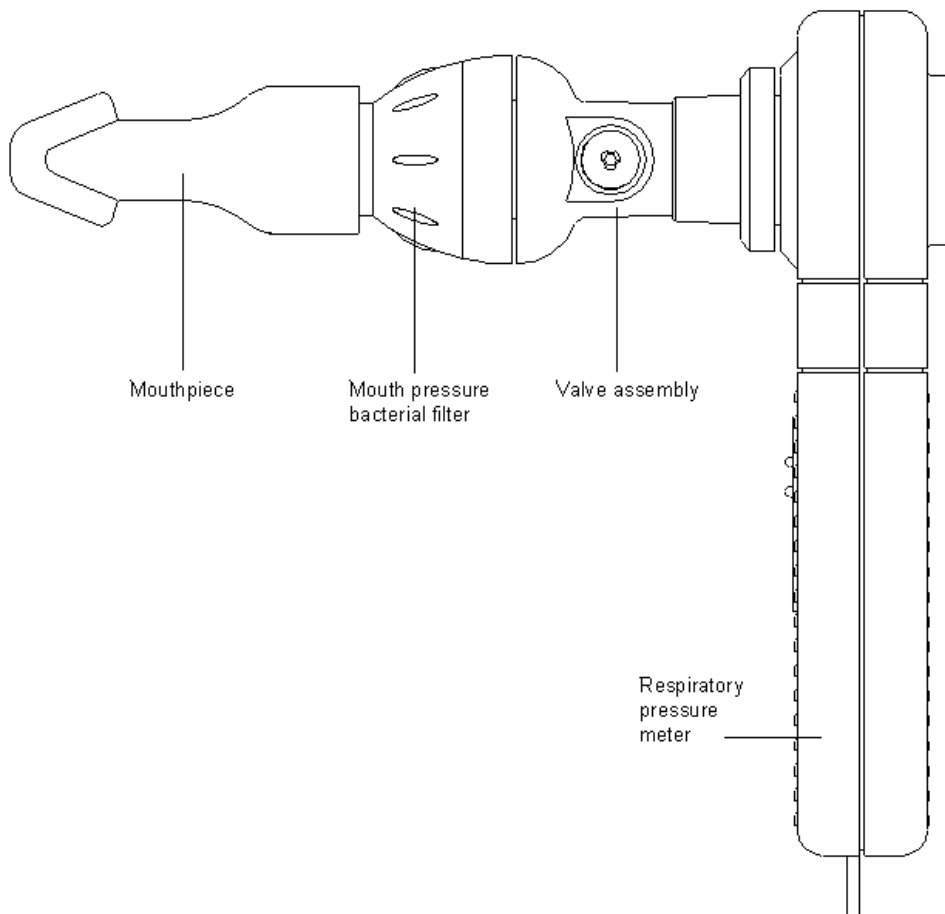
Les fonctionnalités du MicroRPM portable sont largement plus nombreuses et avantageuses lorsqu'il est connecté à un ordinateur PC équipé du logiciel PUMA, via un câble RS232 série qui se branche sur le côté de l'appareil.

Le logiciel PUMA est disponible en téléchargement sur le site [www.carefusion.com/micromedical](http://www.carefusion.com/micromedical). Sélectionnez RPM et choisissez les liens appropriés. Veuillez contacter les départements techniques pour des instructions d'installation et les minimas requis au niveau du système.

Le logiciel PUMA est unique, convivial avec sa plateforme à multifenêtres, performant, permettant le stockage et l'analyse des mesures de force respiratoire de la PImax (pression inspiratoire maximale), de la PEmax (pression expiratoire maximale) et du Sniff test (pression nasale inspiratoire maximale). Ajouté à cela, PUMA permet de bénéficier de fonctions telles que l'affichage de la courbe en direct, la fourniture de valeurs prédites, différents formats d'impression, une animation ludique pendant l'examen, des tendances, la possibilité de faire des tests après médication (post), des indicateurs de fatigue.

## Mode D'emploi – Pressions Buccales

Introduire la pile dans le compartiment situé à l'arrière de l'appareil, placer l'embout buccal sur le filtre lui-même inséré dans la valve adéquate et enfoncer dans l'analyseur selon les illustrations ci-dessous:



|                                 |                                    |
|---------------------------------|------------------------------------|
| Mouthpiece                      | Embout buccal                      |
| Mouth pressure bacterial filter | Filtre buccal anti-bactérien       |
| Valve assembly                  | Valve                              |
| Respiratory pressure meter      | Analyseur de pression respiratoire |

L'appareil est livré avec deux valves. Celle qui est destinée à la pression d'expiration (les deux valves se distinguent par leur inscription respective) permet au patient d'inspirer complètement par la valve qui se referme ensuite durant l'expiration pour que l'analyseur puisse mesurer la pression expirée maximale moyenne sur une seconde.

La valve de pression inspiratoire fonctionne exactement à l'inverse de la valve de pression expiratoire.

Pour mesurer la pression expiratoire maximum (PE<sub>max</sub>), faire glisser le bouton de la position "off" à la position MIP/MEP. Des segments rotatifs s'affichent pendant que l'appareil se règle par fonction autozéro. Attention à ne pas exercer de pression jusqu'à ce que cette opération soit terminée.

Lorsque l'appareil est prêt à être utilisé, un 0 s'affiche.

Pour tester la pression expiratoire, demander au sujet de placer l'embout buccal dans sa bouche en s'assurant que le collet est placé sur les gencives et sous les lèvres et que les pièces à mordre sont situées entre les dents. Il doit ensuite inspirer au maximum de sa CPT (Capacité Pulmonaire Totale) avant d'expirer de toutes ses forces à travers le dispositif de fuite de l'analyseur pendant au moins deux secondes. La valeur affichée est la pression expiratoire maximale moyenne sur une seconde.

Pour obtenir un résultat précis, il est important de s'assurer qu'il n'y a pas de fuite dans le circuit à l'exception du petit dispositif de fuite de l'instrument. Ce dernier est conçu pour éviter les résultats artificiellement élevés dus à la fermeture de la glotte et la compression de l'air dans la bouche par les muscles faciaux.

Avant de recommencer l'analyse ou d'effectuer un test inspiratoire, l'instrument devra être réinitialisé en déplaçant le bouton sur la position off.

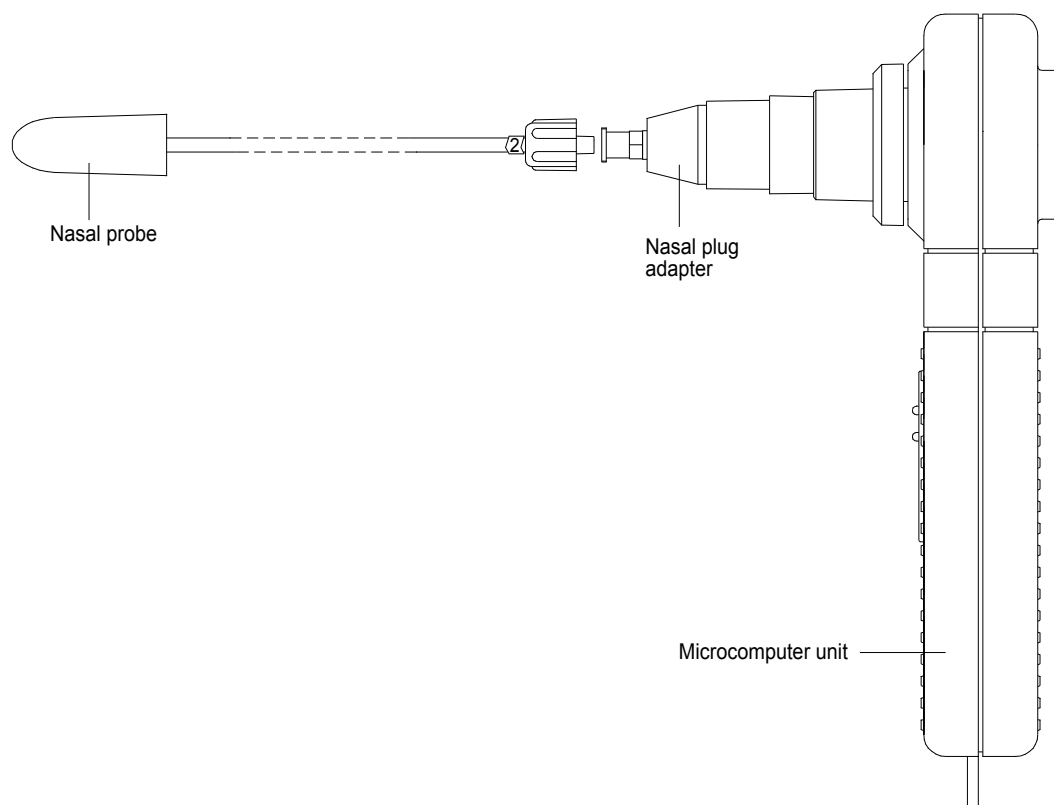
Pour mesurer la pression inspiratoire maximale (PI<sub>max</sub>) il suffit également de suivre les instructions ci-dessus après avoir branché la valve de pression inspiratoire sur l'appareil. Positionner le bouton en position MIP/ MEP à partir de la position off et demander au sujet d'expirer au Volume Résiduel (VR) à travers l'embout buccal avant d'inspirer de toute force pendant au moins deux secondes.

La valeur affichée est la pression inspiratoire maximale moyenne sur une seconde.

### **Mode D'emploi – Pression Inspiratoire Sniff Nasale**

Avant de procéder à l'analyse, il faudra choisir le calibre de sonde nasale adéquat pour le sujet. L'appareil est livré avec quatre calibres de sondes différents afin de pouvoir adapter ces dernières à toutes les tailles de narines. Choisir la taille qui semble la mieux adaptée au sujet, branchez-la à l'appareil selon les illustrations ci-dessous et demandez au sujet de bien introduire la sonde dans sa narine. Une fois la sonde placée, le sujet devra se boucher l'autre narine du doigt et essayer d'inspirer à travers la sonde pour vérifier que la narine est totalement bouchée. Une fois le calibre correct sélectionné, poursuivre comme suit:

Placer la pile dans le compartiment à piles situé à l'arrière de l'appareil et poser la sonde choisie selon les illustrations ci-dessous:



|                    |                         |
|--------------------|-------------------------|
| Nasal probe        | Sonde nasale            |
| Nasal plug adapter | Raccord de sonde nasale |
| Microcomputer unit | Micro-ordinateur        |

Pour mesurer la pression inspiratoire sniff nasale maximale, faire glisser le bouton de la position "off" à la position SNIP. Des segments rotatifs apparaissent pendant que l'appareil se règle par fonction autozéro.

Attention à ne pas exercer de pression jusqu'à ce que cette opération soit terminée.

Lorsque l'appareil est prêt à être utilisé, un 0 s'affiche.

Pour effectuer une analyse SNIP, demander au sujet d'introduire la sonde nasale de façon à ce que la narine soit complètement bouchée. Après une expiration normale, il devra inspirer aussi fort que possible par la narine non bouchée en maintenant la bouche fermée. Ce test



est réalisé à partir de la capacité résiduelle fonctionnelle (CRF). La valeur affichée est la pression inspiratoire nasale de crête.

Avant de recommencer l'analyse, l'instrument devra être réinitialisé en déplaçant le bouton sur la position off.

## Témoin Du Niveau De Charge De La Pile

Le niveau de la pile est contrôlé au moment de la mise sous tension de l'appareil.

Lorsque la pile arrive en fin de vie, la mention 'bAt' s'affiche sur l'écran avant le démarrage du réglage autozéro. L'appareil pourra alors tout de même être utilisé à condition d'effectuer l'analyse tout de suite. La pile devra être changée dès que possible.

Lorsque la pile est totalement usée, l'appareil émet deux bips sonores avant de s'éteindre automatiquement dès sa mise sous tension.

**Remarque:** Lorsque l'analyseur ne doit pas être utilisé pendant de longues périodes, veiller à enlever la pile afin d'éviter les dégâts potentiels sur l'instrument pouvant être causés par les fuites.

## Connexion Au PC

L'analyseur devra être relié à un ordinateur équipé du logiciel PUMA en le branchant sur le port série RS232 situé à gauche de l'appareil.

## Nettoyage

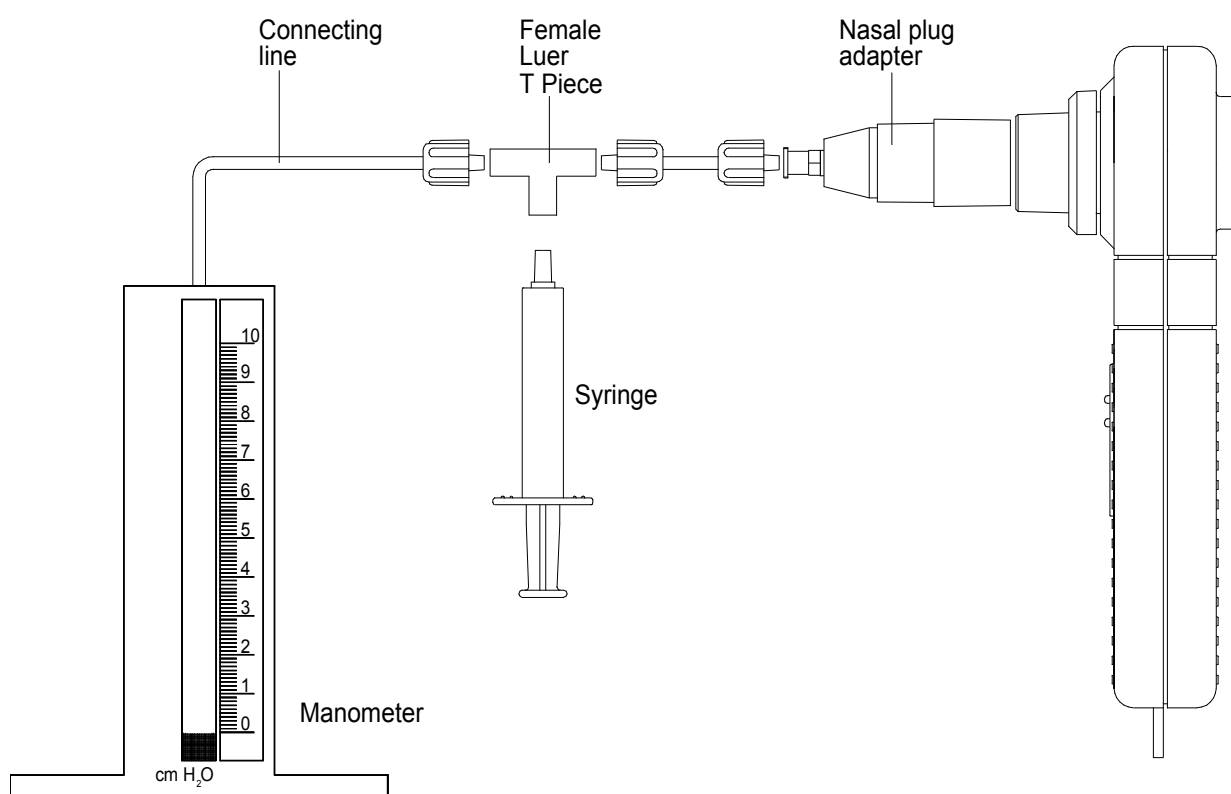
L'analyseur ne demande aucun nettoyage ou entretien régulier et il est protégé de la contamination par le filtre anti-bactérien avec lequel il est livré. Il sera toutefois possible de stériliser l'embout buccal et les sondes nasales en les plongeant dans des solutions stérilisantes telles que PeraSafe ou Anios pendant un maximum de 15 minutes. Rincer les pièces à l'eau distillée, les égoutter puis les laisser sécher avant de les remonter. Il est possible de faire passer de l'air dans le tube de

raccord de la sonde nasale afin d'accélérer son séchage. CareFusion commercialise une pompe à cet effet – voir la liste de pièces de rechange et accessoires en page 40.

PeraSafe peut être obtenue auprès de CareFusion sous forme de récipients en plastique de 81g, N° d'article 36-SSC5000A

## Etalonnage

L'appareil est étalonné en usine et est conçu pour rester stable indéfiniment. Cependant, l'étalonnage pourra être testé en branchant l'appareil à un manomètre suivant l'illustration ci-dessous:



|                     |                           |
|---------------------|---------------------------|
| Connecting line     | Cordon de raccordement    |
| Female Luer T piece | Raccord Luer femelle en T |
| Nasal plug adapter  | Raccord de sonde nasale   |
| Syringe             | Seringue                  |
| Manometer           | Manomètre                 |

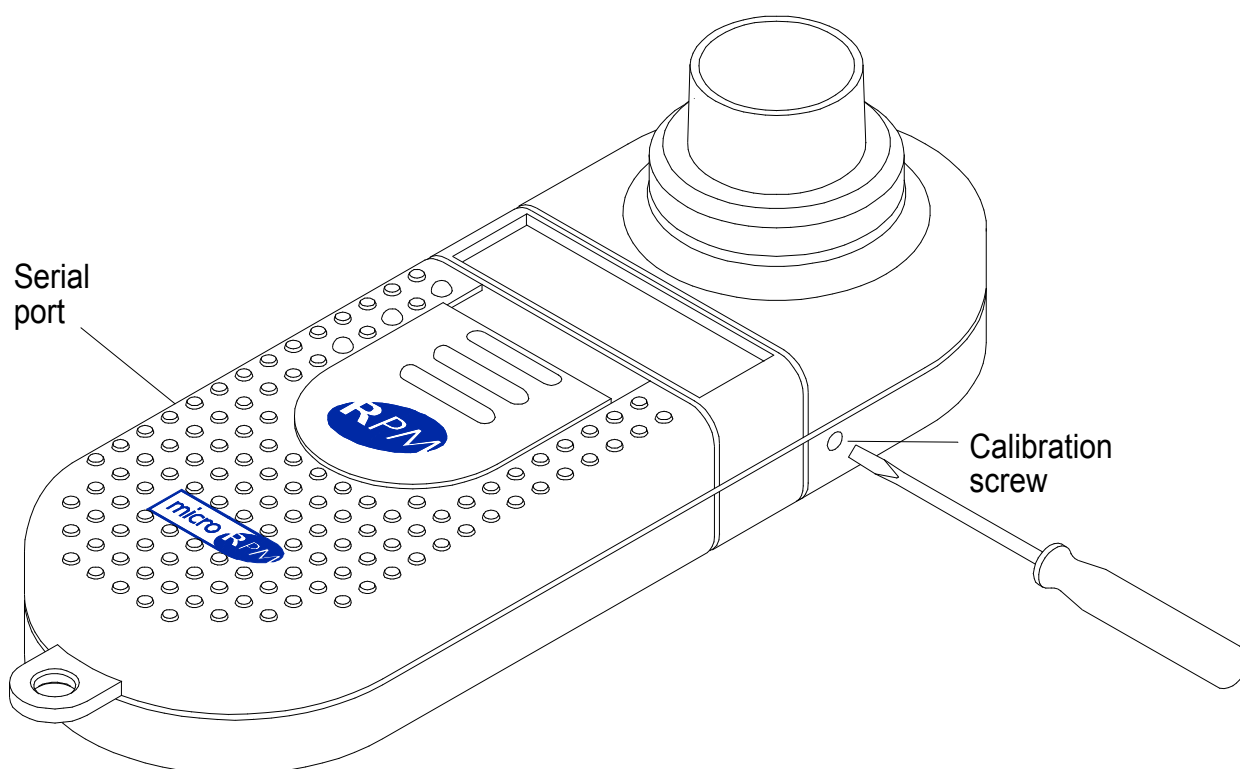
Mettez l'analyseur en position SNIP.

En procédant très lentement, remplissez la seringue jusqu'à ce que le manomètre affiche une pression négative située entre 200 et 300cm.

Contrôler que la différence entre le résultat affiché sur l'analyseur et le résultat du manomètre est inférieure à 3%.

Au cas où un réglage soit nécessaire, réglez l'appareil selon les instructions suivantes:

L'étalonnage ne pourra être effectué que dans le sens positif étant donné que l'analyseur contrôle la pression de crête. Ainsi, si le résultat de l'analyseur est supérieur à celui du manomètre, la vis d'étalonnage devra être serrée dans le sens inverse des aiguilles d'une montre avant de procéder à l'étalonnage.



|                   |                  |
|-------------------|------------------|
| Serial port       | Port série       |
| Calibration screw | Vis d'étalonnage |

Brancher l'analyseur au manomètre selon les indications précédentes. Remplir la seringue au maximum pour obtenir une pression négative avant de visser la vis d'étalonnage dans le sens des aiguilles d'une montre jusqu'à ce que la même valeur s'affiche sur l'analyseur.

## Entretien

Si votre appareil nécessite un entretien ou un dépannage, consulter la page 68 pour obtenir les coordonnées correspondantes.

Un manuel d'entretien complet avec les diagrammes des circuits et une liste des pièces est disponible sur demande.

## Pièces De Rechange / Accessoires

| N° D'article | Description                                                                       |
|--------------|-----------------------------------------------------------------------------------|
| 36-MTH6400   | Embout buccal caoutchouté                                                         |
| 36-ASS1221   | Valve de pression d'expiration                                                    |
| 36-ASS1222   | Valve de pression d'inspiration                                                   |
| 36-FIL6050   | Filtres anti-bactériens de pression buccale<br>(50 unités par boîte)              |
| 36-NPROBE01  | Sondes nasales très petit calibre (10 unités par boîte)                           |
| 36-NPROBE02  | Sondes nasales petit calibre (10 unités par boîte)                                |
| 36-NPROBE03  | Sondes nasales moyen calibre (10 unités par boîte)                                |
| 36-NPROBE04  | Sondes nasales gros calibre (10 unités par boîte)                                 |
| 36-ASS1091   | Raccord de sonde nasale                                                           |
| 36-MEC1299   | Tournevis d'étalonnage                                                            |
| 36-BAT1002   | Pile alcaline PP3                                                                 |
| 36-SSC5000A  | Poudre stérilisante PeraSafe - 81g<br>(Pour obtenir jusqu'à 5 litres de solution) |
| 36-ASS1234   | Kit d'étalonnage de pression                                                      |

## Précautions d'emploi

- Les embouts buccaux sont à usage sur un seul patient. L'utilisation sur plusieurs patients entraîne un risque de surinfection. Une utilisation répétée peut entraîner une détérioration des matériaux et fausser les mesures.

Pour placer une commande de pièces de rechange ou d'accessoires ou pour toute question d'ordre général, veuillez contacter le représentant français de CareFusion aux coordonnées suivantes.

## Symboles



Appareil de catégorie B



Conforme à La directive 93/42/EEC



Disposition conformément à WEEE

## Environnement

Cet appareil est conforme à la directive EN60601-1-2 concernant la compatibilité électromagnétique, mais il est potentiellement sensible aux interférences des téléphones portables et aux interférences magnétiques supérieures aux niveaux spécifiés dans la norme EN 50082-1:1992

## Spécifications

|                                |                       |
|--------------------------------|-----------------------|
| Pression de fonctionnement:    | +/- 300cmH2O          |
| Pression de rupture:           | +/- 700cmH2O          |
| Précision:                     | +/-3%                 |
| Résolution:                    | 1cmH2O                |
| Alimentation:                  | Une seule pile PP3 9v |
| Dimensions:                    | 170 x 60 x 26mm       |
| Poids avec pile:               | 174 grammes.          |
| Poids avec housse:             | 750 grammes           |
| Température de fonctionnement: | Entre 0 et +40 °C     |
| Humidité de fonctionnement:    | Entre 30% et 90% RH   |
| Température de stockage:       | Entre -20 et + 70 °C  |
| Humidité de stockage           | Entre 10% et 90% RH   |

## Customer contact information

### **UK Customers only**

For all Sales Order processing for products, training and spare parts, Service and Technical Support enquiries, please contact the following:

CareFusion UK 232 Ltd  
UK Customer Service & Support  
The Crescent  
Jays Close  
Basingstoke  
RG22 4BS

Customer Service Sales Enquiries:

Telephone: 01256 388550  
Email: [micro.uksales@carefusion.com](mailto:micro.uksales@carefusion.com)

Factory Repair and Administration Enquiries:

Telephone: 01256 388552  
Email: [micro.ukservice@carefusion.com](mailto:micro.ukservice@carefusion.com)

Technical Support Enquiries:

Telephone: 01256 388551  
Email: [support.rt.eu@carefusion.com](mailto:support.rt.eu@carefusion.com)

### **International customers only**

For all Sales Order processing for products and Spare parts, Service and Technical Support enquiries, please contact the following:

Carefusion Germany 234 GmbH  
Customer Service & Support International  
Leibnizstrasse 7  
97204 Hoechberg  
Germany

Customer Service Sales Enquiries:

Telephone: 0049 931 4972 670

Email: [micro.internationalsales@carefusion.com](mailto:micro.internationalsales@carefusion.com)

Factory Repair and Administration Enquiries:

Telephone: 0049 931 4972 867

Email: [support.admin.eu@carefusion.com](mailto:support.admin.eu@carefusion.com)

Technical Support Enquiries:

Telephone: 0049 931 4972 127

Email: [support.rt.eu@carefusion.com](mailto:support.rt.eu@carefusion.com)

**Pour la FRANCE uniquement**

Distribution, vente, assistance et après-vente :

Société **EOLYS SAS**

8 rue de la Grange

69009 LYON

Service client

Téléphone : 04 37 64 47 50

Télécopie : 04 37 64 47 59

Email : [contact@eolys.fr](mailto:contact@eolys.fr)

Site web : [www.eolys.fr](http://www.eolys.fr)





CareFusion UK 232 Ltd.,  
Quayside  
Chatham Maritime  
Kent ME4 4QY  
U.K.



JDE no. 36-MAN1280  
Drg no. 064-04WW  
Issue 1.0  
February 2010  
© CareFusion 2010