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CAPNOGRAPH AND OXIMETER PC-900B

User manual



ATTENTION: *The operators must carefully read and completely understand the present manual before using the product.*

REF 33698 / PC-900B

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M33698-GB-Rev.1.05.18

Welcome to using the Capnograph and Oximeter manual.
This manual is copyright reserved. It is prohibited to copy, duplicate or translate into other languages without our written permission.
Please to read this manual carefully and then follow its instructions when operating this monitor.
It is not permitted to open the monitor's main cover, modify or disassemble it without our permission or official service training.
The buyer will not be advised of Technology updates which do not influence the monitor's key functionality. Furthermore, please pay attention to the difference between the parts or components provided as information in this manual.

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Chapter I
Preface

I. Brief

The purpose of this manual is to provide the User with a brief understanding of the characteristics, functions and operation of the monitor thereby preventing incorrect operation and user error.
This device can monitor four physiological parameters for the patient at the same time: End tidal CO_2 concentration ($EtCO_2$), Respiration Rate (RR), functional Oxygen Saturation (SpO_2) and Pulse Rate (PR). The monitor you bought may have functions with two or more parameters mentioned above, but this manual can be used in common for the applicable functions.

II. Warranty and Maintenance

Warranty on Hardware and Battery
This Monitor has a warranty of 12 Months from the date of purchase.
The following will invalidate the warranty:

- if the monitor is damaged due to misuse or incorrect operation (i.e. without following the User manual instruction),
- the monitor is damaged due to incorrect connection with another instrument.
- the monitor is accidentally damaged or dropped
- if the user modifies or changes the monitor without written authority of the company.
- the serial number is deliberately damaged, torn off or unreadable.

Maintenance
If the monitor is non-functional outside of the warranty period, the manufacturer or distributor will offer an estimate for repair. The maintenance/repair/calibration place depends on actual conditions.
Re-packing for Repair or Calibration
It is recommended to use the original packing boxes and packing materials when returning for repair or maintenance.

III. Safety Requirements

For the purposes of safety, please read the following and abide by these instructions of medical instrumental products.

Warning: Indicating the possible injury on patient or operator.

- This monitor is not suitable for use during the operation of MRI or CT. This Monitor is not MRI Compatible.
- To ensure that the monitor is safely grounded when charging use a three-pole socket.
- Only use manufacturer designated accessories to ensure compliance with appropriate standards
- It is not allowed to remove the cover of the monitor.
- This monitor provides End tidal CO_2 ($EtCO_2$) concentration, Respiration Rate, Oxygen saturation and Pulse Rate. This data only provides assistance for diagnosis and actual diagnosis shall be made by suitably qualified clinical staff using all the clinical information and symptoms.
- In order to prevent pressure sores and correct circulation the SpO_2 sensor must be repositioned regularly, depending on the type of sensor used.

Chapter II
Technical specifications and Characteristics

$EtCO_2$

Method:	Creative proprietary non-dispersive InfraRed Spectroscopy
Range:	0 – 150mmHg or 0 – 20kPa or 0 – 20% (v/v)
Accuracy:	±2mmHg for $EtCO_2$ range 0 - 40mmHg ±5% for $EtCO_2$ range from 41 - 70mmHg ±8% for $EtCO_2$ range from 71 - 100mmHg Over 100mmHg ±10%

Note: The accuracy of CO_2 concentration measurement is influenced by any interfering gas and/or vapour, for example N_2O gas can raise the CO_2 reading (2-10%), and Helium and O_2 can reduce the CO_2 reading (1-10%), so compensation should be set in the balance gas MENU to meet the accuracy requirements if such gases or vapours are present.

Update/Averaging Time:	Option of every breath or 10, 20 or 30 seconds
Warm Up Time:	<20 seconds
Sample Flow Rate:	50–250ml/min User Adjustable. Default =100ml/min
Patient Modes:	Adult and Neonatal
Memory:	24 hours on Screen Trend and Numeric
Sensor:	<25g Single Use Gas Sample Line and Adapter for Intubated and /or Non Intubated Patients
Color Change:	Connector housing has additional built-in LED Colour change feature. Purple (or Red) during occlusion or pump err.

Respiration Rate

Range:	3 - 150 breaths/minute

Accuracy:	±1% of reading or ±1 breaths/min whichever is greater
Memory:	24 hours on Screen Trend and Numeric

SpO_2 (optional)

Method:	Creative Patented Proprietary Pulse Oximetry
Range:	0 - 100%
Accuracy:	±2% for SpO_2 range from 70 - 100% ±3% for SpO_2 range from 50 - 69%
Memory:	24 hours on Screen Trend and Numeric

Pulse Rate (optional)

Range:	30 – 250bpm
Accuracy:	±2% for PR range from 30 – 250bpm
Memory:	24 hours on Screen Trend and Numeric

Power

AC Input:	100V - 250V, 50Hz/60 Hz to 5VDC Adapter with 5V mini USB adapter Cable Optional Vehicle 12V to 5V Mini USB Charger Lead.

Battery

Type:	Built-in rechargeable lithium battery pack (3.6V, 3000mAH)
Charging Time:	4 hours from flat
Operating Time:	10 hours on full charge

Operating Conditions

Temperature:	-5 to +50°C
Humidity:	< 93% % (non-condensing) = < 29.45 hPa
Atmospheric pressure:	70 - 120 kPa

Storage Conditions

Temperature:	-30 to +70°C
Relative Humidity:	<93% (non-condensing)
Atmospheric pressure:	50 - 120 kPa

Dimensions of Monitor

Size:	70x160x40mm (W x H x D)
Weight:	Weight on Airway ETT/LMA <25g. Monitor 600g

Warranty & Maintenance/ Calibration

24 Months warranty on Main Unit and Lithium Ion Rechargeable Battery.
Auto self-zeroing calibration, annual calibration check recommended.

IP rating
IP32 when used in specified Carry Case.

CE & Product classification
As per IEC 60601- 1 / CSA601.1 / UL2601-1

Type of Protection
Class II
Degree of Protection: Type BF-Applied Part
Mode of Operation: Continuous

93/42/EEC Medical Device Directive Compliant
CE 0123 Shenzhen Creative Industry Co. Ltd

Chapter III
Introduction of Monitor

I. Introduction



Figure 1

1. Screen: Displays waves, menu, alarm and all measuring parameters.
2. ▲/🔔: Function button:
   ▲ a) When menu (except the TREND menu) is activated, press this button to move the cursor.
   b) When the TREND menu is activated, this button changes between the trend graph and data table
   🔔 On the main display, to press this button to silence alarms for 2 minutes.
3. ▼: Press this button to move the cursor when menu is activated.
4. **+** : Multifunction button.
   a) Press this button to increase figures on the menu.
   b) In the main display screen, to press this button to freeze the display wavefor m (if frozen, the data to print is the data of the frozen moment)
5. **-** : Press this button to decrease figures.
6. **ENTER**: Confirmation button;
   a) Press this button to “Confirm” on the menu.
   b) In the main menu, to press this button to turn on the pump directly if it has automatically time switched OFF
   c) If the device is connecting with Bluetooth printer, press this button for 2 seconds to print capnography and other result parameters ($EtCO_2$, RR, SpO_2, PR).
7. Press this button to enter or quit menu or change display
8. ⏻ Power button: hold for >2 seconds to activate
9. Indicator **POWER**: Blue LED is lit when the Monitor is either switched ON or subject to external power when not switched ON.
   If the yellow LED is lit, the internal battery is being charged.
10. **CO_2**: The faucet of filter, blue color indicator flashes if the filter T3 is off. when the filter T3 is plugged in ,the indicator color will change to be blue all the time, and it will change to be red during occlusion or pump err.
11. **SpO_2**: The socket of SpO_2 (optional).
12. DC5V Mini USB Charging interface.
    Note: this interface must only be connected to a device which meets safety standards.
13. Exhaust outlet: Do not occlude.
14. Speaker location
15. Battery Compartment with clip on Battery Door
16. Hanging Point for Lanyard if required.

Chapter IV
Patient connection

I. CO_2 measurement

Push in and twist 45° clockwise to connect the filter/water trap T3 to the Connector on the top of the Monitor. Attach the selected Gas Sampling Line to the CO_2 filter/water trap Female Luer Connector (Use a Male to Male Luer adapter if necessary) and then select a sampling point as close as possible to either the Patient or the Ventilator Breathing Circuit.

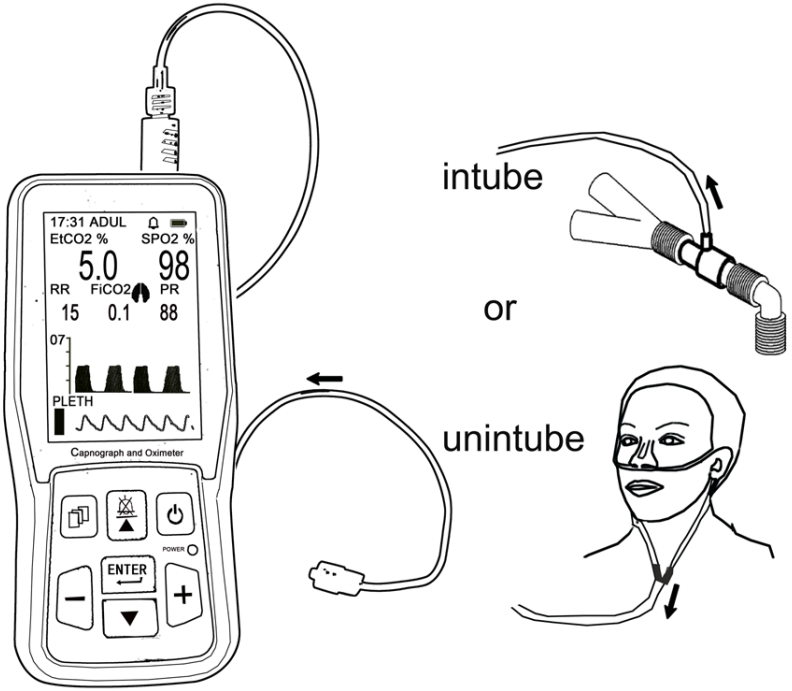


Figure 2

Filter/water trap T3:

WARNING

Do not use the Monitor if the filter/water trap T3 is not installed to avoid contamination and damage to the IR measurement cell.

In order to avoid vapor and respiratory mucus entering into the IR Cell, the machine must be used with the filter/water trap T3.

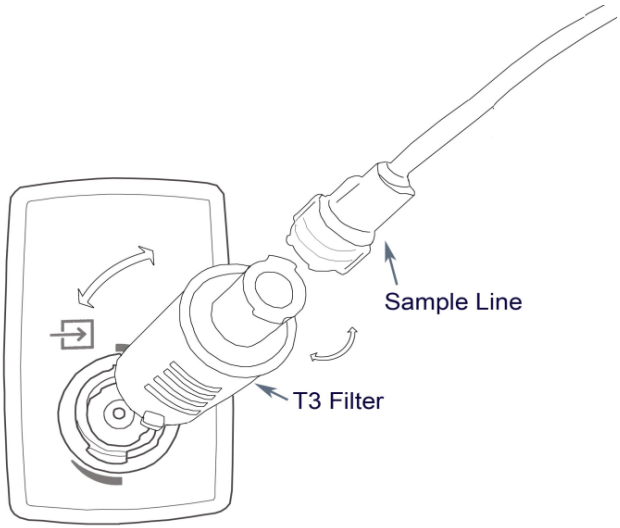


Figure 3

Instruction for use of the filter/water trap T3:

1. Insert the convex cleat of filter/water trap T3 into the notch of the inlet port of device and turn T3 45°clockwise.
2. Attach male luer lock sample line connector to filter/water trap T3 (Use a Male to Male Luer adapter if the sample line has Female Luer connector)
3. Connect the other end of the Sample line to the chosen sampling point of Patient or Ventilator Circuit.
4. Change the filter/water trap T3 as needed – This item may dried if very wet and re-used, subject to local Infection Control requirements. If the filter/water trap T3 becomes dirty or the Occlusion Alarm is activated when it is dry then the filter/water trap must be replaced.

WARNING

Ensure that connections are air tight as if there is leakage, measured values are likely to be inaccurate.

WARNING

Use only recommended Original bespoke filter/water trap T3 to ensure accuracy.

II. Respiration rate measurement

The calculation of respiration rate derives from monitoring the CO_2 waveform.

III. Theory introduction

1 The measuring principle:

The device working theory is NON-DISPERSIVE INFRA RED GAS ANALYZER. The device has an AUTO ZERO ADJUSTMENT SYSTEM and GAIN CONTROL

2 Automatic Offset Calibrations

The device was designed to automatically perform calibrations in order to correct for changes in temperature, altitude and electronic component drift. The air surrounding the device may have elevated concentrations of CO_2 present (such as in an enclosed compartment or room with poor ventilation). Therefore, we recommend use in well ventilated locations to ensure that the CO_2 baseline does not cause inaccuracy.

3 The Moisture Separation System:

This instrument uses a patented filter/water trap T3 which can filter a large amount of moisture whilst maintaining a minimum dead space thereby improving the accuracy of the waveform. PLEASE NOTE that if the filter/water trap becomes full of water or dirt the display will show "OCCLUSION ', the operator needs to change the filter/water trap T3. The old filter can be reused after natural drying in a ventilated and dry environment. Discard the old filter/water trap if dirty.

IV. Oxygen saturation measurement (optional)

1. It is also recommended to use Pulse Oximetry for ventilated or sedated patients. Measurement will begin when your finger is put into the sensor clip, meanwhile, the photoplethysmogram wave will appear on the screen, after several seconds the oxygen saturation and pulse rate appear. The monitor will give a pulse tone sound when each heart beat happens. The tone will change to an alarm tone if the values of SpO_2 and Pulse Rate breach the alarm level settings. The volume of pulse beep can be adjusted by the item **BEEP VOLUME** in the SOUND SET menu. The pulse beep tone will disappear under the silent condition.

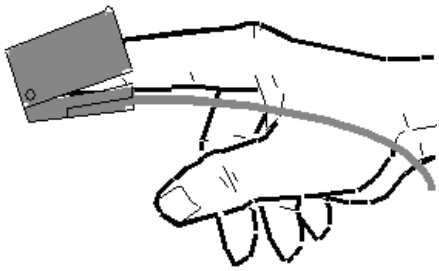


Figure 4

2. The use of different SpO_2 sensors
There are a number of different SpO_2 Sensors for use with this monitor. Please see brochure or listing at rear of Manual for details.
PLEASE NOTE: when SpO_2 is not being monitored the probe should be disconnected from the monitor to save battery life, or the two windows of sensor should be kept face to face, otherwise the light window will remain operational and the photoplethysmogram wave will be disordered and the screen will display "**FAIL SEARCH**".

V. Notice

1. Caution:
Under conditions of electromagnetic influence, for example: electrosurgical devices, MRI, CT etc. they may cause incorrect operation.
This device is not MRI/CT Compatible.
The filter/water trap T3 should be taken off and replaced when it is nearly full of water, otherwise water ingress may cause irreversible damage for IR measurement detector cell. Be sure that the collecting pipe is not occluded to avoid stressing the inner sampling pump reduction of pump life.

2. Attention:
other important information.
1) CO_2:
The approved sampling lines provided by or specified by the manufacturer or distributor, shall be used, otherwise readings may be inaccurate.
Fast changes in ambient Temperature may cause inaccuracy and in this instance the Display will show "TEMP IMBALANCE".
The measured data may be influenced by different kinds of anaesthetic gases. If it is required to calibrate interference gases please refer to Appendix 2.
Any circumstances of blocking of the gas sampling line, such as bending, folding, contamination blocking the sampling tube and filter or water trap etc. may lead to inaccurate measurement.
Serious respiratory conditions leading to exhaled CO_2 concentration being extremely high or low, e.g. $EtCO_2$ lower than 0.5% or higher than 11%, may generate inaccurate measurement.
Any air leaks in the sampling line circuit will seriously influence accuracy of data measured and waveform shape.

2) Oximeter:
The monitor's measurement of SpO_2 may be influenced by strong ambient light. Therefore the user should unplug the SpO_2 Sensor when it is not being used.
Accuracy of oximeter readings will be influenced if there is imaging dye in the blood or if CO has been inhaled by the Patient.

Only use Creative SpO_2 probes approved for use with this Monitor.
Always make sure that the sensor is not contaminated or broken before use.
Always take care to check that the sensor is applied correctly.

Warning:
Do not use the SpO_2 sensor if it is damaged or dirty.
If shock, low blood pressure, serious blood vessel constriction, serious anemia, very body low temperature, artery block near sensor or incomplete heart asystole occur the pulse signal may disappear.

Chapter V
Screen display and Operation

I. Screen main display menu

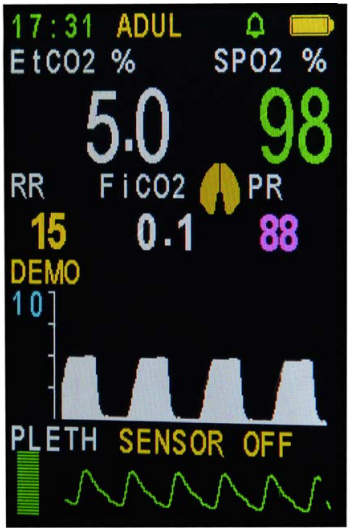


Figure 5

The first line of data shows time (hour, minute)/patient ID, patient type: Adult (ADU) or Neonate (NEO), the memory area full indicator ( ) alarm sound closing (!), silence ( ) or non silence ( ), bluetooth symbol ( ) and battery indicator .

Attention:
a) When the memory full indicator is displayed, further patient data cannot be stored. If you want to save the new data effectively, you need to enter the NEW PATIENT menu toe delete the data in the storage area, or to change patient ID., beside you can set up trend RENEW into AOTO mode,

please see the details in VIII. NEW PATIENT

b) If the symbol appears, the menu is locked, the setting menu will be disabled unless user press the three buttons, ▼, - at the same time, or enters engineer menu to unlock the menu (Refer to Appendix 2 ENGINEER MENU: Changing compensation of balance gas)

c) The symbol () appears if the bluetooth module is equipped. If this symbol is green, it indicates that no bluetooth equipment is connected (e.g, bluetooth printer), if this symbol becomes white, it indicates that some bluetooth equipment is connected (e.g, bluetooth printer).

d) The middle part of the screen shows results data: $EtCO_2$ concentration, respiratory rate, inhaling CO_2 concentration (optional), oxygen PLETH, exhaling or inhaling state (during exhaling, becomes blue color).

The bottom area shows CO_2 respiratory wave. If it is equipped with SpO_2, it will show SpO_2, pulse, oxygen PLETH waveform and histogram.
When the pump is not operating “PUMP OFF” will appear on the screen.
If the filter/water trap is NOT inserted into the inlet port, the screen will show ‘LINE OFF, the pump will also be automatically switched off to prevent ingress to the unprotected IR detector Cell.

Alarm indication:

1. If the $EtCO_2$’s value exceeds the limit of high or low alarm level, the word ‘$EtCO_2$’ will flash and alert with the audible high priority alarm. This high priority alarm will also sound for respiration rate, SpO_2 and pulse rate alarms.
2. If the battery level is almost fully depleted the battery indicates completely empty, the monitor will alarm continuously and will shut down automatically.
3. When the apnea alarm is turned on and apnea occurs the monitor will give a high priority audio/visual alarm. The screen will flash the message ‘APNEA’ (meaning no $EtCO_2$ has been detected for a certain time period) and if the sound alarm is turned on, it will alert a high priority audible alarm.
4. When the SpO_2 sensor is disconnected or not applied, the screen will flash the message ‘**SENSOR OFF**’. If a heart beat pulse is not detected for a period of time, the screen will flash the message ‘**FAIL SEARCH**’.
5. The volume of continuous or interval alarm tone sounds mentioned above can be adjusted up and down by the menu item **ALARM_VOLUME**. The sound will inaudible under the silent condition. If the alarm volume is 0, the silence indicator in the main menu will show '!'
6. All the parameter alarms for over limits and apnea alarm, will lead to the flashing of the red alarm indicator on the panel.

II. The Main Menu

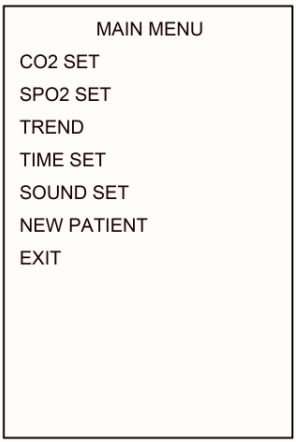


Figure 6

Press the MENU button ⧉ to enter the Main Menu to set monitor parameters (as FIGURE 6).

WARNING

All Menu Settings are LATCHING and remain when the Monitor is powered off. Ensure that all necessary settings are reviewed and are suitable for the patient BEFORE use.

This menu includes the following options:
The setting menu for CO_2: **CO_2_SETUP**
The setting menu for SpO_2: **SpO_2_SETUP**
The trend menu: **TREND**
The time menu: **TIME_SETUP**
The sound menu: **SOUND_SETUP**
The new patient menu: **NEW PATIENT**

In this menu, to press ▲ or ▼ button to move the cursor up or down to highlight an option and Press the ENTER button to select and enter the next level of the menu. To return to the Main menu select EXIT option and press ENTER (not available on Trend screen).

III. CO_2 SET Menu

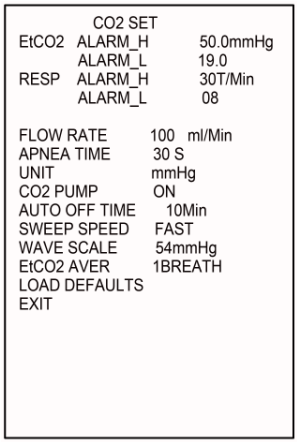


Figure 7

In this menu, press ▲ or ▼ button to move the cursor up or down, press + button or - button to change the data highlighted by the cursor.
To return to the main menu highlight EXIT and press the **ENTER** button. If you want to return the monitor to its default settings highlight LOAD DEFAULTS and Press the **ENTER** button.

This menu includes the following setups:

1. The high alarm limits of **$EtCO_2$: $EtCO_2$ ALARM_H**: 22-99mmHg, off
2. The low alarm limits of **$EtCO_2$: $EtCO_2$ ALARM_L**: off, 10-60mmHg
3. The high alarm limits of respiration rate: **RESP ALARM_H**: 5-60 breaths/min, off
4. The low alarm limits of respiration rate: **RESP ALARM_L**: off, 4-40 breaths/min
5. Pump flow rate setup: **FLOW-SET**: 50cc/min-250cc/min
6. The setup of apnea time: **APNEA TIME**: 15s-44s, off
7. The unit of CO_2: **CO_2 UNIT**: %, mmHg or kPa
8. Pump switch: **ON** or **OFF**
9. Pump auto-closing time: **AUTO-OFF-TIME**: 10-30min
10. Screen speed of capnograph: **SWEEP SPEED**: SLOW, NORMAL or FAST
11. CO_2 Wave scale: **WAVE SCALE**: 54mmHG or 76mmHG
12. $EtCO_2$ average computation time: **$EtCO_2$ Averaging**: every breath, 10sec, 20sec, 30sec
13. Default reload: **LOAD-DEFAULTS**
14. Exit: **EXIT**

Attention:
Pump auto-closing time means that the pump will automatically be closed down when no respiration occurs in the set period (default 10 min).

The wave scale means the maximum value of waveform amplitude display but it does not mean data on full-scale. Data on full-scale still means 99mmHg.

Default values are as follows:
$EtCO_2$ alarm high limit: 50 mmHg
$EtCO_2$ alarm low limit: 19 mmHg
RESP alarm high limit: 30 breaths/min
RESP alarm low limit: 08 breaths/min
$FiCO_2$ alarm high limit: OFF
FLOW_SET: 100 CC/Min
Apnea time: 30S
CO_2 unit: %
CO_2_PUMP: ON
AUTO_OFF_TIME: 10 Min
SWEEP SPEED: NORMAL
$EtCO_2$ Averaging: 1 Breath
WAVE SCALE: 54mmHg

IV. SpO_2 SET Menu

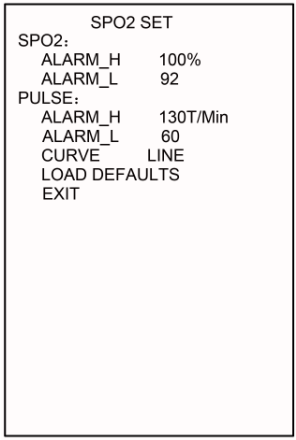


Figure 8

In this menu, press ▲ or ▼ button to move the cursor up or down, press **+** button or **-** button to change the data highlighted by the cursor.

To return to the main menu highlight EXIT and press the **ENTER** button.
If you want to return the monitor to its default settings highlight LOAD DEFAULTS and Press the **ENTER** button.

This menu includes the following setups:
1. The high alarm limits of SpO_2: **SpO2 ALARM_H**: 50%-100%, off
2. The low alarm limits of SpO_2: **SpO2 ALARM_L**: off, 50%-99%
3. The high alarm limits of pulse rate: **P_RATE ALARM_H**: 70-250 beats/m, OFF
4. The low alarm limits of pulse rate: **P_RATE ALARM_L**: OFF, 40-100 beats/m
5. Wave curve selection: **CURVE WAVE**: FILL or LINE
6. Renewing of defaults. **LOAD DEFAULTS**

The wave curve selection means that: FILL indicates the beneath part of photoplethsmogram is filled. LINE indicates the photoplethysmogram is drawn in curve line.
Default values as follow:
SpO_2 alarm high limit: 100%
SpO_2 alarm low limit: 92%
Pulse Rate alarm high limit: 130 beats/min.
Pulse Rate alarm low limit: 50 beats/min.
Curve: Line

V. TIME SET Menu

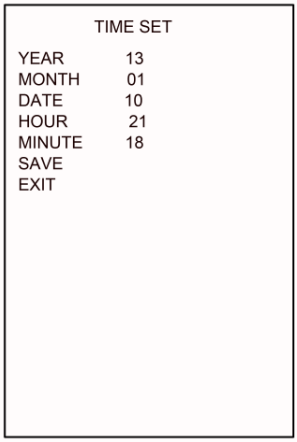


Figure 9

In this menu, press ▲ or ▼ button to move the cursor up or down, press **+** button or **-** button to change the data highlighted by the cursor.
Attention: Any time adjustment will delete any stored trend data, so please take care before making this adjustment.

The procedure is as follows:
1. Change time.
2. Move the cursor to SAVE then press the ENTER button to enter the

following menu FIGURE 9.;
3. YES is already selected (highlighted in white) and if you wish to confirm this change press Enter if you do not wish to confirm the change move the cursor and highlight NO and press Enter.
4. Only by confirming can the time adjustments be made.

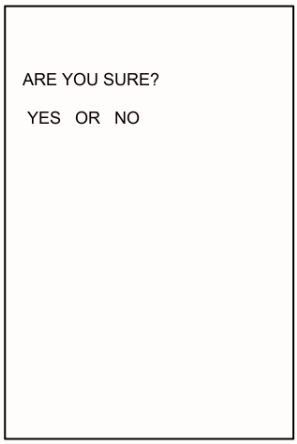


Figure 10

VI. Sound SET Menu



Figure 11

In this menu, press ▲ or ▼ button to move the cursor up or down, press **+** button or **-** button to change the data highlighted by the cursor.
This menu includes following setups:
Pulse sound volume: **BEEP_VOLUME**: 0(OFF)-8
Alarm sound volume: **ALARM_VOLUME**: 0(OFF)-8

If the alarm volume is 0, the top line in the main menu will show '!'

VII. Trend

1. The graph trend

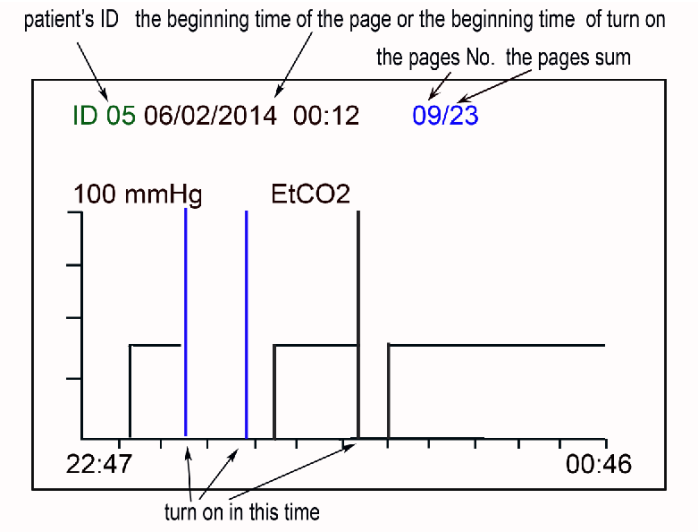


Figure 12

The monitor stores $EtCO_2$, PR, SpO_2 and PR as a group of data every 12 seconds (Adjustable in Store Interval under New Patient menu) with accumulated trend up to 24hours respectively. The stored data is retained even the device is shut off.

The symbol ☐ will appear on screen when the storage is full. There are three options to further store the data.

1. Change patient ID under NEW PATIENT menu.
2. Change store mode to AUTO under NEW PATIENT menu, in auto mode data will be stored and renewed when reaches its limits.
3. Select CLEAR MEMORY under NEW PATIENT menu to empty the stored data.

Figure 12 shows that the time base for the trend page is 1 hours and every point indicates the result of every 12 second. The top line of this page indicates patient's ID number, the start time of this page (date/month/year hour : minute), current page no. and sum pages (24 pages in total).

If in the corresponding time to the one page of trend table, the user turns off and turns on the device once or more times the trend table will show one or several blue vertical lines with full amplitude, at this time press ▼, then the top row will display the initial information at that turn on time: patient's ID number and initial time. The correspondingly initial blue vertical line will become white one. Press ▼ again, the second initial time will display (if turned off and on for several patients).

The time at beginning and ending parts of abscissa in this picture respectively indicates the beginning and ending time for trend of this page.

If the data is not complete, it shows the monitor was turned off although it has not completed 2 hours' record.

In this menu, press ENTER button to change the trends of CO_2 concentration, respiration rate, SpO_2 and pulse (the latter 2 parameters are selectable).
In this menu, press **+** button or **-** button to change the page of trend.

In this menu, press ▲/ 🔔 button to change graph trend to table trend (see Figure 13).
In this menu, press MENU button to quit this menu and return to the main display.

2. The table trend

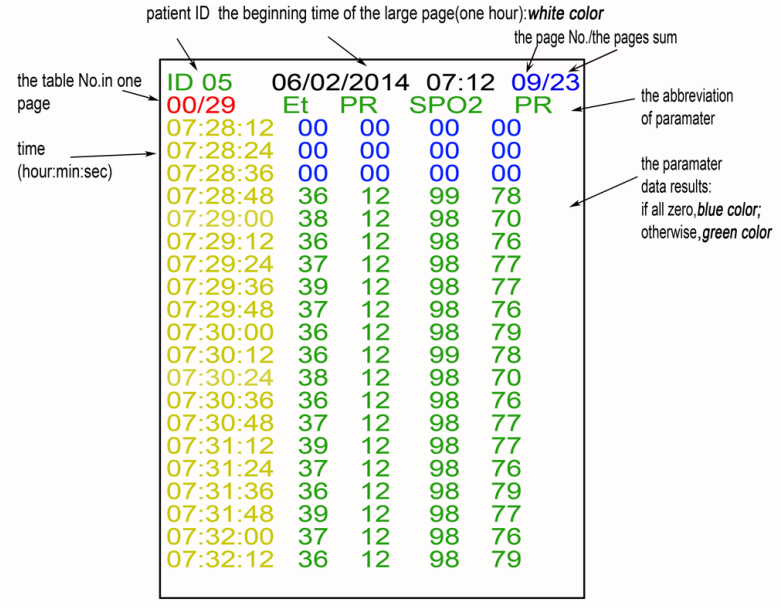


Figure 13

In this graph trend menu, press ▲/ 🔔 button to change graph trend to table trend. Press ▲/ 🔔 button again, to return to graph trend (Figure 12).

Every trend table shows 10 groups of data , including time, $EtCO_2$ (Et), respiration rate (RR), SpO_2, pulse rate (PR). The store inverval is adjustable at 12 seconds in STORE INTERVAL under NEW PATIENT menu.

There are 24 sum pages when the storage is full. Each page contains 30 trend table and each trend table contains 10 groups data. The 30 trend table in one page can be reviewed by ▼ button. The table no. is indicated on left top of the screen in Figure 13.

In fully stored status, 24 pages can be paged up or down by **+** button or **-** button. The page no. is indicated on right top of the screen in Figure 13.
To quickly check if the four parameters of a data group are all zero, the display will display the parameter columns in blue.

VIII. NEW PATIENT Menu

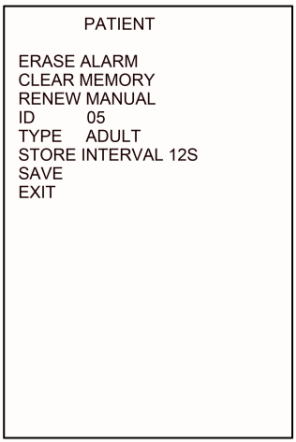


Figure 14

In this menu, press ▲ or ▼ button to move the cursor up or down, press **+** button or **-** button to change the data highlighted by the cursor.
In this menu, press MENU button, then to exit this menu and enter the main menu.
This menu includes the following setups:

1. **ERASE ALARM**: to cancel the current alarm
2. **CLEAR MEMORY**: to delete all the historical data so as to store new data
3. **RENEW MANUAL**: to change store mode between manual andauto.
4. **ID**: patient's ID, 00-99 optional

5. **TYPE**: patient type, Adult or Neonate options
6. **STORE INTERVAL**: adjustable at 12 seconds
7. **SAVE**: to store the changed data (this needs to be confirmed by the new menu due to possibly substitution to the original data of the same ID of patient)
8. **EXIT**: to quit the current menu but not to store the changed setup

Chapter VI
Charging, Maintenance, Cleaning

I. Charge

Connect the AC/DC power adapter via the Mini USB port turn on the unit. The unit will charge the battery with power at the same time as operating. The battery charge will end after battery is full.
The battery of this unit is a long life rechargeable lithium battery. When the unit is operated on battery only the battery indicator shows the battery's charge level on the screen. When the battery charge level is low, the indicator will flash red , and the external 5VDC power must be connected as soon as possible.
After DC power is connected, the monitor will recharge the battery, and will stop charging after the battery has fully recharged. Operation time for a fully charged unit is > 10 Hours. Charge time is approx. 4 Hours.

Battery replacement method:
Note that the operation must be done with the DC Charger disconnected ensuring that the operator's safety is not compromised.
Press down and slide off to remove the battery cover, then carefully disconnect and remove the battery. Reverse this procedure to replace the new battery and re-fit the battery cover.
NOTE: Any battery that is removed and no longer required must be properly disposed of by following national and local regulations.

II. Maintenance

If the monitor appears abnormal (e.g. software system is halted), then to reboot the device hold the Power ON/OFF button down for 5 seconds.

OCCLUSION: If the Display shows 'occlusion', check if the filter/water trap and/or sampling line tubing or connectors are blocked.
Replace as necessary and clear the occlusion or switch OFF to prevent damage to the sampling pump.

Please do not let alcohol, cleaning reagent or sterilizing reagent into filter/water trap. Check that the filter/water trap's internal membrane is dry clean before it is used. Although recommended as a single patient use item for maximized infection control, in an emergency the filter/water trap may be re-used if in good condition. In this case the filter/water trap should be removed, the surface should be cleaned as in section III below, with a dry tissue and the filter/water trap then placed in ventilated dry environment to let it dry naturally. Replace the filter/water trap if it is dirty, shows any sign of contamination or if in any doubt about its condition.
Please Note: It is advised to use the filter/water trap T3 as a single patient use item so as to absolutely remove the risk of crossinfection.

Attention:
The sample line or water trap should be not sterilized and used repeatedly if the packing indication shows that it is disposable.
Attention:
For the environment, disposable sample line or filter shall be treated suitably or recycled.

III. Cleaning

Warning: Before to clean the monitor and probe, power shall be turned off and removed from any charging source.

1. Cleaning the Monitor
It is recommended that the Monitor is used in the supplied Carry Case which offers protection from both contamination, liquid ingress and damage.
Do Not to sterilize the Monitor by high pressure, autoclave or washer.
Do Not to dip or expose the Monitor to liquid.
Do Not to use the Monitor if there is any sign of damage.
Use only PH Neutral Cleaning products.
This product is not suitable for mechanical re-processing or sterilization.
Monitor Cleaning Instructions: Only the Carry Case and if necessary the Monitor surfaces may be cleaned and/or disinfected. Use Moist (not dripping) wipes with 70% solution of isopropyl alcohol, or very dilute Chlor-clean (1000ppm) or Chlorohexidine (1000ppm) or mild detergent, then allow to air dry naturally.

2. Cleaning the SpO_2 probe.
Care:
Do Not sterilize the probe by high pressure, autoclave or washer.
Do Not dip the probe into liquid.
Do Not use the probe if there is any sign of damage.
Use only PH Neutral Cleaning products.

This product is not suitable for mechanical re-processing or sterilization.
Cleaning instructions:
Use Moist (not dripping) wipes with 70% solution of isopropyl alcohol, or very dilute Chlor-clean (1000ppm) or Chlorohexidine (1000ppm) or mild detergent, then allow to air dry naturally.

3. Cleaning of filter/water trap T3 if required (only for re-use)
Please Note: It is advised to use the filter/water trap T3 as a single patient use item so as to absolutely remove the risk of cross infection.

Re-Use Cleaning:
Only the filter surface may be cleaned and/or disinfected. Use Moist (not dripping) wipes with 70% solution of isopropyl alcohol, or very dilute Chlor-clean (1000ppm) or Chlorohexidine (1000ppm) or mild detergent, then allow to air dry naturally.

Chapter VII
Trouble Shooting Analysis

Simple analysis of problems

No.	Phenomena	Causes	Solution
1	The values of CO2 is reading too low, or 'OCCLUSION' appears on the screen.	1. Leaking of filter or sampling tube. 2. Occlusion of filter or sampling line. 3. Out of Calibration.	1. Check and replace filter T3 or sample line. 2. Clear the gas loop Occlusion. 3. Re-calibrate using standard gas.
2	The values of CO2 is zero. 1. Screen indicating PUMP ERR and big noise. 2. Screen indicating IR-LAMP-BAD. 3. Screen indicating CO2 SENSOR ERR.	1. Internal leaking inside the Pump gas loop. 2. The IR lamp resource of sensor damaged. 3. IR Sensor broken.	Contact the Distributor or manufacturer for repair.
3	Screen indicating CAL-ERR.	The last calibration has failed.	Re-calibrate using standard gas.
4	Screen indicating POWER-ERR.	Damaged or incorrect power supply.	Contact Distributor or manufacturer.
5	The CO2 wave is not normal. 1. Screen indicating TEMP-HIGH.	1. Temperature too high. 2. Temperature too low. 3. Sharp ambient Temperature change.	Use in normal environmental temperature range.

	2. Screen indicating TEMP-LOW. 3. Screen indicating TEMP-IMBALANCE.		
6	No values of SpO_2 or no wave.	1. Finger too cold. 2. Interference of very strong external light. 3. The measurement test of SpO_2 and blood pressure are done on the same arm. 4. Red light in the sensor no flashing. 5. Infrared and collector of sensor is not clean.	1. Warm up finger. 2. Avoid strong external light. 3. Place SpO_2 sensor on other arm or position. 4. Renew SpO_2 sensor. 5. Clean internal parts of SpO_2 Sensor.
7	Flashing 'LOW BATTERY' and closed down automatically.	1. No Battery Charge.	1. Connect to Battery Charger.
8	Still flashing 'LOW BATTERY' after the power is supplied and AC indicator no light.	1. Battery Charger power working abnormally.	1. Check battery charger and cable and replace as necessary.

Attention: Please to contact the Distributors Customer Service if you require advice, replacement parts and/ or service.

Appendix 1. Explanations of Terms in this Manual

MENU	Menu
$EtCO_2$	The CO_2 concentration of expiration end phase
$INCO_2$	The CO_2 concentration of inspiration phase
SpO_2	Oxygen saturation
RR or R-RATE	Respiration rate
PR or P-RATE	Pulse rate
mmHg	Millimeters Mercury
kPa	Kilopascal
ALARM-H	Alarm high limit
ALARM-L	Alarm low limit
LINE	Line curve
FILL	Filled or solid under waveform
BEEP_VOLUME	Pulse volume
ALARM_VOLUME	Alarm volume
LOW BATTERY	Low battery charge
APNEA	Apnea or breathing stopped for a set period of time
Breaths/Min	Breaths per minute
CAL	Offset Calibration
SET	Setup

N_2O	Nitrous oxide
HELIUM	Helium gas
O_2 CONCENTRATION	O_2 concentration compensation
ANAESTHETIC GAS	Anaesthetic gas
ZERO GAS	Base point or Zero point
BTPS	Temperature and deep lung air pressure compensation
CALIBRATE	Calibration
CANCEL	Cancellation
OCCLUSION	Blocked filter/water trap or gas sample line

Appendix 2. ENGINEER MENU: Changing compensation of balance gas

Attention: Only the trained personnel may carry out the following the procedure. Contact your Supplier for training and advice.

Enter the engineer menu as follows:
Press **+** and ▼ two buttons simultaneously to enter the following menu.

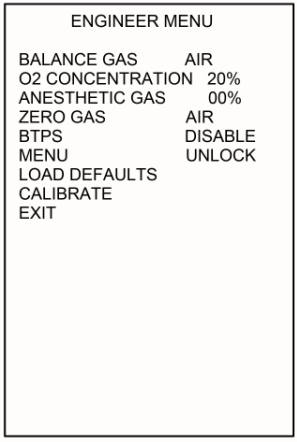


Figure 15

In this menu, press ▲ or ▼ button to move the cursor up or down, press **+** button or **-** button to change the data highlighted by the cursor.

Some items of this menu can be directly adjusted, such as LOAD-DEFAULT or EXIT: to press ENTER button, exit without saving or changing data. In this menu, Press MENU button, then to exit this menu and enter the main menu.

This menu including the following setups

BALANCE GAS: AIR, N_2O, and HELIUM
O_2 CONCENTRATION: 20%-99%
ANAESTHETIC GAS: 0-20%
ZERO GAS: AIR, N2
BTPS: ENABLE, DISABLE
MENU: UNLOCK, LOCK
LOAD DEFAULTS
CALIBRATE

Attention:
1. When the menu is in lock condition, menu is disabled. To unlock the menu, press **+** and ▼ to enter engineer menu and change “unlock” to “lock” the MENU setting. This is to avoid the misoperation of the patient against the preset of the doctor.

2. CALIBRATE is for CO_2 concentration recalibration. Long press ENTER button for 8 seconds to enter this menu.
Default values as follows:
BALANCE GAS: AIR
O_2 CONCENTRATION: 20%
ANAESTHETIC GAS: 0%
ZERO GAS: AIR
BTPS: DISABLE
MENU: UNLOCK

Appendix 3. Calibration of EtCO2 Accuracy

Attention: Only trained personnel are allowed to carry out the following procedure. Contact your Supplier for training and advice.

1. Attentive items and preparative work
The monitor has been calibrated before being shipped by the manufacturer. On each occasion that the monitor is switched on it will do a self-check and gain adjustment according to working environmental temperature, pressure and balance gas etc. Generally the user does not need to calibrate this device other than the recommended annual check.
To check the unit using Cal Gas the following procedure must be obeyed.

1.1 Required Parts and Items:
CO_2 standard gas - Concentration is normally 5-8%

Three-way connector: A three way connector with an inner diameter of 1-3 mm (one connection vented to open air) must be used to protect the

monitor when calibrating using a CO_2 standard gas bottle see figure 16. The device **will be damaged** by the high pressure of the standard Cal Gas Bottle if the connector is not used. It is strictly forbidden to connect the cal gas bottle directly to the device. One end of three-pass connector must be directly open to air to release gas pressure and protect the monitor.
Two tubes (whose length can extend outside room): The standard gas flows into the air continuously through the three way connector and the module pump also vents the gas that is checked. During calibration CO_2 gas of a higher concentration can easily and quickly accumulate around the device. To prevent any potential of this affecting and influencing the calibration of the Zero base vent the connections from the three way adapter and the monitor to outdoor.

1.2 Connect as follows:

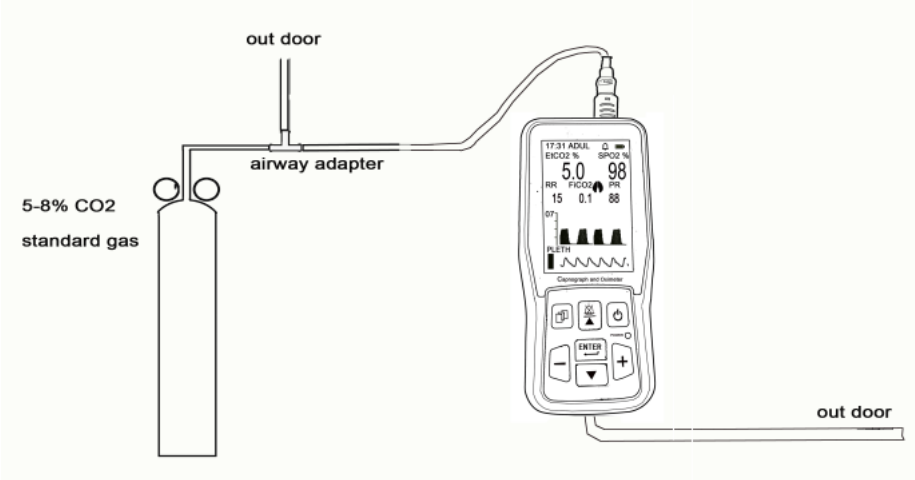


Figure 16

2. Warm-up: Turn on power and run the unit for 20-30 minutes and adjust the pump flow rate to over 120cc/min. To check if there is a leak use the following method: Squeeze the sampling tube by hand, the operating noise of the sampling pump will increase noticeably. If the sampling pump does not accelerate and its operating noise also does not change then there must be a leak in the gas loop. You must then find out where the leak is and solve it, otherwise, it will lead to incorrect calibration. After warming-up, open the flow of standard cal gas, and listen if the sound of pump is as same as original one. If the pump's turning is slow and its turning sound is weak, that means the standard gas pressure/flow is too large.
Turn down the Cal Gas flow rate until the sound of sampling pump resumes its original volume.

3. Enter the engineer menu (procedure given at Appendix 2, Figure 15), highlight CALIBRATE, long press ENTER button for 8 seconds to enter the next menu.

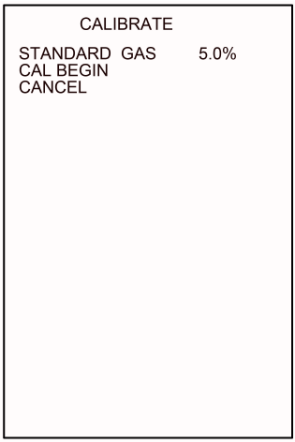


Figure 17

Highlight STANDARD GAS and adjust the value to that of the concentration of CO_2 standard gas. If the standard gas concentration precision is to 2 decimal places numbers round up accordingly.
Then highlight CAL-BEGIN and long press the ENTER button for 8 seconds, at the same time, open the standard gas as set per Figure17 and the device will begin to calibrate. The screen will display the message 'ADJUSTING!' as sown in FIGURE 18.

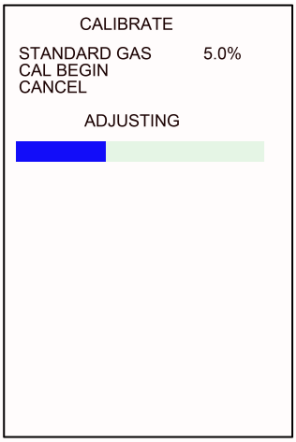


Figure 18

The thick cross bars in the display will be erased as time passes and the calibration will end when they are completely erased. If the calibration is successful, the menu will show ADJUST OK and subsequently exit into

the main menu. If the calibration is unsuccessful, this menu will show ADJUST ERR. If this occurs the loop needs to be checked to determine if there is a leak or standard gas has run out (the pressure indicator of gas bottle shows 0). The Calibration menu will remain if the calibration is unsuccessful.

If you require to exit this menu during the calibration press the MENU button or highlight CANCEL and press the ENTER button.
Note: Remember to close the valve of the standard gas to prevent wastage.



***Disposal**: The product must not be disposed of along with other domestic waste. The users must dispose of this equipment by bringing it to a specific recycling point for electric and electronic equipment. For further information on recycling points contact the local authorities, the local recycling center or the shop where the product was purchased. If the equipment is not disposed of correctly, fines or penalties may be applied in accordance with the national legislation and regulations.*

GIMA WARRANTY CONDITIONS

Congratulations for purchasing a GIMA product. This product meets high qualitative standards both as regards the material and the production.
The warranty is valid for 12 months from the date of supply of GIMA.
During the period of validity of the warranty, GIMA will repair and/or replace free of charge all the defected parts due to production reasons.
Labor costs and personnel traveling expenses and packaging not included.
All components subject to wear are not included in the warranty.
The repair or replacement performed during the warranty period shall not extend the warranty. The warranty is void in the following cases: repairs performed by unauthorized personnel or with non-original spare parts, defects caused by negligence or incorrect use. GIMA cannot be held responsible for malfunctioning on electronic devices or software due to outside agents such as: voltage changes, electro-magnetic fields, radio interferences, etc. The warranty is void if the above regulations are not observed and if the serial code (if available) has been removed, cancelled or changed.
The defected products must be returned only to the dealer the product was purchased from. Products sent to GIMA will be rejected.