Before operating, please read this Manual carefully. Please store this Manual properly for future reference.
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Chapter I Overview

1.1 Introduction
The MONITOR is used to measure SpO2 (blood oxygen saturation) and ETCO2 (End Tidal CO2)

WARNING
This equipment must be operated by veterinary professionals. Personnel who are not authorized or trained should not attempt to operate this device.

NOTE
The illustrations in this manual may be slightly different than actual device due to manufacturer updates.

Safety

Do not use monitor while charging.

Degree of protection against electric shock: Type BF Applied.

The MONITOR is suitable for small animal vital signs monitoring. With the spot measurement mode, it stores up to 100 patients’ data (200 records for each patient). With the monitoring mode, it stores 48 hours of measurement data, with a friendly interface, 3.5” color TFT screen, and data review functions.

When using audio and visual alarm mode, the red light flashes when power is low. When measuring results are outside the specified limits, the font of the result becomes red and an audio alarm sounds. The user can turn on or off alarms.

NOTE
The device will shut off automatically in spot measurement mode with 1 minute of no activity. Auto shut off can be disabled if needed. See section 3.4.5.
Chapter II Main Part & Accessories

2.1 Button and indicator light

- **Power** - Switch on/off
- **Mute** - Press this key to mute or unmute audible
- **Function 1** - Carry out functions as indicated by text showing on the lower left corner of screen
- **Function 2** - Carry out functions as indicated by text showing on the lower right corner of screen
- **Select** - Choose different options on setting menu
- **Alarm light** - Red light flashes when alarm is triggered or when battery is low.
- **Power light** - Solid red light indicates monitor is charging. Solid green light indicates full charge.

Fig. 2.1.1 buttons and indicator light
2.2 Power Socket on Bottom

![Power Socket](image)

**Fig. 2.2.1 Power Socket**

**NOTE**
Please use the power adapter as provided only. Do not use device while charging.

2.3 Reset Micro USB

![Reset Micro USB](image)

**Fig. 2.3.1 Reset Micro USB**

Open the protecting shell, and plug a paper clip into the reset hole. Press hard, the device will be reset.

2.4 Ports on top

![Ports](image)

**Fig. 2.4.1 Ports**

**NOTE**
Not all ports are available on all models.
2.5 Mounting hole

![Mounting hole](image)

**Fig. 2.5.1 Mounting**

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting hole is used with the optional Pole/Cage Mount device (<a href="#">J1459P</a>).</td>
</tr>
</tbody>
</table>

2.6 Accessories

A. SpO2 sensor, 1 pc  
B. SpO2 clips, 1 small, 1 large  
C. Y Cable, 1pc  
D. ETCO2 Module, 1pc  
E. Disposable ETCO2 Adaptors, 1 pediatric, 1 adult  
F. USB cable, 1 pc  
G. Power Adaptor, 1 pc  
H. Charging Dock, 1 pc  
I. User Manual, 1 pc
Chapter III Interface

3.1 Main Interface

Fig. 3.1 Main Interface

3.2 SpO2 Measurement Interface

3.3 ETCO2 Measurement Interface
3.4 System Menu

Turn on the device, press “Set” button to enter the system setup menu.

![Fig. 3.4 System Menu](image)

3.4.1 Work Mode Setup: SPOT & Monitoring Mode

SPOT mode is best used to obtain a single reading, or series of readings. Monitoring mode is best used when needing to continuously monitor a patient undergoing sedation, anesthesia, critical events, etc. Under SPOT mode, the device will shut off automatically after 1 minute of no monitoring activity. The results will be saved/stored at intervals ranging from 4-120 seconds, as set by the user (see section 3.4.3). ID management can only occur under SPOT mode (see section 3.4.5).

Under Monitoring mode, auto-shut off is disabled and the device works continuously. The results are recorded at intervals ranging from 4-120 seconds, as set by the user (see section 3.4.3). User ID’s can be selected under Monitoring mode, but ID creation and management can only occur in SPOT mode (see section 3.4.5).
3.4.2 Alarm Setup: Set the alarm limit.

**SpO2 alarm range:** 100%~0%
**Pulse rate alarm range:** 0~501 BPM
**ETCO2 alarm range:** 1-152 mmHg
**INCO2 alarm range:** 0-99 mmHg
(Note: INCO2 low alarm is always set to 0)
See ETCO2 Set Up for information on apnea alarm

### Fig. 3.4.2 Alarm

3.4.3 SpO2 Set Up
Beep: Turn beep per heart beat on/off
Mean Time: Select the time interval for recording data

3.4.4 ETCO2 Set Up
**CO2 Unit:** Choose mmHg, kPa or %
**Apnea Time(s):** Set time device will alarm with no breaths detected.
Note: Monitor must detect 3 breaths before this timer is activated.
**CO2 Save Time(s):** Set how often monitor records ETCO2 data (in seconds)
**CO2 Range:** Choose how high the vertical axis (Y Axis) of the ETCO2 waveform graph will display
**ETCO2 Zero:** Use this when connecting a new adaptor or resetting a current adaptor, see section 5.1.2.1 Pressing “OK” while ETCO2 zero is highlighted will start the operation.
3.4.5 System Set up: User Preferences Set Up

Low Power Mode:
Under SPOT mode, the device will shut off automatically with no measurement taken within 1 minute. To disable auto shut off, set Low Power Mode to “off”.

| NOTE | Under monitoring mode, Low Power Mode (auto shut off) is unavailable. |

Bluetooth: On/Off

| NOTE | The Bluetooth function is not available in current version of device. |
Language: English, Chinese
Brightness: Level 1, Level 2
Time: Adjustable

Set ID (under Spot mode): select ID, New ID, Delete ID. ID’s can only be created & selected in SPOT mode. Once the ID is created & selected, user can switch to Monitoring mode to begin monitoring and recording data for that ID.

Default Configuration: To Restore the Default Factory Settings

Machine Maintenance: For service technicians only
Machine Information: Version No.

3.4.6 Review: Measurement Results Review
Choose “OK”, system will display saved IDs. Select ID and press “ok” to display the results:

3.4.7.1 Table
**Spo2 Table:** Time, SPO2, PR  
**CO2 Table:** Time, ETCO2, INCO2, RR

3.4.7.2 Trend Chart
**SpO2 Trend Chart**

The SpO2 trend chart displays SPO2 and Pulse Rate. The left vertical axis is oxygen saturation in percent, the right vertical axis is pulse rate and the horizontal axis is time.
ETCO2 Trend Chart

The trend chart shows ETCO2, INCO2 and RR by different color. The left vertical axis represents the value, the horizontal axis represents time. The trend chart includes ID, Pages, Date (time range in this page). To view all the data through the pages, use the up and down arrow keys.
Chapter IV SpO2 Measurement

4.1 Measurement Parameters
Arterial oxygen saturation(SpO2): Oxyhemoglobin percentage of total hemoglobin
Pleth waveform(Pleth): patient pulse signal in Pleth waveform
Pulse Rate: pulse per minute
Index bar: in proportion to the pulse strength
Blood flow perfusion index: PI values reflect the pulse strength. The stronger the pulse the higher the PI value.

4.2 Measurement instruction
SPO2 sensor:
1) Connect the SpO2 sensor to the monitor appropriately.
2) Press the power button to turn on the monitor.
3) Place the SpO2 sensor on the patient appropriately. Lingual surface is preferred but sensor can also be placed on lip, ear, prepucce/vulva, or any other non-haired, minimally pigmented surface.

4.3 Cautions
1) Must use the SpO2 sensor supplied with the monitor.
2) Keep the SpO2 sensor stable to get accurate measurement results.
3) When the SpO2 sensor or the patient is moving, the measurement results may not be accurate.
4) Do not put the SpO2 sensor on the same limb as a blood pressure cuff, bandage or peripheral catheter.
5) Check all the cables and make sure the SPO2 sensor is in good condition before use.
6) Do not use the monitor when the patients pulse rate is lower than 25 bpm, it may give incorrect results.
7) During long term monitoring, user should verify the SpO2 sensor is still correctly placed. Re-position as needed every 2-4 hours.
8) Keep the SpO2 probe placement location clean. Blood, dirt or other fluids may cause inaccurate results.
### 4.4 SpO2 Error and SpO2 Possible Cause of error

<table>
<thead>
<tr>
<th>Error</th>
<th>Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>SysErr3</td>
<td>SPO2 module self-test error</td>
</tr>
<tr>
<td>SysErr4</td>
<td>SPO2 module communication</td>
</tr>
<tr>
<td>no pulse</td>
<td>Can’t find pulse</td>
</tr>
<tr>
<td>no Sensor</td>
<td>SPO2 sensor not connected</td>
</tr>
<tr>
<td>Sensor off</td>
<td>Sensor is no longer placed on patient</td>
</tr>
<tr>
<td>Searching</td>
<td>Searching for pulse</td>
</tr>
</tbody>
</table>
Chapter V Mainstream CO2 Module

5.1 Hardware Interface

5.1.1 Mainstream CO2 Module:

5.1.2 Points for Attention:

5.1.2.1 Zero Operation
It is recommended that users ensure each module goes down to zero before use to ensure the best measurement accuracy. This operation is not necessary but is recommended. During the zero calibration operation, ensure that the gas sampled by the module is room air. If the module is in use and zero calibration must be performed, the module must alarm “apnea” first and the user must disconnect the module from the patient, ensuring that none of the gas sampled is from the patient. If the probe needs to return to zero, just unplug the adaptor and re-insert it. The probe will automatically return to zero without having to enter the monitor set-up software (see section 3.4.4).

5.1.2.2 Check Adaptor
When “check adapter” warning appear, check to see if the adapter is connected and that the optical analysis window is clean. Clean probe with alcohol or install a new probe if needed.
5.1.2.3
The monitor may report “compensation not set” after power failure or device reset. If this warning occurs, enter the Set ETCO2 menu to adjust the compensation settings.

5.1.2.4
Upon initial power up and after connecting a new probe to the monitor, a solid red light will illuminate on the module itself. This means the module is in a pre-heated state. When the red light goes out, the probe is preheated. When the probe is pre-heated and in a normal measurement state, a green light will illuminate during exhalation and will turn off during inhalation. If the red light is slowly blinking, that indicates a “check adaptor” alarm. A fast blinking red light indicates the adapter needs to return to zero (see section 5.1.2.1).
Note: The adapter needs to be preheated for 2-3 minutes (until the red light extinguishes) to prevent condensation on the optical analysis window from affecting the measurement results.

5.2 Proper Connection
For the mainstream module, the adaptor should always be kept in the correct position, as follows:
5.3 Troubleshooting of mainstream CO2 module

5.3.1 The mainstream ETCO2 module needs to be pre-heated before use. Preheating time takes about 3 minutes, depending on the ambient temperature. For example, the preheating time in a colder room will take about 3 minutes whereas a warmer room may take as little as 1 minute. The purpose of preheating is to prevent condensation from building up in the adapter. The optical analysis window can get covered and affect the measurement. When condensation occurs, the monitor will prompt the “check adapter” alarm. Condensation and respiratory secretions can be removed with a cotton tipped applicator dipped in alcohol. When a new probe is connected to the monitor, the red light will always be on, which means the module is in a preheated state. When the red light goes out, the module is preheated and no lights will be on. When the probe is in a normal measurement state, the green light will turn on when exhalation is detected and will turn off when inhalation is detected. If the module has a slow flashing red light, it is in a “check adapter” state. The user should check to ensure the adapter is connected properly and the optical analysis window is clear. If the module has a fast flashing red light, it is indicating “return to zero”. Disconnect the module from the patient, ensure no respiratory gases are in the adapter, then disconnect and reconnect the adapter to the module. The module will automatically return to zero without entering the monitor set up software.

5.3.2 When the mainstream ETCO2 module is being used for a long period of time, it is recommended to periodically check the optical analysis window to see if it is contaminated by respiratory secretions. If the optical analysis window is found to be dirty, it is necessary to clean the adapter window or replace with a new adapter. If the optical analysis window is dirty, the monitor will display the “check adapter” alarm. If the user attempts to zero the module, the procedure will cause an error. At this point, the module will not work properly and
will continue to prompt the “check adapter” or “adapter need replace” warnings. If the user attempts to clean the module but the warning and alarms persist, a new adapter should be connected. Baseline elevation will cause the ETCO2 readings to be high. When a new adapter is connected, the module will automatically carry out a return to zero operation. This process can last about 15 seconds and the user should ensure that no respiratory gases enter the adapter during this time.

5.4 CO2 Compensations
The measurement of CO2 is affected by temperature, pressure and gas compensations. The barometric pressure, as well as the presence of O2, N2O, Helium, and anesthetic agents in the gas mixture need to be compensated for by the device in order to achieve it’s stated accuracy. The device provides instrument settings to allow the user to communicate these operating conditions. Please set the correct settings according to your operation environment the first time you use this monitor. Adjusting these settings is only necessary if using the monitor in extreme conditions, 99% of users will not need to adjust these settings. The settings can be found in the ETCO2 set up menu.

5.5 Apnea Alarm
The “Apnea Time(s)” is the maximum time allowed from the detection of one breath to the next breath. Therefore, if the time between breaths exceeds the time out period, the alarm “Apnea” will be triggered.
At start-up, or following a zero operation, three breaths need to be detected before this timer is activated. To clear the “Apnea” alarm, three breaths are required, or a zero operation must be carried out.

NOTE
The Capnostat monitor is not an apnea monitor. The software cannot discriminate between the patient no longer breathing and a sensor that has been disconnected from the patient circuit.
6.1 Equipment Classification (IEC 60601-1)
IEC Class II, Type BF applied

**Display:** 3.5” Color TFT
**Dimension:** 65mm*30mm*145mm (2.5” x 1.2” x 5.7”)
**Weight:** 250g (8.8 oz) with rechargeable battery

**Working Environment:**

**Temperature**
- **Operating:** 5°~ 40°C (41°~104°F)
- **Storage/Transportation:** -20°~+55°C (-4°~131°F)

**Humidity**
- **Operating:** 15%~80%
- **Storage/Transportation:** ≤ 95%

**Power:** 4V, DC, P≤3.2VA

**Power Source:** AC power or battery

**Fuse (self-recovery):**
- Input fuse: 2A/250V
- Fuse (battery): 60Vdc/3A(max)

**Battery**
- Lithium ion rechargeable battery: 3.6V/4.2Ah
- Work time: 3 hours
- Charge time: 6 hours

**SpO2 Measurement Range:**
- Spo2: 0~100%
- PR: 0-500 bpm
- Perfusion Index: 0.05%-20%
CO2 Measurement Range:
0-150 mmHG
0-19.7%
0-20 kPa

6.2 Accuracy Range
SpO2: 70%-100%
PR: 30-500 bpm
Perfusion Index: 0.05%-20%

<table>
<thead>
<tr>
<th>ETCO2 Concentration</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-40mmHg</td>
<td>±2 mmHg</td>
</tr>
<tr>
<td>41- 70 mmHg</td>
<td>±5% of reading</td>
</tr>
<tr>
<td>71 – 100mmHg</td>
<td>±8% of reading</td>
</tr>
<tr>
<td>101-150mmHg</td>
<td>±10% of reading</td>
</tr>
</tbody>
</table>

6.3 Measurement accuracy
SpO2: +/- 2 digits (70-100%)
Undefined (<70%)

On motion condition:
Pulse rate: +/- 3 digits
SpO2: +/- 3 digits

CO2 concentration measurement resolution:
0.1mmHg

Respiratory rate measurement:
- 150 BPM accuracy:±1 BPM
Chapter VII Instruction of USB Data Upload

7.1 Instruction of USB Data Upload

1) Open ‘HandleVitalSignsMonitorSoftwareSetup’

![Image of file browse with files]

2) Select ‘Run anyway’

![Image of Windows protected your PC dialog box]

3) Select ‘Next’

![Image of setup wizard]
4) Select ‘Install’

5) Select ‘Next’
6) Select ‘Finish’

![Device Driver Installation Wizard](image1)

7) Select ‘Close’

![Microsoft Visual C++ 2010 x64 Redistributable Setup](image2)
8) The icon below will appear on your desktop

![Icon](image)

9) Open the software and connect the InSight Vet Vital Signs via USB to the computer, select Import to transfer data to the PC.

![Software Interface](image)