InSight™ Multi Parameter

Monitor

Operator's Manual

Table of Contents

Chapter I Overview 4
1.1 Introduction 4
Chapter II Main Parts & Accessories 5
2.1 Button and Indicator Light 5
2.2 Power Socket 6
2.3 Reset Micro USB 6
2.4 Ports 6
2.5 Mounting Hole 7
2.6 Accessories 7
Chapter III Interface 8
3.1 Main Interface 8
3.2 SpO2 Measurement Interface 8
3.3 ETCO2 Interface 8
3.4 NIBP Measurement Interface 9
3.5 System Menu 9
3.5.1 Work Mode Setup: 9
3.5.2 Alarm Setup: Set the Alarm Limit of Each Parameter 10
3.5.3 SpO2 Setup 10
3.5.4 ETCO2 Setup 10
3.5.5 NIBP Setup 11
3.5.6 System Setup: User Preferences Setup 11
3.5.7 Review: Measurement Results Review 13
Chapter IV SpO2 Measurement 16
4.1 Measurement Parameters 16
4.2 Measurement Instruction 16
4.3 Cautions 16
4.4 SpO2 Errors and Possible Causes of Errors 16
Chapter V NIBP Measurement 18
5.1 General 18
5.2 NIBP Measurement 18
5.3 Operation Instructions 19
5.4 NIBP Errors and Possible Causes of Errors 20
5.5 Maintenance and Cleaning 21

Chapter VI Mainstream CO2 Module 22
6.1 Hardware Interface 22
6.1.1 Mainstream CO2 Module 22
6.1.2 Points for Attention 22
6.2 Proper Connection 23
6.3 Troubleshooting of Mainstream CO2 Module 24
6.4 CO2 Compensations 25
6.5 Apnoea Alarm 25
Chapter VII Specifications 26
7.1 Equipment Classification (IEC 60601-1) 26
7.2 Accuracy Range 27
7.3 Measurement Accuracy 28
Chapter VIII Instruction of USB Data Upload 29
8.1 Instruction of USB Data Upload 29

Chapter I Overview

1.1 Introduction

The monitor is used to measure SpO2 (blood oxygen saturation), NIPB (Non-Invasive Blood Pressure) and ETCO2 (End Tidal CO2).

WARNING This equipment must be operated by veterinary professionals. Personnel who are not authorised 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 the 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" colour 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 alarms on or off as required.

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 3.5.6.

Chapter II Main Parts & Accessories

2.1 Button and Indicator Light

Fig 2.1.1 Buttons and Indicator Light

- **Power –** Switch on/off
- **Mute –** Press this key to suspend or resume the alarm loudspeaker
- **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 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

2.2 Power Socket

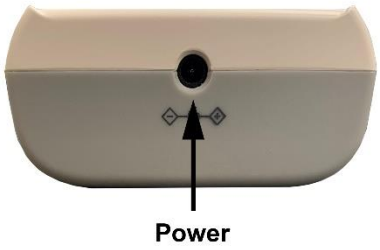


Fig 2.2.1 Power Socket

NOTE Please only use the power adapter supplied. Do not use device while charging.

2.3 Reset Micro USB

Fig 2.3.1 Reset Micro USB

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

2.4 Ports

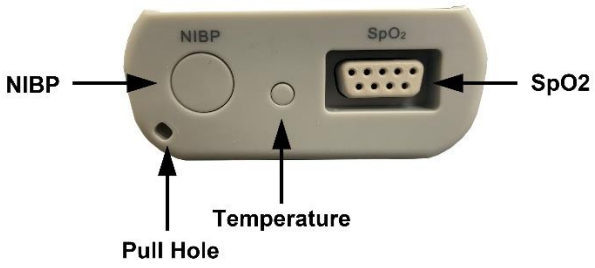


Fig 2.4.1 Ports

NOTE Not all ports available on all models.

2.5 Mounting Hole

Fig 2.5.1 Mounting Hole

NOTE Device is supplied with cage clip in situ.

2.6 Accessories

A. SpO2 Sensor, 1pc
B. SpO2 Clips, 1 small, 1 large
C. Y Cable, 1pc
D. ETCO2 Module, 1pc
E. Disposable ETCO2 Adapters, 1 paediatric, 1 adult
F. Disposable Blood Pressure Cuffs, 5pcs
G. NIBP Extension Hose, 1pc
H. USB Cable, 1pc
I. Power Adapter, 1pc
J. Charging Dock, 1pc
K. User Manual, 1pc

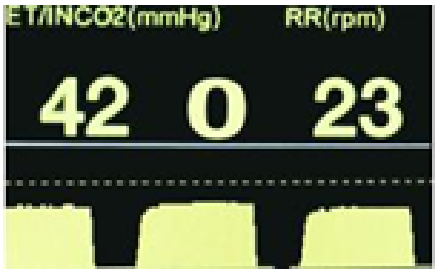
Chapter III Interface

3.1 Main Interface

Fig 3.1 Main Interface

3.2 SpO2 Measurement Interface

3.3 ETCO2 Interface



3.4 NIBP Measurement Interface

3.5 System Menu

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

Fig 3.5 System Menu

3.5.1 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, anaesthesia, 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 Sections 3.5.3 and 3.5.4). ID management can only occur under SPOT mode (see Section 3.5.6)

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 Sections 3.5.3 and 3.5.4). NIBP measurement interval needs to be set in the NIBP setup menu (see Section 3.6.5). User ID's can be selected under Monitoring mode but ID creation and management can only occur in SPOT mode (see Section 3.5.6).

NOTE After the internal memory is full, the earliest records will be overwritten.

3.5.2 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 Setup for information on apnoea alarm

SYS Alarm Range: 40-280 mmHg

DIA Alarm Range: 10-220 mmHg

Fig 3.5.2 Alarm

3.5.3 SpO2 Setup

Beep: Turn beep per heartbeat on/off

Mean Time: Select the timer interval for recording data

3.5.4 ETCO2 Setup

CO2 Unit: Choose mmHg, kPa or %

Apnoea 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 adapter or resetting a current adapter, see Section 6.1.2.1. Pressing “OK” while ETCO2 zero is highlighted will start the operation

3.5.5 NIBP Setup

Measure Mode: Manual, Auto, Stat
Patient Type: Big cuff, small cuff
Pressure Unit: mmHg, KPa
Measuring Interval: Measurement interval can be set for use with Auto mode

3.5.6 System Setup: User Preferences Setup

Fig 3.5.6 System Setup

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.

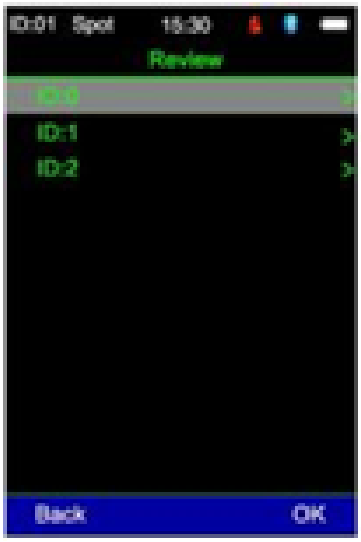
Bluetooth: On/Off

NOTE The Bluetooth function is not available in the current version of the 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 and selected in SPOT mode. Once the ID is created and selected, the 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.

3.5.7 Review: Measurement Results Review

Choose “OK”, system will display saved IDs. Select ID and press “OK” to display the results.



3.5.7.1 Table

SpO2 Table: Time, SpO2, PR
CO2 Table: Time, ETCO2, INCO2, RR
NIBP Table: Time, SYS, DIA, PR

3.5.7.2 Trend Chart

SpO2 Trend Chart

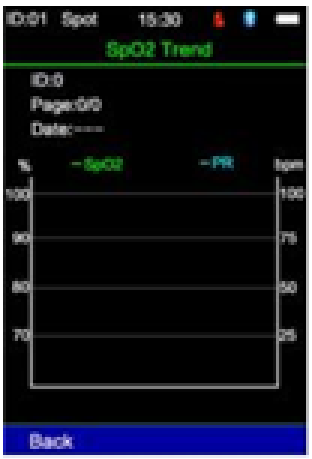


Fig 3.5.7.2 SpO2 Trend Chart

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

Fig 3.5.7.2.1 ETCO2 Trend Chart

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

NIBP Trend Chart

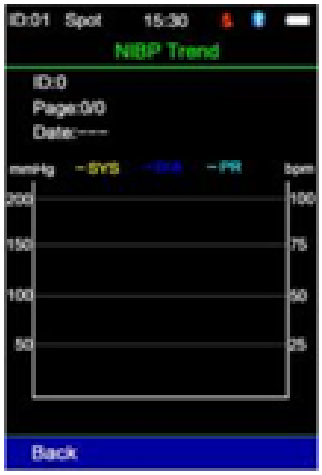


Fig 3.5.7.2.2 NIBP Trend Chart

The trend chart shows SYS, DIA and Pulse Rate by different colour. The left vertical axis represents the NIBP, the right vertical axis represents the pulse rate and 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): Oxyhaemoglobin percentage of total haemoglobin
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, prepuce/vulva or any other non-haired, minimally pigmented surface

4.3 Cautions

1. You 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 as this can cause incorrect results
7. During long term monitoring, the 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 Errors and Possible Causes of Errors

Error	Cause
SysErr3	SpO2 module self-test error
SysErr4	SpO2 module communication
No Pulse	Can’t find pulse
No Sensor	SpO2 sensor not connected
Sensor Off	Sensor is no longer placed on patient
Searching	Searching for pulse

Chapter V NIBP Measurement

5.1 General

- NIBP monitoring uses oscillometric technology
- Measurement Mode: Manual, Auto, Stat
- Measure systolic, mean, diastolic blood pressure and pulse rate

WARNING Do not measure NIBP on patients with any skin damage. Select the correct patient type. This is especially important for small animals. Use the Big Cuff for patients 20+ lbs. Use the Small Cuff for patients under 20 lbs. Guidelines based on lean body weight.

5.2 NIBP Measurement

WARNING Make sure the hose is connected to the cuff and the monitor without kinks or twists to help ensure accurate readings.

1. Insert the inflatable hose into the NIBP socket on the monitor
2. Apply appropriately sized cuff to patient. NIBP measurement can be obtained on any limb or the tail.
    - Make sure the cuff is completely deflated before placement
    - Select an appropriate cuff size for the patient. Be careful not to wrap the cuff too tightly as this could cause ischemia

NOTE The width of the cuff should be 40% of the limb circumference. The inflatable part of the cuff should be long enough to encircle 50-80% if the limb. The wrong size cuff can cause erroneous readings. **Fig 5.2.1 Cuff Usage**

3. Connect the cuff and the inflatable hose. The limb chosen for taking the measurement should be placed on the same level as the patient's heart. You can adjust the measurement results as below:
    - If the cuff is placed higher than the heart level, add 0.75 mmHg (0.10 kPa) per each centimetre gap
    - If the cuff is placed lower than the heart level, deduct 0.75 mmHg (0.10 kPa) per each centimetre gap
4. Select the correct NIBP measurement mode that is suitable for the patient (big cuff vs small cuff). Use Big Cuff for patients 20+ lbs. Use Small Cuff for patients under 20lbs.
5. Press button labelled "Start" to start testing.

5.3 Operation Instructions

1. Perform Automatic Measurement: User can set the measurement interval time to start automatic measurement. System will work according to the interval time
2. Stop Automatic Measurement: During automatic measurement, press the "Stop" button to stop measurement activity. This will reset the timer for automatic measurements, the next measurement will occur at the specified interval as set by the user (see Section 3.5.4)
3. Perform Manual Measurement:
    - Press the "Start" button to start manual measurement
    - In between schedules intervals in automatic measurement mode, pressing the "Start" button will start a manual measurement. If the "Stop" button is pressed later, the system will stop manual measurement and continue with automatic measurement

---

WARNING If liquid is spilled on the monitor or accessories, especially if liquid enters the monitor, please discontinue use and contact Woodley Equipment Company.

NOTE Oscillometric measurement has some limitations. This method requires the monitor to find the regular pulse wave form generated by arterial pressure. Oscillometric readings should always be verified by Doppler if the user has any doubts.

The following situations may cause a longer measurement time or unreliable values:

- Patient Movement
- Severe Shock
- Low Heart Rate
- Arrhythmia
- Rapid Pressure Changes
- Extremely Large Animals

5.4 NIBP Errors and Possible Causes of Errors

Error	Cause
SysErr	Self-test fail
SysErr2	NIBP module system error
CuffLoose	Cuff is too loose, or cuff not connected
CuffErr	Using small cuff in big cuff mode
Leakage	Valve or gas circuit leak
PressErr	NIPB valve isn't working properly
Weak	Patient's pulse is too weak, or cuff is too loose
OveRange	Patient's blood pressure exceeds the measurement range
Motion	During measurement, motion artifact in signal or too much interference
Protect0	Cuff pressure exceeds the range 300 mmHg
Saturate	Too large signal amplitude caused by motion or other reasons
TimeOut	Big Cuff: Cuff pressure over 2 kPa (15 mmHg) lasting for more than 3 minutes Small Cuff: Cuff pressure over 0.67 kPa (5 mmHg) lasting for more than 90 seconds
Reset	NIBP module reset

5.5 Maintenance and Cleaning

- Don’t constrict or kink the rubber hose
- Don’t allow liquid to come in contact with the monitor or charging dock
- When cleaning the monitor, only wipe the case
- Don’t submerge or place in any type of gas or steam steriliser

Disposable NIBP Cuff

Disposable NIBP cuff should only be used for one patient, it cannot be disinfected or be sterilised under high pressure steam.

Chapter VI Mainstream CO2 Module

6.1 Hardware Interface

6.1.1 Mainstream CO2 Module

Fig 6.1.1 Mainstream CO2 Probe

6.1.2 Points for Attention

6.1.2.1 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 “apnoea” 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 adapter and re-insert it. The probe will automatically return to zero without having to enter the monitor set-up software (see Section 3.5.4).

6.1.2.2 Check Adapter

When “check adapter” warning appears, 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.

Fig 6.1.2.2 Adult Airway Adapter

6.1.2.3

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.

6.1.2.4

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 adapter” alarm. A fast blinking red light indicates the adapter needs to return to zero (see Section 6.1.2.1).

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.

6.2 Proper Connection

For the mainstream module, the adapter should always be kept in the correct position, as follows:

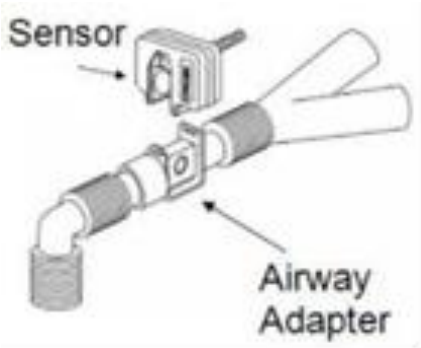


Fig 6.2

Fig 6.2.1

6.3 Troubleshooting of Mainstream CO2 Module

6.3.1

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.

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 setup software.

6.3.2

When the mainstream ETCO2 module is being used for a long period of time, it is recommended to periodically check whether the optical analysis window 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.

6.4 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 anaesthetic agents in the gas mixture need to be compensated for by the device in order to achieve its 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. This 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 setup menu.

6.5 Apnoea Alarm

The “Apnoea 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 “Apnoea” 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 “Apnoea” alarm, three breaths are required or a zero operation must be carried out.

NOTE InSight Multi Parameter is not an apnoea monitor. The software cannot discriminate between the patient no longer breathing and a sensor that has been disconnected from the patient circuit.

Chapter VII Specifications

7.1 Equipment Classification (IEC 60601-1)

IEC Class II, Type BF applied

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

Working Environment

Operating Temperature: 5~40°C (41~104°F)
Storage/Transportation Temperature: -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: 8 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

NIBP
Measuring Technology: Automatic oscillometric
Mode: Manual, Auto, Stat
Measuring Interval in Auto Mode: 1 – 90 minutes
Measuring Interval in Stat Mode: ~3 seconds
Pulse Rate Range: 40-500 BPM
Alarm: SYS, DIA, Mean

Measuring Range
Systolic: 40-270 mmHg
Diastolic: 10-220 mmHg
Mean: 20-230 mmHg

Resolution Pressure: 1 mmHg
Maximum Mean Error: +/- 5 mmHg
Maximum Standard Deviation
Over-Pressure Protection: 300 mmHg

Alarm Limit Setting
SYS: 40-280 mmHg
DIA: 10-220 mmHg

7.2 Accuracy Range

SpO2: 70-100%
PR: 30-500 BPM
Perfusion Index: 0.05-20%

ETCO2 Concentration	Accuracy
0-40 mmHg	±2 mmHg
41-70 mmHg	±5% of reading
71-100 mmHg	±8% of reading
101-150 mmHg	±10% of reading

7.3 Measurement Accuracy

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

On Motion Condition

Pulse Rate: +/- 3 digits
SpO2: +/- 3 digits

Temperature

Range: 25-45°C (77-113°F)
Resolution: 0.1° F
Accuracy: +/- 0.1° F

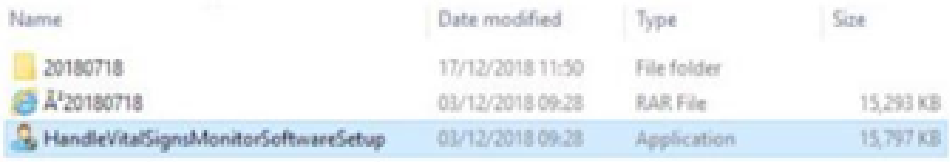
CO2 Concentration Measurement Resolution: 0.1 mmHg

Respiratory Rate Measurement: - 150 BPM
Accuracy: ±1 BPM

Chapter VIII Instruction of USB Data Upload

8.1 Instruction of USB Data Upload

1. Open ‘HandleVitalSignsMonitorSoftwareSetup’



2. Select ‘Run anyway’

3. Select ‘Next’

4. Select ‘Install’

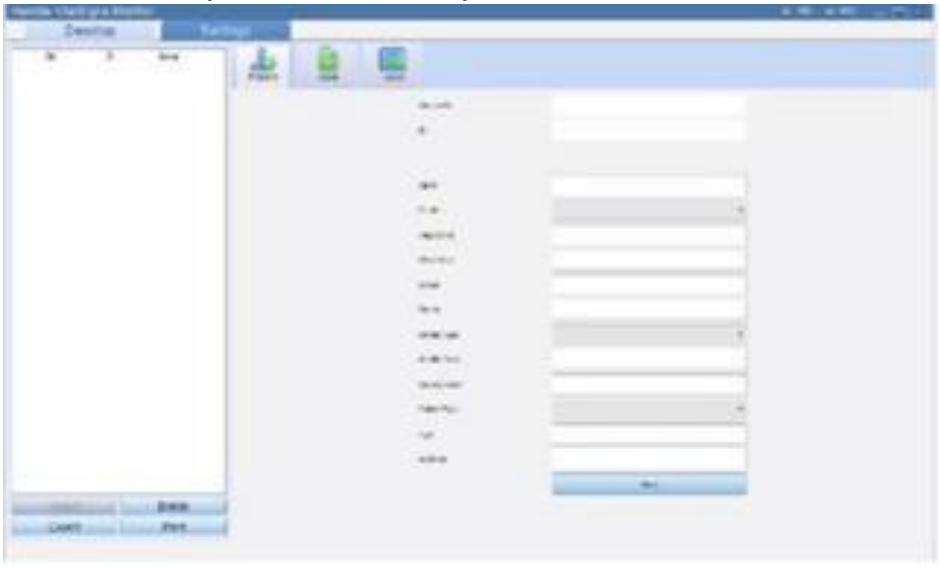
5. Select ‘Next’

6. Select ‘Finish’

7. Select ‘Close’

8. The icon below will appear on your desktop

9. Open the software and connect the InSight Multi Parameter via USB to the computer, select Import to transfer data to the PC



Old Station Park Buildings
St. John Street
Horwich
Bolton
Lancashire
BL6 7NY, UK
Tel: +44 (0) 1204 669033
Email: sales@woodleyequipment.com
Website: www.woodleyequipment.com