InSight™ Vet Capnograph

Monitor

Operator's Manual

Before operating, please read this manual carefully.
Please keep this manual safe for future reference.

Product Name: InSight Vet Capnograph

Table of Contents

Chapter I Overview

1.1 Introduction

The InSight Vet Capnograph Monitor is mainly used to measure blood pressure, Sp02, temperature, pulse rate and CO_2. This monitor is suitable for Dogs, Cats, Horses, Cattle, Sheep and Pigs, and could be applied in the operational bed and cage with the optional configuration-wall mount clip.

WARNING   This equipment must be operated by a professional veterinarian or trained veterinary professionals.

Safety

Degree of protection against electric shock: Type BF
Applied.

The monitor is suitable for suitable for Dogs, Cats,
Horses, Cattle, Sheep and Pigs Vital Signs Monitoring.
Under the spot measurement mode, it stores up to 100
patients' data (200 data sets per patient). Under the
monitoring mode, it stores 48 hours of measurement
data with a user friendly, easy to use interface with 3.5"
colour TFT screen and data review functions,

including data listing and data trend chart.

Under audio and visual alarm mode, the red light flashes when power is low. When measuring data beyond the alarm limit, the font of the result data becomes red with audio alarm. The user can turn alarms on or off as required.

⚠**Note**

The device will shut off automatically under spot measurement mode within 3 minutes of inactivity.

Chapter II Main Parts & Accessories

2.1 Button and Indicator Light

Fig. 2.1.1 Button and Indicator Light

- Power Switch

   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 the
   lower right corner of screen

- Select

   Choose different options on setting menu

- Alarm Light

   Red light flashes when alarm sounds

- Power Light

   Red light flashes when charging or in low power.
   Green light flashes when fully charged. No flashing under
   normal conditions

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
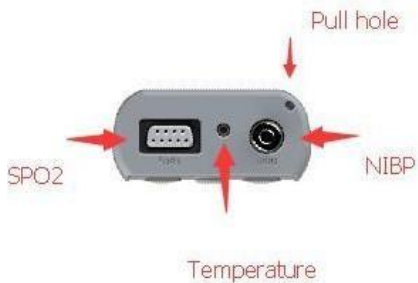
Fig. 2.4.1 Ports

2.5. Mounting Hole

Fig. 2.5.1 Mounting Hole

⚠️**Note**

Mounting hole is used with accessories from other

manufacturers such as accessories on stand of

infusion pump.

2.6. Accessories

A. Veterinary Cuff, 5pcs

B. NIBP Extension Hose,1pc

C. Sp02 sensor, 1 pc

D. Temperature Probe, 1 pc

E. Power Adapter, 1pc

F. User Manual, 1pc

Chapter III Interface

3.1 Main Interface
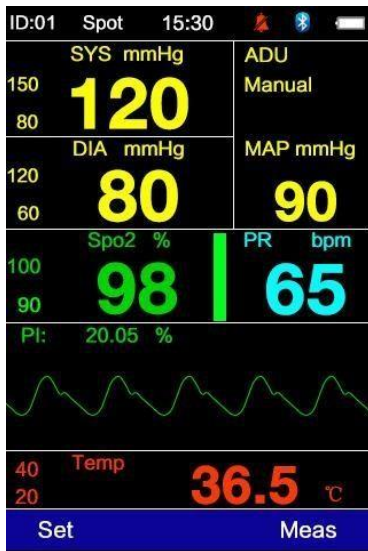
⚠ **Note**

After the internal memory is full, the earliest records will

be overwritten.

3.2 NIBP Measurement Interface

When measuring NIBP, the MAP bar displays real-time
blood pressure data and current measurement
information.

3.3 NIBP Measurement Result Interface

If there is a blood pressure measurement error, the

device will show an error code on the screen.

⚠ **Note**

When Sp02 sensor is plugged in, the pulse rate is from the Sp02 calculation; otherwise the pulse rate is from blood pressure calculation.

3.4 Sp02 Measurement Interface
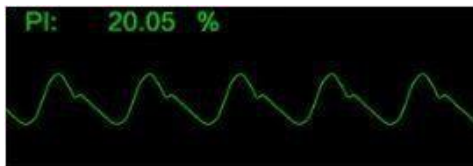
3.5 Temperature Measurement Interface

3.6 System Menu

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

Fig. 3.6 System Menu

3.6.1 Work Mode Setup

SPOT & Monitoring Mode

Under SPOT mode, the device will shut off automatically with no measuring operating within 3 minutes, otherwise the results are recorded once every 30 seconds.

Under Monitoring mode, the device works continuously, the results are recorded once every 2 seconds.

3.6.2 NIBP Setup

Measure Mode：Manual, Auto, Stat

Vet Type：Large animal, medium, small

Pressure Unit：mmHg, KPa

Measuring Interval: Measuring interval can be set under AUTO Mode,

3.6.3 Temperature Unit

°C, °F

3.6.4 Alarm Setup：Set the Alarm Limit of Each Parameter

ID:01 Spot	15:30	🔔 🅱 ▬
Set Alarm		
SYS ALM HI(mmHg)		160
SYS ALM LO(mmHg)		90
DIA ALM HI(mmHg)		90
DIA ALM LO(mmHg)		50
SpO2 ALM HI(%)		100
SpO2 ALM LO(%)		90
TEMP ALM HI(℃)		39.0
TEMP ALM LO(℃)		35.0
PR ALM HI(bmp)		120
PR ALM LO(bmp)		50
Back		OK

Fig.3.6.4 Alarm

SYS alarm range： 40～280mmHg

DIA alarm range： 10～220mmHg

Sp02 alarm range： 0%~100%

Temperature alarm range：18~45℃

(64-113°F)

Pulse rate alarm range：0～250BPM

3.6.5 System Setup：System Parameters Setup

Fig. 3.6.5 System Setup

Low Power Mode

Under SPOT mode with low power mode on, the device will shut off automatically with no measuring operating within 3 minutes. If low power mode is off, it will not shut off.
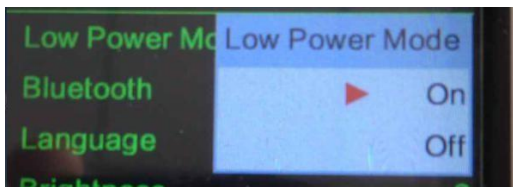
⚠ **Note**

Under Monitoring mode, Low Power Mode 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

Default Configuration:

To restore the default factory settings

Machine Maintenance: password "0000"

Machine Information: Version No.

3.6.6 Review: Measurement Results Review
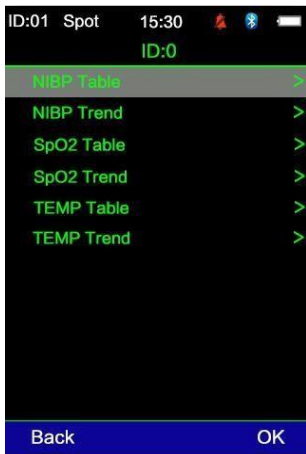
Choose "OK", System will return to "Review" Menu:

Fig.3.6.6 Review Menu

3.6.6.1 Table

NIBP Table：Time，SYS，DIA，PR

Sp02 Table：Time，Sp02，PR

Temperature Table：Time，TEMP

3.6.6.2 Trend Chart

NIBP Trend Chart
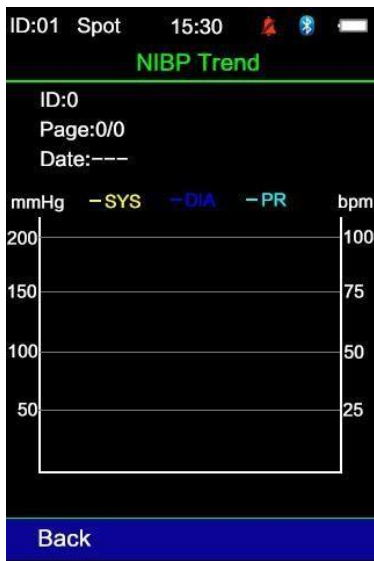
Fig.3.6.6.1 NIBP Trend Chart

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. The

horizontal axis represents time, the trend chart includes

ID, Pages, Date (time range in this page), to view all the

data through all the pages.

Sp02 Trend Chart
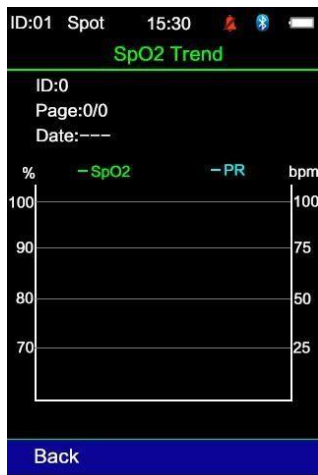
Fig.3.6.6.1 NIBP Trend Chart

The Sp02 trend chart displays Sp02 and pulse rate. The left vertical axis is oxygen saturation in percent, the right vertical axis is pulse rate, the horizontal axis is the measurement time.

Temperature Trend Chart

The temperature trend displays temperature data, the unit is either Fahrenheit or Celsius.
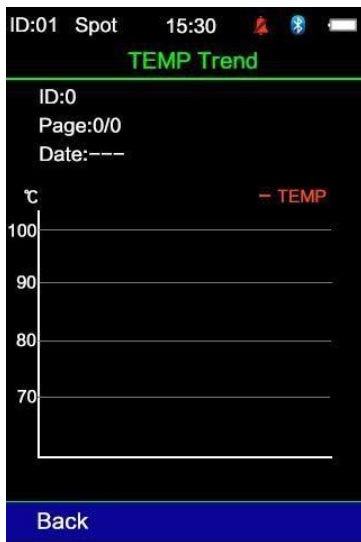
Fig.3.6.6.2 Temperature Trend Chart

Chapter IV NIBP Measurement

4.1 General

- NIBP monitoring adopts oscillometric technology

- Measurement Mode: Manual, Auto

- Measure systolic, mean, diastolic blood pressure and pulse rate

- Applies to Dogs, Cats, Horses, Cattle, Sheep and Pigs.

Warning

- Do not measure NIBP on patients with sickle-cell disease or with any skin damage.

- Select the correct species type. Especially for small animals, do not apply the higher vet inflation, over-pressure limits of measurement time

4.2 NIBP measurement

Warning: Make sure the inflatable hose is connected with the cuff and the monitor, and the hose is not folded or twisted.

1. Insert the inflatable hose into the NIBP socket.

2. Secure the blood pressure cuff on the patient's limb (Fig. 4.2.1):

◆ Make sure that the cuff is completely deflated.

◆ Adjust an appropriate cuff size for the patient, and make sure that the symbol "**φ**" exactly on the appropriate artery. Ensure that the cuff is not wrapped too tightly. Otherwise, it may

cause Ischaemia.

Fig. 4.2.1 Cuff Usage

⚠ **Note**

The width of the cuff should be 40% of the appendage circumference in dogs and 30% in cats, using the forelimb, hindlimb or tail. Using a cuff that is too large will tend to give falsely lower blood pressure readings and vice versa.

Vet Reusable NIBP Cuff:

Species Type	Circumference	Cuff Width	Hose
Cat	10～19cm	8cm	1.5m
Dog	18～26cm	10.6cm	
Sheep	25～35cm	14cm	
Bovine	33～47cm	17cm	

Equine	46～66cm	21cm	

Veterinary Disposable NIBP Cuff:

Size	Circumference	Cuff Width	Tube Length
1	3～6cm	2.5cm	1.5m
2	4～8cm	3.2cm	
3	6～11cm	4.3cm	
4	7～13cm	5.1cm	
5	8～15cm	6.0cm	

Make sure that the cuff size is within the range.

3. Connect the cuff and the inflatable hose. It is recommended that the tail is used for taking the measurement or alternatively the chosen limb

should be placed at 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
    0.75mmHg (0.10kPa) per each centimetre gap.

◆   If it is placed lower than the heart level, deduct
    0.75mmHg (0.10kPa) per each centimetre gap.

4.   Check the correct NIBP measurement mode that is

suitable for your species type.

5.   Press the Function 2 button to start testing

4.3 Operation Instruction

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 measuring, system will start next automatic

measurement after 30 seconds.

3.   Perform Manual Measurement

◆ Press the 'Meas' button to start the manual
measurement

◆ During the non-working time of the automatic
measurement, press the 'Meas' button to start
manual measurement. If you press the STOP button
later, the system will stop manual measurement and
continue automatic measurement.

⚠ **Warning**

- ◆ If liquid is spilled on the monitor or accessories, especially when liquid enters the monitor, please stop using the capnograph monitor and contact related service personnel.

- ◆ According to the vet situation, oscillometric measurement has some limits. This measurement method requires to find the regular pulse waveform generated by the arterial pressure. The following situations may cause a longer measurement time or unreliable values:

  - ■ Patient moving

  - ■ Arrhythmia

  - ■ Artificial heart-lung machine

  - ■ Quick Pressure Change

  - ■ Severe shock

  - ■ Limited heart rate

  - ■ Extreme large animals

4.4 NIBP Error and Possible Cause of Error

Error	Cause
SysErr	Self-test fail
SysErr2	NIBP module system error
CuffLoose	Cuff is too loose, or cuff not connected
CuffErr	Use small animal cuff under vet mode
Leakage	Valve or gas circuit leak
PressErr	NIBP Valves are not working appropriately
Weak	Patient's pulse is too weak or cuff is loose

OverRange	Patient's blood pressure exceeds the measurement range
Motion	During measurement, motion artefact in signal or too much interference
Protect0	Cuff pressure exceeds the range, Large animals：300mmHg, Small animals：150mmHg
Saturate	Too large signal amplitude caused by motion or other reasons
TimeOut	Vet: Cuff pressure over 2kPa（15mmHg）last

	for more than 3minutes
	Small Animals: Cuff pressure over 0.67kPa
	（5mmHg）last for more than 90s
Reset	NIBP module reset

4.5 Maintain and Clean

⚠ Warning

- Don't press the rubber hose

- Don't let the cleansing liquid enter the vital signs monitor and the charge dock, as it may damage the monitor

- When cleaning the monitor, only wipe the case

Reusable NIBP Cuffs

Sterilise in hot air-drying oven, gas or radiation sterilisation. Remember to remove the rubber hose prior to sterilisation. Cuff can be cleaned by hand-wash or machine-wash (hand-wash can extend service life), but do not dry-clean. Remember to remove the rubber hose prior to cleaning.
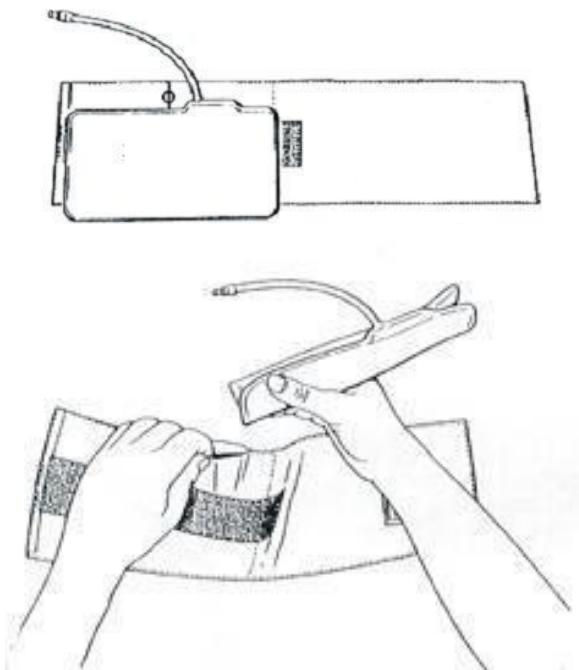
Fig. 4.5.1 Take off the rubber hose from the cuff

Disposable NIBP Cuff

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

Chapter V Sp02 Measurement

5.1 Measurement Parameters

Arterial Oxygen Saturation (Sp02): Oxyhaemoglobin percentage of total haemoglobin

Pleth Waveform (Pleth): Vet pulse signal Pleth waveform

Pulse Rate: pulse per minute

Index Bar: In proportion to the pulse strength

Blood flow perfusion index: PI values reflect the situation of pulsatile blood flow, which reflect the ability of blood flow perfusion. The larger the pulsation of the blood flow, the higher the PI value.

5.2 Measurement Instruction

Vet Sp02 Sensor:

1) Connect the Sp02 sensor appropriately

2) Press the power button to turn on the monitor

3) Put the patient's tongue into the Sp02 sensor appropriately. If this is not practical alternatives are the Lip, Ear, Paw (digits) or Vulva/Prepuce.

5.3⚠Cautions ⚠

■ Must use the Sp02 sensor shipped with the monitor

■ Keep the Sp02 sensor stable to get accurate measurement results

■ When the Sp02 sensor or the patient is moving, the measurement results are not accurate

■ Don't put the Sp02 sensor and the NIBP cuff on the same limb.

■ Check all the cables and make sure the Sp02 sensor is in good condition

■ Don't put the Sp02 sensor on the limb with arteries or veins injection pipe

■ Don't use the monitor when the patient's pulse rate is lower than 25 BPM, otherwise, it may give incorrect values

- Don't reuse a disposable Sp02 sensor

- During long term monitoring, check the placement of the probe frequently and ensure there is good contact between the Sp02 sensor and the patient.

- Keep measured skin clean, otherwise it may influence the accuracy of the Sp02 measurement

- Sterilise the Sp02 sensor before measuring different patients. In cases of methaemoglobinemia and carboxyhaemoglobin, the pulse oximeter may not be accurate. Results will also be affected by heavily pigmented skin.

5.4 Sp02 Error and Sp02 Possible Cause of error

Error	Cause
SysErr3	Sp02 module self-test error
SysErr4	Sp02 module communication
no pulse	Can't find pulse

no Sensor	Sp02 sensor not connected
Sensor off	No paw in sensor
Searching	Searching pulse

Chapter VI Temperature Measurement

6.1 Connection Mode

For reusable TEMP probe, plug it into the TEMP

probe socket. The TEMP probe can either be placed

into the oesophagus (recommended) or be placed

rectally.

Maintain and Cleaning

⚠ Warning

Turn off the device and disconnect the AC power before

cleaning the device or probe.

Reusable TEMP probe

1. Temperature of the probe shall not exceed 100°C
(212°F). It can only bear 80°C (176°F) ~100°C (212°F) for
a very short period of time.

2. Do not use steam sterilisation.
3. Only use detergent with alcohol sterilisation

6.2 TEMP Error and Possible Cause of error

Error	Cause
SysErr5	TEMP module self-test/communication err
Overrange	Beyond the measurement range

Chapter Ⅶ Mainstream Call End C02 Module

7.1 Hardware Interface

7.1.1 Mainstream C02 Module:

Fig. 7.1.1 Mainstream C02 Probe

7.1.1.1 Points for Attention

7.1.1.2 Zero Operation

It is recommended that users check the zero before each module is used, to ensure that the module can achieve the best measurement accuracy. This operation is not necessary.

During the zero calibration operation, make sure that the gas sampled by the module is air. When the module reports a suffocation alarm ("no breath" or "apnoea") and ensures that no CO_2 gas is sampled from the exhaled body, the zero calibration operation can be performed.

If the probe needs to return to zero, unplug the

adapter and re-insert it. The probe will automatically

return to zero without entering the monitor software to

set. If you do not need to support this function, you need

to explain to the manufacturer.

7.1.1.3 When a "check adapter" warning appears, you

need to check if the adapter is connected. If this warning

is not reached, you need to connect the adapter.

7.1.1.4 Module after power on, if there are no

compensation settings, the module will report the

"compensation not set" warning.

Enter the settings menu, set the relevant compensation

parameters, and then keep the default settings. When the

settings are completed, the "compensation not set"

warning will disappear. This setting module does not save after power failure and needs to be reset after its next power up. The atmospheric pressure /N2O/O2 compensation parameter can be set for the module.

7.1.1.5 After the new version of the mainstream probe is connected to the monitor, the red light will always be on, which means that the module is in a preheated state. When the red light goes out and the probe is preheated, the red light and the green light will not be on. When the probe is out of the normal measurement state, the green light will turn on (very weak) when the exhalation is detected, and the green light will turn off when the probe

is inhaled. When the red light is slowly flashing, it is out of the "CHECK ADAPTER" state (that is, check the adapter). When the red light flashes fast, it is in a "return to zero" state, and care must be taken to ensure that no breathing gas enters the play adapter. This process takes approximately 10 seconds.

7.2 Use Connection Mode:

For the mainstream module, the airway adapter should be kept in the correct form, as follows:

Fig 7.2

Fig 7.2.1
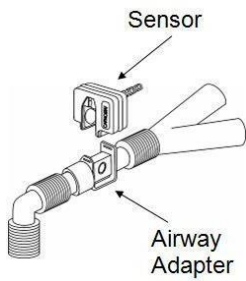
Appendix 1: Consumables Accessories

Figure 1 Adult Airway Adapter

7.3 Troubleshooting of Mainstream C02 Module

7.3.1 Mainstream ETC02 module needs to be preheated before use. The preheating time takes about 3 minutes. The preheating time varies according to the ambient temperature. For example, the preheating time of low ambient temperature (winter) is about 3 minutes, and the

preheating time of high ambient temperature (summer) is about 1 minute. The purpose of preheating is to prevent the water vapor from breathing out in the adapter. The optical analysis window condenses and affects the measurement.

When condensation occurs, the monitor will prompt the "CHECK ADAPTER" alarm.

When the new version of the mainstream probe is connected to the monitor, the red light will always be on which means that the module is in a preheated state. When the red light goes out and the probe is preheated, the red light and the green light will not be on. When the probe is out of the normal measurement state, the green light will turn on (very weak) when the exhalation is detected, and the green light will turn off when the probe

is inhaled. When the red light flashes quickly, it is in a 'return to zero' state and care must be taken to ensure that no breathing gas enters the play adapter. This process takes approximately 10 seconds.

If the probe needs to return to zero, unplug the adapter and re-insert it, then the probe will automatically return to zero without entering the monitor software to set.

window

7.3.2. When the mainstream ETCO2 module is in use for a period of time, it is necessary to check periodically whether the window of the consumables (mainstream adapter) is contaminated by the patient's secretion. If the adapter window is found to be dirty, it is necessary to clean the adapter window or replace the new adapter.

If the adapter is dirty, the monitor will prompt the "CHECK ADAPTER" alarm, and if the patient "returns to zero" operation, the module will record the error zero information. At this point, the system will not work properly, will always prompt "CHECK ADAPTER" or "ADAPTER NEED REPLACE", at this time the system should replace a new adapter, and in the presence of "apnoea" alarm ("apnoea") after a "return to zero" operation.

Baseline elevation will cause the measurement value to be on the high side when the mainstream adapter (consumables) is re-plugged in, the module will automatically carry out a return to zero operation. This process lasts about 15 seconds, the return to zero

process to ensure that the probe is in the breathless gas

into the probe (no exhaled CO2 gas into).

7.4 Main Points for Attention

7.4.1   The probe needs to be preheated for 2-3 minutes until the probe temperature rises to approximately 40°C (104°F) to prevent the condensation of water vapor on the main adapter (consumables) from affecting the measurement results.

7.4.2 Plug in the mainstream adapter, the probe will automatically return to zero and the zero return process will take about 10-14 seconds.

In the case of abnormal measurement, please let the veterinarian check whether the mainstream adapter (consumables) is contaminated by the patient's secretion. If so, the mainstream adapter needs to be replaced.

Chapter VIII Specifications

8.1 Equipment Classification (IEC 60601-1)

According to the type of protection against electric shock: Class II (on AC power) internally powered (on battery power)

According to the degree of protection against electric shock: Type BF Applied

Display: 3.5" Colour TFT

Dimensions: 65mm*30mm*145mm

Weight: 250g with rechargeable battery

Working Environment：

Temperature

Operating: 5⁰C～40⁰C (41°F～104°F)

Storage/Transportation: -20⁰C～+55⁰C

(-4°F～131°F)

Humidity

Operating:15%~80%

Storage/Transportation: ≤95%

Altitude

700hPa~1060hPa

Power

4V, DC

P≤3.2VA

NIBP

Measuring Technology: Automatic oscillometric technology

Mode: Manual, Auto, Stat

Measuring Interval in AUTO Mode: 1 ~ 90 (Min)

Measuring Interval in Continuous Mode: 5 (Min)

Pulse Rate Range: 40 ~ 240 (bpm)

Alarm: SYS, DIA, MEAN

Measuring Range:

Large animal Mode

SYS	40 ~270 (mmHg)
MEAN	20 ~230(mmHg)
DIA	10 ~210 (mmHg)

Medium Animal Mode

SYS	40 ~ 200 (mmHg)
MEAN	10 ~ 150 (mmHg)
DIA	20 ~ 165 (mmHg)

Small Animal Mode

SYS	40 ~ 135 (mmHg)
MEAN	20 ~ 105 (mmHg)
DIA	10 ~ 95 (mmHg)

Resolution

Pressure   1mmHg

Maximum Mean Error $\pm$5mmHg

Maximum Standard Deviation   8mmHg

Over-pressure Protection

Large Animal Mode   290(mmHg)

Medium Animal Mode   240 (mmHg)

Small Animal Mode   145 (mmHg)

Alarm Limit Setting

SYS 40～280 mmHg

DIA 10～220 mmHg

Measurement Range:

Sp02: 0～100%

PR：0-254bpm

Perfusion Index: 0.05%-20%

8.2 Accuracy Range

Sp02：70%-100%

PR：30-254bpm

Perfusion Index: 0.05%-20%

8.3 Measurement Accuracy

Sp02:

Large/Medium Animal: ±2digits（70-100％） undefined
（<70%）

Small Animal: ±3digits （70-100％） undefined
（<70%）

On Motion Condition:

±3digits

Pulse Rate:

Large/Medium Animal: ±3digits

Small Animal: ±3digits

On Motion Condition: ±3digits

Alarm Range：0%~100%

Temperature

Range: 25 - 45°C

(77 – 113°F)

Resolution: 0.1°C

Accuracy: ±0.1°C

C02 Concentration Measurement Range:

0   –   150 mmHg

0   –   19.7 %

0   –   20 kPa

C02 Concentration Measurement Accuracy

Corresponding Concentration Section	Corresponding Accuracy
0 – 40 mmHg	±2 mmHg
41 – 70 mmHg	±5% of reading
71 – 100 mmHg	±8% of reading
101 – 150 mmHg	±10% of reading

C02 Concentration Measurement Resolution:

0.1 mmHg

Respiratory Rate Measurement:

- 150 BPM　　Accuracy：±1

BPM Calibration Requirements:

No frequent user calibration is required.

The compensation parameters can be

set:

Pressure Compensation range: 450-850mmHg

Oxygen Compensation Range: 0-100%

Balanced gas compensation N2O, He

C02 temperature and humidity requirements:

Working environment: temperature requirement 10-40°C (50 - 104°F), humidity 10% - 90% RH

Storage environment: temperature requirement -40 - 70°C (-40 - 158°F), humidity requirement <90% RH

Power Source

AC power or battery

AC Power

100-240VAC, 50/60Hz, 30VA

Fuse (self-recovery)

Input Fuse: 2A/250V

Fuse (battery): 60Vdc/3A(max)

Battery

Lithium Ion Rechargeable Battery:
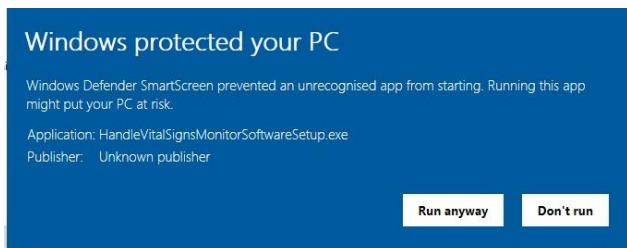
3.6V/4.2Ah

Work Time: 8 hours

Charge Time: 6 hours

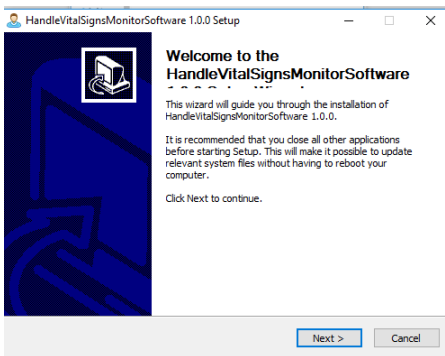# Chapter IX Instruction of USB Data Upload

9.1 Instructions for USB Data Upload

1) Open "HandleVitalSignsMonitorSoftwareSetup"

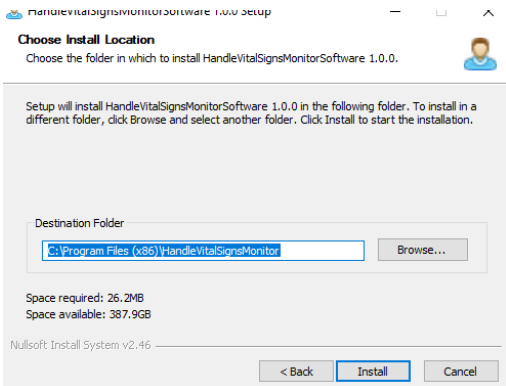| Name	Date modified	Type	Size
20180718	17/12/2018 11:50	File folder	
Ä²20180718	03/12/2018 09:28	RAR File	15,293 KB
HandleVitalSignsMonitorSoftwareSetup	03/12/2018 09:28	Application	15,797 KB

2) Select 'Run anyway'

Windows protected your PC

Windows Defender SmartScreen prevented an unrecognised app from starting. Running this app might put your PC at risk.

Application: HandleVitalSignsMonitorSoftwareSetup.exe
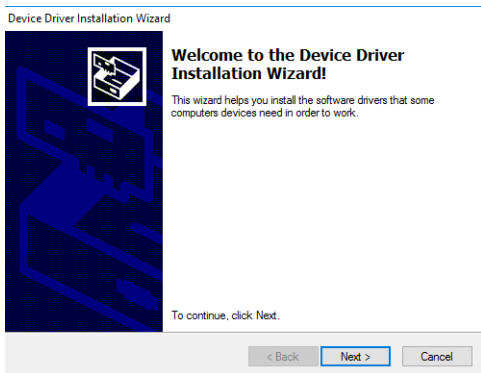Publisher: Unknown publisher

[Run anyway]   [Don't run]

3) Select 'Next'

4) Select "Install"

5) Select "Next"

6) Select "Finish"

7) Press "Close"

Microsoft Visual C++ 2010 x64 Redistributable Setup ✕

Setup has detected that this computer does not meet the requirements to install this software. The following blocking issues must be resolved before you can install Microsoft Visual C++ 2010 x64 Redistributable Setup software package.

Please resolve the following:

A newer version of Microsoft Visual C++ 2010 Redistributable has been detected on the machine.

Please, see the Microsoft Visual Studio website for more information.
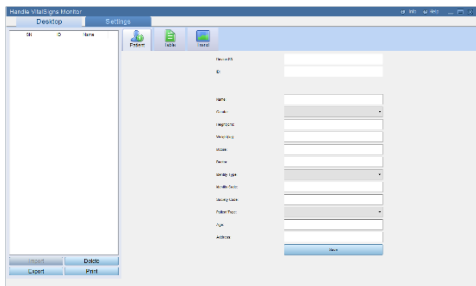
Continue   Close

8) The below icon will appear on your desktop

HandleVital...

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

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