



SunTech[®] ***Vet20[™]*** **BP MONITOR**

Automated Blood Pressure Monitor for Veterinary Use

USER MANUAL



Changes

This manual is identified as Part number: 80-0066-00 Rev. C. An updated version may be available for download from the SunTech Medical website. Should you notice errors or omissions in this manual, please notify us at:

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Welcome to the SunTech Vet20!

Thank you for choosing this SunTech Vet20 blood pressure monitor! For over 30 years, SunTech Medical has been the preeminent supplier of leading edge technology and innovative products to obtain blood pressure measurements. Developed specifically for the veterinary care environment, the SunTech Vet20 BP monitor quietly takes accurate blood pressure measurements very quickly and is extremely easy to use. The monitor also is lightweight and portable for convenient mobility between exam rooms and other clinic locations.

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Safety Considerations

Intended Use

The SunTech Vet20 is intended to be used on companion animals, specifically dogs and cats, to obtain oscillometric blood pressure measurements, including systolic, diastolic, mean arterial pressure, and heart beats per minute. This non-invasive monitor uses algorithms specifically designed for these animal populations.

User Responsibility

The SunTech Vet20 is designed to perform in conformity with the description thereof contained in this operation manual when operated. The user of this monitor shall have the sole responsibility for any malfunction which results from improper use, faulty maintenance, improper repair, damage or alteration by anyone other than SunTech Medical or their authorized service personnel.

Warnings and Precautions

1.

A **WARNING** indicates a situation which, if not avoided, could result in serious injury or death.



WARNING: DO NOT connect patient hose or monitor to any other devices or connections, especially intravenous (IV) tubes as there is potential for air to be pumped into a blood vessel which could cause serious injury.



WARNING: DO NOT use in the presence of flammable anesthetics; this could cause an explosion. This device is not suitable for use in an oxygen enriched environment.



WARNING: This monitor is intended for use by healthcare professionals only. This monitor may cause radio interference or may disrupt the operation of nearby equipment. It may be necessary to take mitigation measures such as re-orienting, relocating or shielding the location.

A **CAUTION** indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury to the user, patient or damage to the equipment or other property.



CAUTION: This monitor is for veterinary use only. NOT for use on humans.



CAUTION: DO NOT use the monitor for any purpose other than specified in this manual without written consent and approval from SunTech Medical. Substitution of a component or accessory different from that supplied may result in measurement error, equipment damage, increased emissions or decreased immunity. Repairs should be undertaken only by personnel trained or authorized by SunTech Medical.



CAUTION: DO NOT use this monitor when oscillometric pulses may be altered by other devices or techniques.



CAUTION: DO NOT immerse the monitor in any fluid, place fluids on top of or attempt to clean with liquid detergents or cleaning agents. This may cause an electrical hazard. Do not use the monitor if accidental wetting occurs.



CAUTION: DO NOT remove unit covers. Doing so may increase the risk of electrical shock. This monitor does not contain any user serviceable parts.



CAUTION: DO NOT gas sterilize or autoclave this monitor.



CAUTION: Too frequent measurements may cause injury to the patient due to blood flow interference.



CAUTION: At the end of product life, the monitor, accessories, components and other consumable goods may become contaminated from normal use. Consult local codes and ordinances for proper disposal of equipment and other consumable goods.



CAUTION: The monitor may not operate correctly if used or stored outside the relevant temperature or humidity ranges described in the Performance Specifications.



CAUTION: Do not use if device is dropped and/or is damaged. Have a qualified service representative check the unit before using again. Repairs should only be conducted by an authorized SunTech Medical service representative.



CAUTION: Remove batteries when device is not in use for long periods of time to prevent possible battery leakage and product damage.



CAUTION: ENSURE batteries are inserted with the correct polarity. Improper installation may cause equipment damage or malfunction. Follow battery installation procedures.

A TIP provides application tips or other useful information to assure that you get the most from your equipment.

TIP: This device is designed to be used on dogs and cats. In this document where the word “patient” is used, this is to mean a small animal such as a cat, dog, or other small animal.

TIP: Accuracy of any blood pressure measurement may be affected by the position of the subject, the patient’s physical condition and use outside of the operating instructions detailed in this manual. **Interpretation of blood pressure measurements should be made only by a veterinarian or trained medical staff.** Minimize limb movement during the measurement.

TIP: To obtain accurate blood pressure readings, the cuff must be the correct size, and also be correctly fitted to the patient. **Incorrect size or incorrect fitting may result in incorrect readings.**

Icons and Symbols

2.



Exits or closes a screen



Goes back to previous screen

TIP:

Provides practical advice for using monitor



Manual consultation symbol



This product meets the requirements of the applicable Low Voltage Directive



Disposal in compliance with WEEE



Manufacturer



Date of Manufacture



Serial Number



Cuff index line must fall within range markings



Arrow should be placed over artery



Symbol indicating limb circumference



Index line



Not made with natural rubber latex



Not made with PVC



Catalog Number



Type BF Applied Part



Fragile, handle with care



Humidity Limits



Temperature Limits



Keep Dry

Getting to know SunTech Vet20

3.

Connect Power and Hose



Open battery door on monitor back and insert 4 AA batteries paying attention to the correct polarity. Use lithium ion or alkaline batteries.



Alternatively, insert AC adapter plug into the power receptacle. Only use AC Adapter supplied by SunTech Medical.



Connect the patient hose to the back of the monitor making sure the connector “clicks” into the locking position.

Front Panel



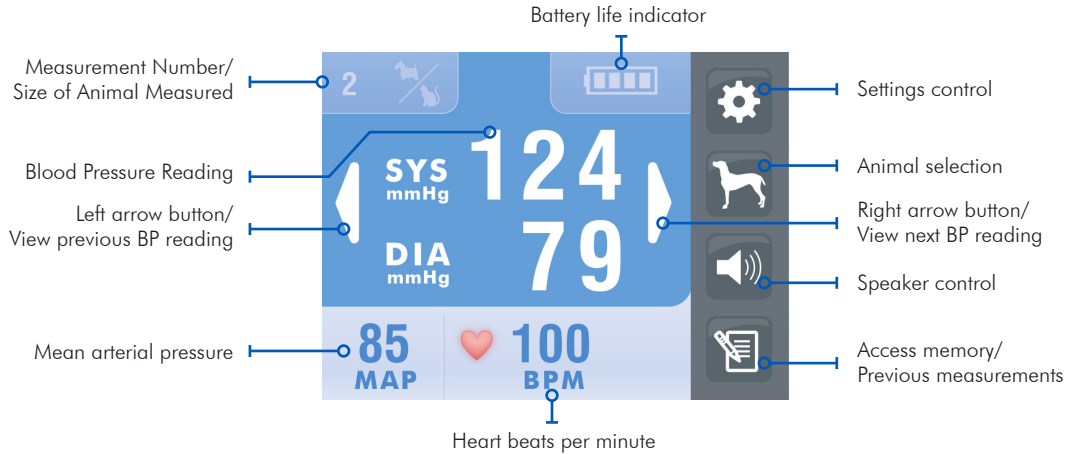
Power button.
Turns monitor on and off.

Start/Stop button.
Starts blood pressure measurement. Stops measurement at any time.

Colors: Magenta – monitor is ready to take a BP measurement
 Blue – Measurement is in progress
 Red – A problem occurred during the measurement

Main Screen View

After you begin using your SunTech Vet20, your main screen will display your most recent patient measurements. Here is a quick overview of the key symbols and numeric values you will see.

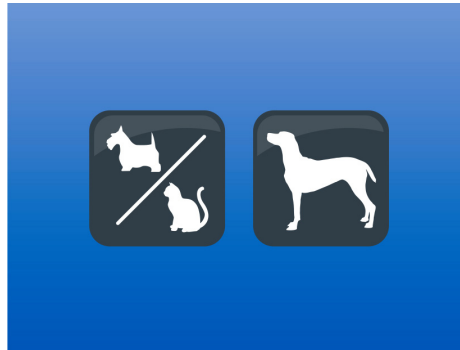


Selecting Your Settings

4.

Animal Selection Screen

When you turn on your SunTech Vet20, you will see the Animal Selection Screen. Even if you are not ready to measure BP on a patient, select either Large or Small animal so that you can proceed to the Main Screen. This screen can be turned off (see Animal Selection). Additionally, the animal mode can be toggled using the animal selection icon on the Main screen.



Choosing the Correct Companion Animal Mode

Small Animal Mode should be chosen when taking BP measurements on cats and dogs up to a #3 BP cuff size. *Large Animal Mode* has been designed for animals requiring a #4 BP cuff or larger. This size typically applies to dogs weighing more than 8 kg (~17.5 lbs.). If a problem arises try switching animal modes.

Speaker Setting/Noise Control

The SunTech Vet20 monitor's default setting is Speaker Off so that patients are not disturbed by sounds. To toggle between Speaker Off and Speaker On, press the Speaker button. When sound is OFF, you still will hear a very quiet clicking when you touch buttons but no beeps.



Settings

Clinical Alarms.

Provides access to turning ON and setting clinical alarms.

Animal Selection.

Turn ON or OFF startup screen.



Power Management.

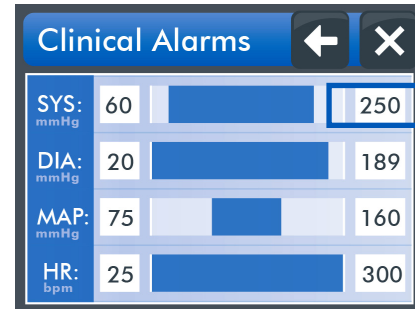
Select how long monitor stays on before Auto OFF shutdown. Auto OFF is disabled when powered by an AC adapter.

Language.

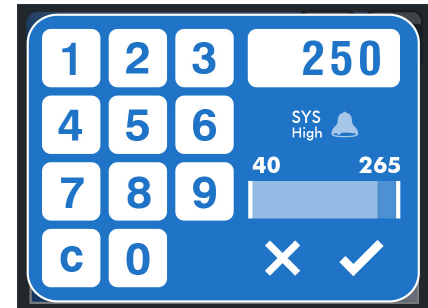
Select desired language.

Clinical Alarms

The SunTech Vet20 allows clinical alarms for all BP values (SYS, DIA, MAP and HR). Factory setting is OFF.



- To change alarm values, touch Set Alarm Values.
- Touch the range value that you want to adjust.
- Using the keypad, type in the desired value and touch the checkmark.
- To reset to default clinical alarms, touch Use Defaults.
- Out of range values will be Red on the Main Screen. If speaker is ON, a beep will occur.



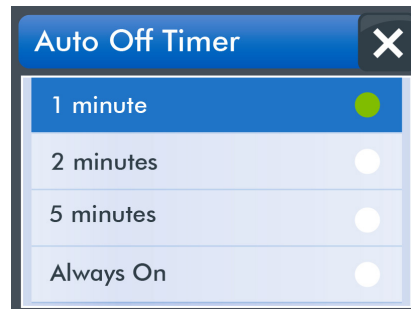
Power Management

The SunTech Vet20 includes an Auto OFF feature which turns the monitor off after a selected time period. The Auto OFF timer is disabled when powered by an AC Adapter.

Factory setting is 1 minute.

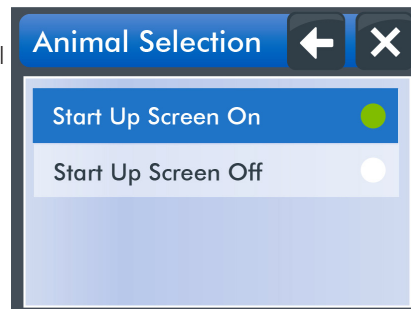
- Intervals include 1, 2 and 5 minutes as well as always ON.

TIP: Batteries may be rapidly depleted if set to always ON.



Animal Selection


The animal selection start up screen can be turned OFF. This is useful for clinics catering to a specific species such as an all cat clinic.



Languages

Multiple languages are available including English, French, Italian, German, Spanish and Brazilian Portuguese.





5. Before You Begin: Important Preparations

These preparations can help ensure a successful and accurate blood pressure measurement.

Where to Apply the Cuff

SunTech recommends that the cuff be placed on a front limb while the patient is lying on the right or left side. This helps ensure that the cuff is at heart level, which is best for measurement accuracy. Also, the patient is less likely to retract the front limb when the cuff gently squeezes it during the measurement. The cuff should be placed so that its artery marker aligns with the limb artery.

Alternate Patient Positioning: If the patient seems more comfortable seated, position the cuff as described above and hold up the limb during the BP measurement. This will help keep the cuff at heart level and relax the patient's muscles. If the patient appears agitated enough to bite or scratch, or is standing, the base of the tail is an acceptable alternate location.

Cuff Size

The SunTech Vet20 comes with a variety of different BP cuff sizes. Each cuff contains important markings that help with selecting the right cuff size.


**ARTERY**

Make sure this part of cuff is placed over the patient's artery.



When the cuff is wrapped around the patient's limb, its Index Marker should fall within this line.



When you wrap the cuff around the patient's limb, the Index Marker should fall within the Range Marker on the inside of the cuff.



Indicates limb circumference range of the cuff.



Not made with natural rubber latex.



Not made with PVC.

TIP: When more than one cuff size fits the limb, always choose the larger size for more accurate measurements. When a cuff is too small, it can cause BP values to be overestimated.

An alternative sizing method is to measure the circumference of the limb and choose a cuff whose width is 40% of the circumference for dogs and 30% for cats.

Using SunTech Vet20

6.

Taking a BP Measurement

Step 1. Place blood pressure cuff on patient and connect hoses.

Position patient so that they are lying down. Place the cuff just above the paw making sure not to place it over a joint. Connect cuff hose to monitor hose. (See “Before You Begin” for cuff size/placement guidelines and alternate positioning options.)

TIP: The success of the BP measurement is dependent on choosing the correct cuff and attaching it to the patient correctly. The cuff is the sensor so make sure to snugly fit the cuff as this provides better signals to the monitor.

Step 2. Power up and select animal mode.

Press the Power Button. Select Large or Small companion animal.

TIP: To change animal size after initial selection, touch the Animal Selection icon on Main Screen to toggle between Large and Small.

Step 3. Take blood pressure reading.

Press START/STOP button to start blood pressure measurement. START/STOP button turns Blue during measurement. Reading is complete when START/STOP button returns to Magenta. Main Screen will show SYS and DIA values, plus MAP and heart rate (BPM).

Interrupting/Stopping a Measurement

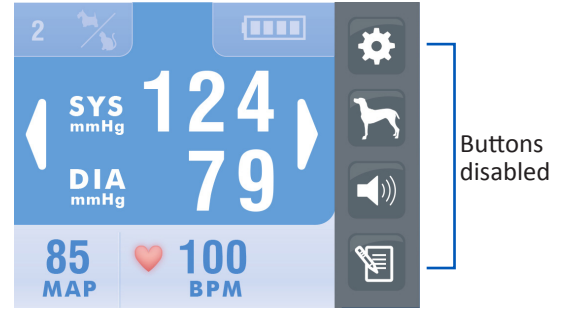
To stop a measurement while in progress, touch the START/STOP button. START/STOP button returns to Magenta and monitor is ready to start new reading.

Taking/Viewing Multiple Measurements

To take additional readings, press START/STOP again.

To view previous readings from the Main Screen, touch the Left Arrow button on Main Screen.

Touch the right arrow to see more recent measurements and to return to the Main Screen.



Deletes all
memory data

Averages values
for selected data

#	Sys	Dia	MAP	HR	Animal
10	122	80	94	110	Large
9	118	79	95	85	Large
8	⚠ Air leak in hose				
7	119	80	94	95	Large
6	120	77	95	100	Small

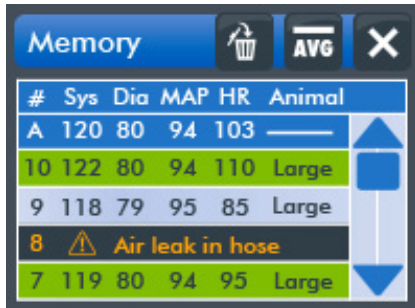
To view previous readings from the Memory Screen, touch the Memory button on Main Screen.

Up to 50 measurements can be stored in memory.

Averaging Measurements

To average measurements, touch the rows with the measurements you wish to average. Selected rows will turn green. To unselect a measurement, touch its row a second time.

Average of selected readings shows on top row with "A" as the identifier.



The screenshot shows a mobile application interface for monitoring patient data. At the top, there is a blue header bar with the word "Memory" on the left, a trash can icon in the middle, and a button labeled "AVG" on the right. Below the header is a table with five columns: "#", "Sys", "Dia", "MAP", "HR", and "Animal". The table contains five rows of data. The first row is blue and contains "A", "120", "80", "94", "103", and a horizontal line. The second row is green and contains "10", "122", "80", "94", "110", and "Large". The third row is white and contains "9", "118", "79", "95", "85", and "Large". The fourth row is black with yellow text and contains "8", a warning triangle icon, "Air leak in hose", and an empty cell. The fifth row is green and contains "7", "119", "80", "94", "95", and "Large". To the right of the table is a vertical scrollbar with blue arrows at the top and bottom.

#	Sys	Dia	MAP	HR	Animal
A	120	80	94	103	—
10	122	80	94	110	Large
9	118	79	95	85	Large
8	⚠	Air leak in hose			
7	119	80	94	95	Large

Taking Care of the SunTech Vet20

7.

Cleaning the Monitor



CAUTION: The SunTech Vet20 is not sterilizable. Do not immerse the monitor in any fluid or attempt to clean with any liquid detergents, cleaning agents, or solvents.

Dampen a soft cloth with mild medical grade disinfectant and wipe the monitor to remove surface dust and dirt.

Preventative Maintenance

System Self Checks

The SunTech Vet20 performs a range of system checks during normal operation. If the monitor detects a problem, it will display an error message recommending a trouble-shooting action or to contact SunTech Customer Service.

Replaceable Parts

On a routine basis, inspect the monitor, cuffs and hoses for cracks, fraying, or kinks. Immediately replace any damaged part.

System Components

Your Vet20 System should contain the following items. Some items are only included in upgraded packages.

Vet20 System	Standard Qty.
Vet20 BP Monitor	1
Patient Hose, 4ft	1
AA Batteries	4
Vet System Cuff Kit (6 cuffs)	1
Vet20 User Manual	1
Additional Accessories (included with some Vet20 systems)	Standard Qty.
AC Adaptor, Universal	0
Protective Armor - Blue Peacock	0
Protective Armor - Pink Flamingo	0

Accessories & Replacement Parts

Contact your sales representative to purchase the following items:

Description	Part Number	Details
#1 Cuff	98-0400-80	3 – 6 cm, white, non-locking, box of 20
#2 Cuff	98-0400-81	4 – 8 cm, white, non-locking, box of 20
#3 Cuff	98-0400-82	6 – 11 cm, white, non-locking, box of 20
#4 Cuff	98-0400-83	7 – 13 cm, white, non-locking, box of 20
#5 Cuff	98-0400-84	8 – 15 cm, white, non-locking, box of 20
#6 Cuff	98-0400-F1	12 – 19 cm, white, non-locking, box of 20
#7 Cuff	98-0400-F3	17 – 25 cm, white, non-locking, box of 20

Patient Hose	91-0028-72	4 ft (1.2m), black, individual
AC Adapter	19-0018-00	Power Supply, 5.9 VDC, 3.0 A, individual
Vet20 Armour in Blue Peacock	39-0195-01	Protective cover, blue, individual
Vet20 Armour in Pink Flamingo	39-0195-00	Protective cover, pink, individual

Status Messages

If the SunTech Vet20 has a problem taking a blood pressure measurement, a short beep will occur (if speakers are ON), the START/STOP button will turn Red and a Status Message will appear on the monitor screen. Take action as directed on the screen, or as suggested in the table below.

Status Message	Reason	Solution
Air Leak	There is a leak in the cuff, hose or monitor. Also possible if cuff or hose is not attached to the monitor.	<ul style="list-style-type: none"> • Check that the hose is connected to the monitor and cuff. • Check that the cuff is properly tightened. • Check that the cuff is in the correct position. • Check that the cuff is not leaking air. • Check that the hose connections are not damaged or loose.
Status Message	Reason	Solution
Value out of Range	The blood pressure value is outside of SunTech Vet20's published ranges.	<ul style="list-style-type: none"> • Make sure you are using the proper cuff size. • Patient may have been moving too much. • Check that the cuff is properly tightened and in proper position.
Poor Signal Quality	Monitor is not receiving a strong signal from patient. Also possible if a rapid deflation occurs during a measurement.	<ul style="list-style-type: none"> • Check that cuff is in correct position. • Check the patient. • Check that cuff is properly tightened. • Check that correct size cuff is used.

Artifact Detected	Monitor is picking up on unexpected noise or movements.	<ul style="list-style-type: none"> • Check animal mode. It might be on wrong setting. • Check patient for motion, trembling. Too much movement. • Check that cuff is in correct position. • Check that correct size cuff is used.
Measurement Too Long	The monitor is not detecting strong and consistent signals from the patient for an extended time period.	<ul style="list-style-type: none"> • Check to ensure cuff is fitting snugly on patient and is positioned properly. • Check that cuff is in correct position. • Check patient for moving, trembling.
Check Batteries!	Battery power is low.	<ul style="list-style-type: none"> • See the battery life indicator on the Main Screen. Replace batteries if needed.
Air Blockage	Air is not able to pass through the hose or cuff properly.	<ul style="list-style-type: none"> • Check that hose has no sharp bends and is not pinched. • Check that patient is not lying or stepping on cuff. • Check that cuff is in correct position.
Cuff Overpressure	Pressure in the cuff briefly exceeded 300 mmHg due to patient movement, air blockage or using a cuff that is too small.	<ul style="list-style-type: none"> • Check that correct size cuff is being used. • Check that hose has no sharp bends and is not pinched. • Check that patient is not lying or stepping on cuff. • Ensure patient is not moving excessively.
Monitor Not Ready	Monitor is preparing for next measurement or may need service.	<ul style="list-style-type: none"> • Touch START/STOP to start a new measurement. For repeated errors, calibration or service may be required.
System Failure	A monitor system has failed.	<ul style="list-style-type: none"> • Service is required.

Frequently Asked Questions

8.

How many measurements can I store in Memory?

You can store up to 50 measurements. The monitor has a revolving memory. When you take your 51st measurement, it will be listed as measurement #1.

How do I delete BP data from memory?

Select the Memory button and touch the Delete button. Before the memory is cleared, you will be asked to confirm or cancel the deletion. When you clear the Memory, you delete all measurements.

For medium-sized dogs, which animal mode do I choose?

Use cuff size as the determination factor. If a #3 cuff or smaller is the best fit, choose small animal mode. If #4 or larger, choose large animal mode.

How do I choose the correct cuff size?

Wrap the cuff around the patient's limb and make sure the index line falls within the range marker. If two different cuff sizes fit the patient, choose the larger size.

How long will the batteries last?

250+ BP measurements can be expected from typical alkaline batteries. Lithium batteries will provide even more measurements. Battery life is very dependent on the touch screen display ON time. To maximize life, SunTech suggests setting the Auto OFF timer to 1 minute.

Can I use this monitor on awake and anesthetized animals?


Yes. The SunTech Vet20 can be used on anesthetized animals as well as awake animals.

How do I keep the cuff from slipping down the limb or coming off?

Attach the cuff as tight as possible. Extra attention will be needed on species with dense or thick fur. If the cuff will not stay attached, check the Velcro for fur and remove if possible.

Are there other power options?

Yes. An AC adapter is available.



What are the minimum and maximum cat & dog weights when taking measurements with the Vet20?

There are none. Any cat or dog that has a limb that fits within the cuff ranges is acceptable.

Can I use rechargeable batteries?

Yes, you can use NiCd and NiMH rechargeable batteries but the Vet20 does not charge them.

Limited Warranty

9.

SunTech Medical, Inc. provides to the original purchaser the following limited warranty from date of invoice.

Monitors	24 months
Cuffs/Hoses	90 days

SunTech Medical, Inc. warrants each instrument to be free from defects in material and workmanship. Liability under this warranty covers servicing of the instrument when returned from the customer's facility within the United States prepaid to the factory. SunTech Medical, Inc. will repair any component(s) or part(s) that it finds to be defective during the period of this limited warranty. Should a defect become apparent, the original purchaser should first notify SunTech Medical, Inc. of the suspected defect. The instrument should be carefully packaged and shipped prepaid to:

SunTech Medical, Inc.
Service Department
507 Airport Boulevard, Suite 117
Morrisville, NC 27560 USA

Tel: 800.421.8626
919.654.2300
Fax: 919.654.2301

SunTech Medical, Ltd.
Service Department
Oakfield Industrial Estate
Eynsham, Oxfordshire OX29 4TS UK

Tel: 44 (0) 1865.884.234
Fax: 44 (0) 1865.884.235



This limited warranty is void if the instrument has been damaged by accident, misuse, negligence, act of God or serviced by any person not authorized by SunTech Medical, Inc. It contains the entire obligation of SunTech Medical, Inc. and no other warranties expressed, implied or statutory are given. No representative or employee of SunTech Medical, Inc. is authorized to assume any further liability or grant any further warranties except as herein.

Technical Information


10.

Factory Default Settings

Parameter Name	Default Value
Clinical Alarms Status	OFF
Clinical Alarms – low SYS	40 mmHg
Clinical Alarms – High SYS	265 mmHg
Clinical Alarms – low DIA	20 mmHg
Clinical Alarms – High DIA	200 mmHg
Clinical Alarms – low MAP	27 mmHg
Clinical Alarms – High MAP	222 mmHg
Clinical Alarms – low HR	25 bpm
Clinical Alarms – High HR	300 bpm
Speaker Status	OFF
Auto OFF Timer	1 minute
Language	English
Startup Animal Selection	ON



Performance Specifications

<i>Method of Measurement:</i>	Oscillometric
<i>Blood Pressure Range:</i>	Systolic: 40 – 265mmHg MAP: 27 – 222mmHg Diastolic: 20 – 200mmHg
<i>Pulse Rate Range:</i>	25 to 300 BPM (Beats Per Minute)
<i>Cuff Deflate Rate:</i>	Deflation step size varies with heart rate, cuff pressure and cuff volume
<i>Initial Inflation Pressure:</i>	180 mmHg (default)
<i>Subsequent initial inflation:</i>	previous Systolic + 30 mmHg
<i>Transducer Accuracy:</i>	±3mmHg between 0 mmHg and 300 mmHg
<i>Transducer Calibration:</i>	Recommended bi-annually or if a calibration problem is suspected
<i>Operating Conditions:</i>	0°C to 50°C, 15% to 95% non-condensing humidity
<i>Storage Conditions:</i>	-20°C to 65°C, 15% to 90% non-condensing humidity
<i>Altitude:</i>	Measurement accuracy not affected by altitude
<i>Power:</i>	4 AA alkaline batteries. AC Adapter - Input: 100-240V ~ 47-63Hz 0.48A Max, Output: 5.9V  3A 17.7W Max
<i>Dimensions:</i>	6.25" x 5" x 5.25" (15.9cm x 12.7cm x 13.3cm)
<i>Weight:</i>	1.3 lbs (0.59Kg) with batteries

Electromagnetic Compatibility (EMC)

Changes or modifications to the SunTech Vet20 that are not approved by SunTech Medical may cause EMC interference problems with this or other equipment.

Medical equipment can be affected by portable and mobile RF communications equipment.

Guidance and manufacturer's declaration – electromagnetic emissions		
The Vet20 is intended for use in the electromagnetic environment specified below. The customer or the user of the Vet20 should assure that it is used in such an environment.		
Emissions test	Compliance	Electromagnetic environment – guidance
RF emissions CISPR 11	Group 1	The Vet20 uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment The Vet20 is suitable for use in all establishments, including domestic establishments and those directly connected to the public low-voltage power supply networks that supplies buildings used for domestic purposes.
RF emissions CISPR 11	Class B	
Harmonic emissions IEC 61000-3-2	Class A	
Voltage fluctuations/ flicker emissions	Complies	


Guidance and manufacturer's declaration – electromagnetic immunity

The Vet20 is intended for use in the electromagnetic environment specified below. The customer or user of the Vet20 should assure that it is used in such an environment.

Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment - guidance
Electrostatic discharge (ESD) IEC 61000-4-2	± 6 kV contact ± 8 kV air	± 6 kV contact ± 8 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%
Electrical fast transient/burst IEC 61000-4-4	± 2 kV for power supply lines	± 2 kV for power supply lines	Mains power quality should be that of a typical commercial or hospital environment.
	± 1 kV for input/output lines	Not applicable	
Surge IEC 61000-4-5	± 1 kV differential mode ± 2 kV common mode	± 1 kV differential mode ± 2 kV common mode	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	>95% dip in UT for 0.5 cycle 60% dip in UT for 5 cycles 30% dip in UT for 25 cycles >95% dip in UT for 5 s	>95% dip in UT for 0.5 cycle 60% dip in UT for 5 cycles 30% dip in UT for 25 cycles >95% dip in UT for 5 s	Mains power quality should be that of a typical commercial or hospital environment.
Power frequency (50/60 Hz) Magnetic field IEC 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.
NOTE UT is the a.c. mains voltage prior to application of the test level			

Guidance and manufacturer's declaration – electromagnetic immunity

The Vet20 is intended for use in the electromagnetic environment specified below. The customer or user of the SunTech Vet20 should assure that it is used in such an environment.

Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment - guidance
Conducted RF IEC 61000-4-6	3 V rms 150KHz to 80MHz	3 V rms 150KHz to 80MHz	<p>Portable and mobile RF communications equipment should be used no closer to any part of the Vet20, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter.</p> <p>Recommended separation distance $d = 1.2\sqrt{P}$</p> <p>$d = 1.2\sqrt{P}$ 80 MHz to 800 MHz</p>
Radiated RF IEC 61000-4-3	3 V/m 80MHz to 2.5GHz	3 V/m 80MHz to 2.5GHz	<p>$d = 2.3\sqrt{P}$ 800 MHz to 2,5 GHz</p> <p>where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacture and d is the recommended separation distance in metres (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey,^a should be less than the compliance level in each frequency range.^b</p> <p>Interference may occur in the vicinity of equipment marked with the following symbol:</p> 

NOTE 1 At 80 MHz and 800 MHz, the higher frequency range applies.

NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

^a Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the Vet20 is used exceeds the applicable RF compliance level above, the Vet20 should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as re-orienting or relocating the Vet20.

^b Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.

Recommended separation distances between portable and mobile RF communications equipment and the Vet20

The Vet20 is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the Vet20 can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and Vet20 as recommended below, according to the maximum output power of the communications equipment.

Rated maximum output power of transmitter W	Separation distance according to frequency of transmitter m		
	150 kHz to 80 MHz $d=1.2\sqrt{P}$	80 MHz to 800 MHz $d=1.2\sqrt{P}$	800 MHz to 2,5 GHz $d=2.3\sqrt{P}$
0.01	0,12	0,12	0,23
0.1	0,38	0,38	0,73
1	1,2	1,2	2,3
10	3,8	3,8	7,3
100	12	12	23

For transmitters rated at a maximum output power not listed above, the recommended separation distance d in metres (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

NOTE 1 At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

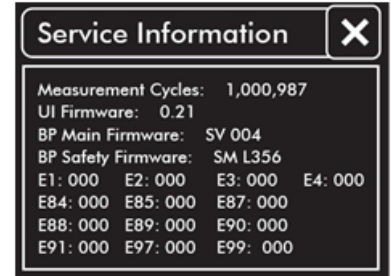
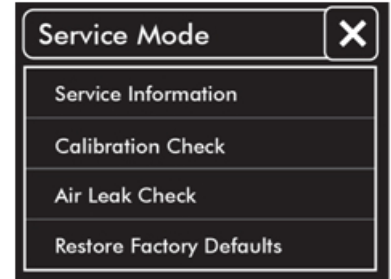
Appendix A: Service Screens

The SunTech Vet20 BP monitor includes a service mode where service information can be accessed, factory default settings can be restored and hardware verification checks can be performed. The service screens are accessed by holding down the power button for approximately 6 seconds when turning the monitor ON. When viewing service screens, the Start/Stop button LED is white.

No parts on the monitor or its accessories are serviceable.

Service Information

Basic details are logged which includes the number of measurement cycles, user interface firmware version, both firmware versions for the BP algorithm as well as a count for each status message. Status codes are provided to assist in troubleshooting during a service call.



Calibration Check

The pressure transducer in the SunTech Vet20 BP monitor is designed to hold its calibration for many years. Human NIBP devices require that the maximum static pressure accuracy shall be $\pm 3\text{mmHg}$ or 2% of the reading, whichever is greater. This is a stringent requirement and all test equipment must be in excellent working order to properly perform this test. If you do not have access to this equipment or prefer to have someone else verify the calibration, the monitor can be sent to SunTech following the procedure described in the Limited Warranty section of this manual. There may be a charge associated with the verification if the transducer is not out of calibration.

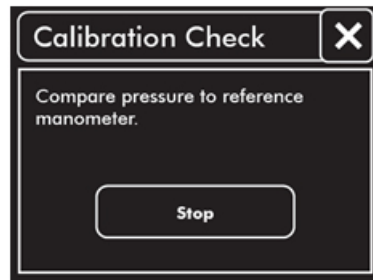
SunTech suggests this check be performed every 2 years or if there is suspicion that the monitor may be out of calibration.

Equipment Needed

- Calibrated Manometer
- Pneumatic "T" Adapters
- Volume (500mL bottle or #6 or #7 cuff wrapped tightly around a solid object)
- Hand Bulb
- Connection Tubing

Procedure

- Connect a manometer, volume and the hand bulb to the end of the monitor hose using "T" adapters and connection tubing.
- Touch the Start button which closes the valves and shows the pneumatic pressure.
- Apply various pressures (between 0 mmHg and 250 mmHg) to the monitor with the hand bulb. INFLATE SLOWLY when adding pressure over 200 mmHg to avoid an overpressure. Verify that the module pressure is equal to the manometer pressure ($\pm 3\text{ mmHg}$ or 2% of the target value).



- If the pressure is within limits, then touch the Stop button and the calibration check is complete.
- If the pressure does not agree with the manometer, then the transducer needs to be re-calibrated. Send monitor back to SunTech Medical following the procedure in the Limited Warranty section of the manual.

Air Leak Check

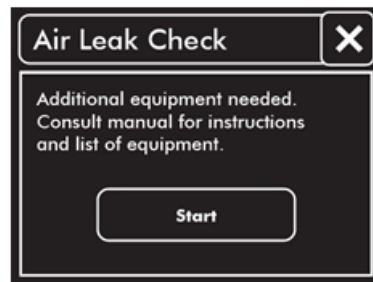
International standards for human NIBP devices require that air leakage within the pneumatic system must not exceed 6 mmHg/min. During manufacturing at SunTech Medical, acceptable air leakage is less than 3 mmHg/min. Both of these pass criteria will not affect the performance or accuracy of the NIBP module so the SunTech Vet20 uses the 6 mmHg/min pass criteria. If you do not have access to this equipment or prefer to have someone else perform the air leak check, the monitor can be sent to SunTech following the procedure described in the Limited Warranty section of this manual. There may be a charge associated with performing an air leak check.

SunTech suggests this check be performed if there is suspicion of an air leak.

Equipment Needed

- Volume (500mL bottle or #6 or #7 cuff wrapped tightly around a solid object)
- Standard patient hose

TIP: A reduction in cuff pressure is expected during the first 60 seconds due to pneumatic expansion of the cuff, patient hose and internal tubing. Make sure cuff is wrapped tightly around a solid object. Do not perform with cuff on a patient, laying flat or wrapped loosely.



Procedure

- Connect the volume to the monitor patient hose.
- Touch the Start button which begins the air leak check and shows the pneumatic pressure and a timer. This check takes approximately 2 minutes.
- When the check is complete, the monitor will indicate a pass or fail result.
- If pass, then touch the Pass button and the air leak check is complete.
- If fail, then there is an air leak within the pneumatic system. Try repeating the check with a different cuff making sure all connections are sealed. If it still fails, you may send the monitor and cuffs back to SunTech Medical following the procedure in the Limited Warranty section of the manual.



Restore Factory Defaults

Factory defaults are restored by accessing this screen. A list of factory default settings is in the Technical Information section of this manual.







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