# MiniSim 1000 Basic

# User Manual


▶Compact ▶Lightweight ▶Easy to Use

## Patient Simulator

(Waveform Simulation Instrument)

NETECH

Innovative Instruments Since 1987

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# Notices

## Copyright



## Quality Assurance

Netech is ISO 9001-2015 Registered. This instrument was thoroughly tested and inspected according to Netech's ISO 9001-2015 quality system and test procedures and found to meet those specifications when it was shipped from the factory. Calibration measurement Instruments are traceable to the NIST (National Institute of Standards and Technology).

## Trade Mark

Netech and MiniSim 1000 Basic are trademarks of Netech Corporation. Any other trademark names used in this manual are only for editorial purposes and the benefit of the respective trademark owner with no intention of improperly using that trademark

## Unpacking and Inspection of the Unit

Before unpacking the MiniSim 1000 Basic, inspect the shipping box for any visual damage. If damage is found, do not unpack the unit and immediately notify the shipping carrier. If no damage is found to the shipping box, open the box and perform a visual inspection of the MiniSim 1000 Basic. If any damage to the unit is observed please contact Netech Customer Service.

## Technical Support

For technical support questions, either email Techsupport@NetechBiomedical.com or Call 1-800-547-6557 or (1-631-531-0100)

## Refunds and Credits

A Return Material Authorization (RMA) number must be obtained from our service or customer service dept, before a product is returned for refund or credit. The RMA number should be clearly marked on the package along with a statement indicating the reason for return.

## Restocking Charges

Products returned within 30 days after purchase are subject to a restocking charge of 15%. Products must be shipped prepaid in original shipping cartons with all accessories and parts. Additional charges will be applied for any missing parts or accessories.

## Repair and Recalibration

Products returned for repair or recalibration must obtain a RMA (Return Material Authorization) from our service department after completing a service request form our website https://www.NetechBiomedical.com/repair or contact Netech Customer Service Department at CustomerService@NetechBiomedical.com

## Calibration

The MiniSim 1000 Basic is factory calibrated, thoroughly tested, and meets Netech's ISO 9001-2015 quality standards.

Any attempt to remove or tamper with the calibration seal will void the warranty.

## General Contact Information

Netech Corporation, 110 Toledo St, Farmingdale, NY 11735.

Phone: 631-531-0100, (or) 1-800-547-6557

Website: www.NetechBiomedical.com

Email: sales@NetechBiomedical.com

### Warnings

| SYMBOL | DESCRIPTION |
|---|---|
|  | Caution: Important Safety Information |
|  | Hazardous Voltage |
| CE | Conforms to European Union Directive |

# Introduction

## Description

The MiniSim 1000 Basic Multi-Parameter Patient Simulator is a micro-controller based instrument. It is designed to simulate patient signals of ECG, arrhythmia, invasive blood pressure, respiration, and temperature. The device also simulates square, sine, triangle, and pulse performance waveforms.

The easy to operate MiniSim 1000 Basic is menu driven via eight tactile feel soft keys. All functions are displayed on a two-line sixteen-character LCD display.

The small hand held instrument is powered by one 9 Volt batteries or an optional AC adapter. The MiniSim 1000 Basic is CE marked and shipped with a Certificate of Calibration traceable to the NIST.

The MiniSim 1000 Basic is a rugged instrument that performs its simulations quickly, accurately, and with ease.

## MiniSim 1000 Basic Features

- Best value
- Easy-to-use
- Compact Size
- Menu-driven operation
- Large LCD Display
- Tactile keypad
- Battery or AC operation

# Specification

## General Specifications

**ECG**: 12 leads with independent outputs referenced to RL.

**NORMAL SINUS RHYTHM (NSR)**

**ECG Rates**: 30, 60, 70, 80, 90, 100, 120, 150, 180, 210, 240, 270, 300, and 350 BPM.
Accuracy 0.5%.

**Amplitudes**: 0.15, 0.3, 0.5, 1.0, 2.0, 3.0, 4.0, and 5.0 mV on Lead II.
Lead 1 is 0.6 X Lead II, Lead III is 0.4 X Lead II, and Lead V is the same as Lead II.

**High Level**: 500 X low level output on Lead II.
Accuracy: 2% (1-5mV).

**PERFORMANCE WAVEFORMS (PERF)**:
Sine, Square, Triangle, Pulse

**Frequencies**: 0.1 to 0.9 in 0.1 Hz steps.
1.0 to 9.0 in 1.0 Hz steps.
10 to 100 in 10 Hz steps.

**Accuracy**: 1%

**Amplitudes**: 0.1, 0.2, 0.5, 1.0, 2.0, 3.0, 4.0, and 5.0 mV on Lead II.
**Pulse**: 20 ms pulse of 1mV amplitude repeated at 4 second intervals.

**R WAVE DETECTION (RWD)**

**Widths**: 10, 40, 50, 60, 70, 80, 90, 100, 110, and 120 ms.
**Amplitudes**: 0.15, 0.3, 0.5, 1.0, 2.0, 3.0, 4.0, 5.0 mV on Lead II.

**PACER (PCR)**

**AP**: Atrial Pacer set at 70 BPM.

**ASP**: Asynchronous Pacer – Ineffective Pacing.
**Pacer Amplitudes**: + 2 mV and –2mV.
**QRS Amplitudes**: 1 mV
**PCR**: Pacer pulses alone.
**Pacer Widths**: 0.1, 0.2, 0.5, 1.0, 1.5, and 2.0 ms.
**Amplitudes**: 0.15, 0.3, 0.5, 1.0, 2.0, 3.0, 4.0, and 5.0 mV.
**VP**: Ventricular Pacer set at 70 BPM.
**AVP**: Atrial Ventricular Pacer set at 70 BPM.
**QRS Amplitude**: 1 mV.
**Pacer Amplitude**: -2mV.

**RESPIRATION**
**Baseline Impedance**: 250, 500, 750, and 1000 Ohms.
**Delta Impedance**: 0.1, 0.5, 1.0, and 1.5 Ohms.
**Accuracy**: 20%.
**Rates**: 15, 30, 60, and 120 BPM.
**Accuracy**: 1%
**Apnea**: Off, continuous, 12 seconds and 32 seconds.
**Lead Configuration**: Leads I and II.

**BLOOD PRESSURE**
**Impedance**: 350 Ohms.
**Excitation**: 2 to 16 Volts.
**Sensitivity**: 5µV/V/mmHg.
**Static**: 0, 5, 10, 20, 25, 30, 40, 50, 100, 150, 200, and 300 mmHg.
**Dynamic**: 50/10, 60/20, 70/30, 80/40, 100/60, and 120/80 mmHg.
Dynamic waveforms track all NSR rates.
**Accuracy**: 1%

**TEMPERATURE**
Compatibility: YSI 400 and 700 Series.

Temperature: 25 and 37 degrees Centigrade.
Accuracy: 2% of setting

**POWER REQUIRMENTS**: One 9 Volt alkaline battery or optional AC adapter.

**PHYSICAL CHARACTERISTICS:**
Dimensions: 5.5 X 3.5 X 1.5 inches (13.9 X 8.9 X 3.8 cm).
Weight: 10 oz ( 0.3 kg).

**TEMPERATURE REQUIREMENTS**:
Operating: 59 to 95° F (15 to 35°C).
Storage: 32 to 131° F (0 to 55°C).

**CALIBRATED DC OUTPUTS**: 10 Calibrated DC outputs from 0.04 to 2 mV.

## Output Connections:

**Part # 303-R1**, Open Ended Pressure cable:

Pressure: Single Pressure
Pin 1 + Excitation
Pin 4 + Signal
Pin 2 - Signal
Pin 5 - Excitation
Pressure: Dual Pressure
Pin 3 + Signal
Pin 2 - Signal

**Part # 327, 328** Open Ended Temperature Cable:

3.5 mm Stereo Jack
YSI 400 Tips, Ring, Shield.
YSI 700 Tip, Ring.

High Level Output: 3.5 mm Stereo Jack

Signal Positive Tip

Signal Ground Shield

Input/Unused Ring

Note: Specifications are subject to change without notice

## Part Numbers and Ordering Information

**Part Number:** **300-0.1**: MiniSim Patient Simulator with 12 Lead ECG and Arrhythmias

**Standard Accessories (Included with the unit):**

**535-CASE:** Hard Carrying Case

**1000:** Universal ECG Snap to banana plug adapter (set of 10)

**327:** YSI 700 Temperature Interface cable

**Optional Accessories:**

| PART NO. | DESCRIPTION |
|---|---|
| 327 | Temperature Interface Cable (YSI 700) for MiniSim 1000 (Advanced). |
| 328 | YSI 400 Temperature Interface cable |
| 303-R1 | Unterminated Blood Pressure Interconnect Cable |
| 305-R1 | Dual Space Labs BP Interface Cable for Patient Simulator (R1) |
| 305-S-R1 | Single Space Labs BP Interface Cable for Patient Simulator (R1) |
| 306-R1 | Dual Datascope BP Interface Cable (R1) |
| 308-R1 | Single Hewlett Packard (HP) / Philips BP Interface Cable (R1) |

**Optional Accessories (Continued):**

| | |
|---|---|
| 311 - R1 | Dual Bard BP Interface Cable (R1) |
| 311-S-R1 | Single Bard Medical BP Interface Cable (R1) |
| 313B-R1 | GE Healthcare Marquette IBP Interface Cable (R1) |
| 316R1 | Datex Ohmeda AS3 Single Input BP Interface Cable (R1) |
| 323-R1 | Datex Ohmeda AS3 Single Input BP Interface Cable (R1) |
| 325-R1 | Single Maquet BP Interface Cable (R1) |
| 326-R1 | WITT BP Interface Cable (R1) |

Note:Various Manufacturers' model specific interface cables are available. Please call for the part numbers or visit www.NetechBiomedical.com

# Instrument Familiarization

Before getting started, it is important to get familiar with the control and operation of the unit.

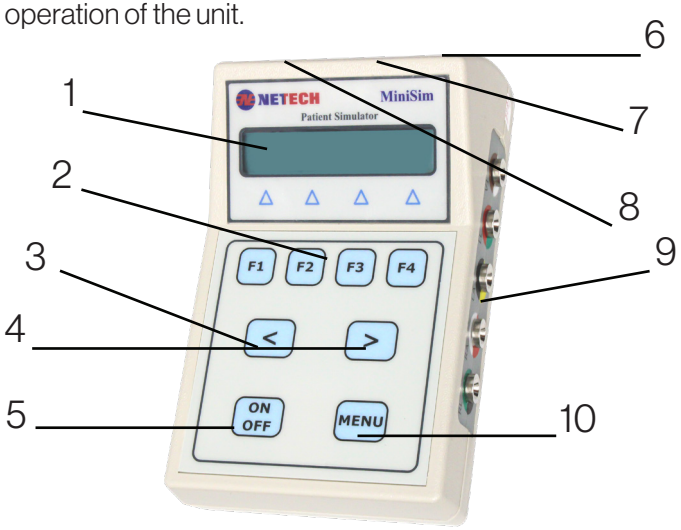



Figure 1. Waveform Simulator Controls

| Number | Description |
|---|---|
| 1 | LCD Display |
| 2 | Function Keys (F1, F2, F3, F4) |
| 3 | Arrow Key < (Left) |
| 4 | Arrow Key > (Right) |
| 5 | On/Off Key |
| 6 | High Level ECG Output |
| 7 | Blood Pressure Connector |
| 8 | Temperature Connector |
| 9 | ECG Lead Snaps Arrow Key < (Left) |
| 10 | Menu Key |

The operating menu of the MiniSim 1000 Basic is arranged in a tree structure. When turned on, the microcontroller initializes a test routine and displays the model and software version numbers and then switches to the Main Menu.

During operation, the 'MENU' key returns the currently displayed menu to the previous menu.

The 'F1', 'F2', 'F3', and 'F4' keys select the parameter for simulation, the specific type of parameter, and the functional characteristics of the parameter.

The '<' and '>' arrow keys move through the available choices under the selected parameter.

# Operating Instructions

**Menu Descriptions:** The following are the menu sequence displays, their abbreviations, definitions, and default settings.

| SIMULATOR MENU | | | |
|---|---|---|---|
| **Ecg** | **Resp** | **Bp** | **Temp** |

**Ecg**: ECG
**Default Setting**: Normal Sinus Rhythm (NSR) at 80 BPM with Amplitude of 1 mV
**Resp**: Respiration
**Default Setting**: 30 BPM, Impedance 500 Ohms, Delta R 1.0 Ohm, and Apnea Off
**Bp**: Blood Pressure
**Default Setting**: 120/80 Dynamic Setting

0 Static Setting

**Temp**: Temperature

**Default Setting**: YSI 700 series set to 25°C
YSI 400 series set to 25°C

## Basic Operating Instructions:

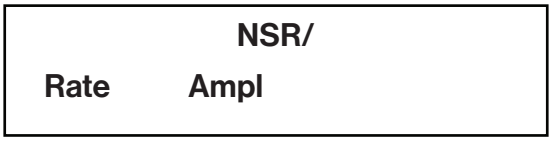
1. Connect the MiniSim 1000 Basic to a patient monitor using the ECG lead snaps, correct blood pressure interface cable and correct temperature interface cable.
2. Turn the Minisim 1000 Basic On.
3. Select the parameter for simulation, 'ECG', ' Resp', ' BP', or 'Temp'.
4. Continue to select choices under the parameter to be simulated until the functional characteristics have been chosen.
5. Each Parameter has default settings.

| ECG MENU | | | |
|---|---|---|---|
| **Base** | **Perf** | **Arth** | **Aut** |

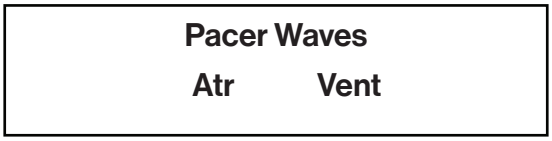
**Base: Baseline ECG**
**Perf: Performance Waveforms**
**Arth: Arrhythmia Waveforms**
**Aut: Automatic Test Sequences**

| Baseline ECG | | | |
|---|---|---|---|
| **NSR** | **PCR** | **ST** | **RWD** |

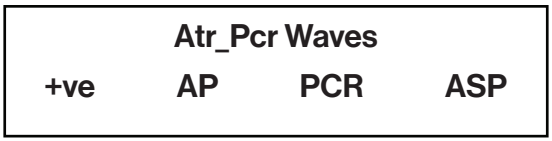
**NSR: Normal Sinus Rhythm**
**PCR: Pacer Waveforms**
**ST: ST Segment Analysis Waveforms**
**RWD: R Wave Detection**




Rate and Amplitude selections under NSR are:
Rate: 30 60 70 80 90 100 120 150 180 210 240 270 300 350
Ampl:.15 0.3 0.5 1.0 2.0 3.0 4.0 5.0




Selecting **Atr** branches to:




+ve: Changes pacer pulse from positive (+ve) to negative ( – ve).

**AP**: Atrial Pacer – Normal Paced Rhythm

QRS with rate of 60 BPM and Pacemaker pulses with amplitudes of + 2 mV and –2 mV with duration of 0.1 ms or 2 ms with a normally paced QRS T (QRS amplitude of 1 mV, duration of 100 ms, T wave amplitude of 0.2 mV, duration of 180 ms, and Q-T interval of 350ms)

**PCR**: Pacer Pulses Alone. Amplitude default setting of 1.0 mV and width of 1.0 ms.

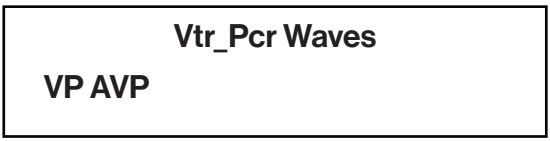
**Widt**: width selections
0.1 0.2 0.5 1.0 1.5 2.0

**Ampl**: amplitude selections
.15 0.3 0.5 1.0 2.0 3.0 4.0 5.0

**ASP**: Asynchronous Pacer – Ineffective pacing.
A non-synchronized waveform that combines QRS waves at 30 BPM and other specifications as in AP above with pacer waves with a 0.1 ms or 2 ms width and amplitude of ± 2 mV at 80 BPM.

Note: 0.1 ms pacer width for AP and ASP can only be selected by going to 'PCR'. A selection other than 0.1 ms produces 2 ms wide pulses.

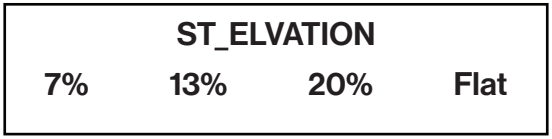
Selecting **Vent** branches to:




**VP**: Ventricular Pacer at 70 BPM
**AVP**: Atrial Ventricular Pacer at 70 BPM

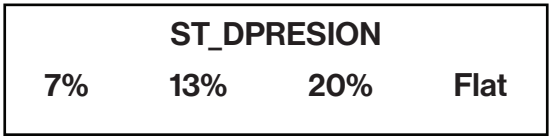
Selecting **ST** branches to:


ST segment analysis waveforms are divided into four classes:
**ele**: ST Elevation
**dep**: ST Depression
**MI**: Myocardial Infarction
**TalT**: Tall T Wave Rejection




**ST Elevation**: 7, 13, and 20% DC levels of ST Elevation may be selected. Example: at a QRS amplitude of 1 mV, ST segments are produced at positive DC levels of 70, 130, and 200 micro volts.

Waveforms may be selected with a '**Flat**', a positive '**+sl'**, or a negative **'-sl**' slope. The ST segment is proportional to the ECG amplitude setting.




**ST Depression**: Identical to ST Elevation except the ST segments are now depressed.
Selecting MI Myocardial Infarction branches to:


**Isc**: Ischemia
**Inj**: Injury
**Inf**: Infarction
**Iinf**: Inferior Infarction

**Isc**: Ischemia : Normal Sinus Rhythm (NSR) with fully inverted T waves. This is a condition of reduced blood supply to the heart in a normal patient.

**Inj**: Injury. A waveform with ST elevation of 20% with a negative slope and inverted T wave.

**Inf**: Infarction. Normal Sinus Rhythm (NSR) with a large Q wave with the amplitude increased six times and the width increased three times compared to normal.

**Iinf**: Inferior Infarction. A waveform with the Q wave modified as in Infarction and the ST segment elevated 7% as in ST Elevation.

Selecting TaIT branches to:

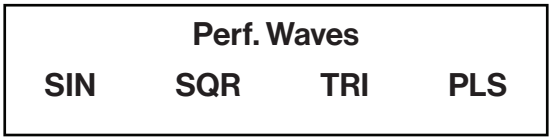
| TaIT/Rate=80 | |
|---|---|
| **Rate** | **Ampl** |

An 80 BPM QRS test signal of 1 mV amplitude and 100 ms duration is generated with a T wave duration of 180 ms and Q-T interval of 350ms.
The T wave amplitude may be varied from 0 to 1.2 mV in steps of 0.1mV .
**Rate**: 80 BPM
**Amplitude**: 0.0 0.1 0.2 0.3 0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2
Selecting **RWD** branches to:

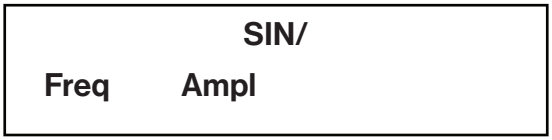
| RWD/ | |
|---|---|
| **Widt** | **Ampl** |

**RWD**: R Wave Detection. A QRS waveform is generated at 70 BPM with selectable width and amplitude changes.

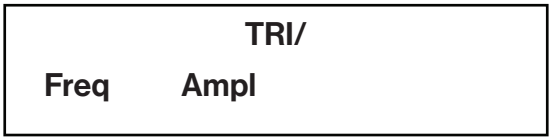
**Widt**: Width default setting 100 msec
10 40 50 60 70 80 90 100 110 120
**Ampl**: Amplitude default setting 1.0 mV
.15 0.3 0.5 1.0 2.0 3.0 4.0 5.0




**SIN**: Sine Wave
**SQR**: Square Wave
**TRI**: Triangle Wave
**PLS**: Pulse Wave








The frequency and amplitude default settings and choices are the same for the sine, square and triangle performance waveforms.

**Freq**: Frequency default setting 1.0 Hz
0.9 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10 20 30 40 50 60 70 80 90 100
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8

**Ampl**: Amplitude default setting 2.0 mV
2.0 3.0 4.0 5.0 0.2 0.5 1.0

**Pulse wave default setting**: A pulse wave is generated at 4 second intervals with an amplitude of 1mV and width of 20 ms.

Selecting Arr branches to:

| Perf. Waves | | |
|---|---|---|
| **Atr** | **AC** | **Vent** |

Arrhythmias are divided into Atrial, Atrial Conduction, and Ventricular waveforms. Normal Sinus Rhythm (NSR) at 80 BPM is the default waveform in this menu. Function keys select the desired arrhythmia and the MENU key clears the arrhythmia to NSR.

The following are the arrhythmia definitions:

## Atrial: Atrial Arrhythmias

**SA: Sinus Arrhythmia**: The ECG rate uniformly increases and decreases continuously.

The pattern is cyclic with rates changing in the following order: 60, 70, 80, 90, 100, 90, 80, 70, 60 BPM.

**M80: Missing Beat**: Normal Sinus Rhythm is generated at 80 BPM with every 10th beat missing.

**AFLT: Atrial Flutter**: Varying ECG rates with 12 cycles at 60 BPM for 12 seconds, 9 cycles at 90 BPM for 6 seconds, 15 cycles at 150 BPM for 6 seconds repeating with large P waves at 300 BPM. This corresponds to ventricular responses of 5:1 for 12 seconds, 3:1 for 6 seconds, and 2:1 for 6 seconds.

**AFB: Atrial Fibrillation**: Irregular QRS complexes with no P waves

and constantly changing R-R intervals are generated. The rate varies in a cyclic fashion at 30, 60, 70, 80 and 30 BPM with low amplitude oscillations on the baseline.

**PAT: Paroxysmal Atrial Tachycardia**: NSR is generated at 180 BPM with inverted P waves.

**NODL: Junctional Premature Contraction**: NSR is generated at 80 BPM with a short PR interval. The QRS starts immediately following the P wave.

## AC: Atrial Conduction Arrhythmias

**AB1: First Degree AV Block**: The QRS is generated at 80 BPM, the P wave precedes the QRS by a fixed but prolonged PR interval > 0.2 seconds ( PR interval = 0.26 seconds).

**MB1: Second Degree AV Block: Mobitz I: Wenckebach**: The QRS is generated at 80BPM. There is a progressive lengthening of the PR interval with intermittent dropped beats. The PR intervals are 170, 230, and 310 ms.

**MB2: Second Degree AV Block: Mobitz II**: The QRS is generated at 80 BPM with every 4th QRS missing. The PR interval is constant at 170 ms.

**AB3: Third degree AV Block**: The P wave and QRS are independent of each other.

The P wave is generated at 80 BPM and the QRS is generated at 50BPM.

**RBB: Right Bundle Branch Block**: A prolonged QRS (>0.12 sec) is generated at 80BPM. The resulting QRS looks like the letter “M”.

**LBB: Left Bundle Branch Block**: A widened QRS is generated at 80 BPM with a large wide S wave.

**LAH: Left Anterior Hemiblock**: A QRS is generated at 80 BPM with an S wave larger than the R wave.

## Ventricular: Ventricular Arrhythmias

**PV1: Premature Ventricular Contraction 1**: NSR is generated at 80 BPM. Each time the 'F1' function key is pressed one PVC is generated.

**PV3: Premature Ventricular Contraction 3**: NSR is generated at 80 BPM. Each time the 'F2' function key is pressed 3 PVCs are generated.

**PV6: Premature Ventricular Contraction 6**: NSR is generated at 80 BPM. Each time the 'F3' function key is pressed 6 PVCs are generated.

**PV12: Premature Ventricular Contraction 12**: NSR is generated at 80 BPM. Each time the 'F4' function key is pressed 12 PVCs are generated at different intervals.

**PV24: Premature Ventricular Contraction 24**: NSR is generated at 80 BPM. Each time the 'F1' function key is pressed 24 PVCs are generated at different intervals.

**BGY: Bigeminy**: NSR is generated at 80 BPM with every other beat as a PVC.

**TGY: Trigeminy**: NSR is generated at 80 BPM with every third beat as a PVC.

**PVC: Premature Ventricular Contraction**: Continuous PVCs are generated at 80BPM.

**VFLT: Ventricular Flutter**: Sine waves at 240 BPM are generated with irregular amplitudes.

**VFB: Ventricular Fibrillation**: A totally irregular waveform is generated with chaotic undulations of the baseline.

**VTC: Ventricular Tachycardia**: A fast moving series of PVCs is generated at 210BPM.

**PVR: Right Focal PVC**: NSR is generated at 80 BPM with every 10th beat a right focal PVC.

Selecting **Aut** branches to:

| <Auto Sequence> | | | |
|---|---|---|---|
| **RWD** | **TalT** | **PPR** | **TAC** |

The Automatic Test Sequence generates test waveforms in sequences according to AAMI requirements eliminating the need for the user to make numerous manual selections.

The automatic test sequences are:

**RWD: R Wave Detection**
**TalT: Tall T Wave Rejection**
**PPR: Pacemaker Pulse Rejection**
**TAC: Time for Alarm for Tachycardia**

The automatic sequence is initiated when the test is selected and continues until all of the test patterns have been generated. During the test sequence the values generated are displayed on the LCD. At the completion of the automatic test, the display will return to its steady mode.

## RWD: R Wave Detection

R waves are generated with three varying parameters of amplitude, width, and rate. The three parameter values are displayed on the LCD while generated. Each test waveform is displayed for 20 seconds.

The complete waveform test sequence is performed in three separate sets.

**Set 1:** Variable Parameters
Amplitude: 0.5, 2, 5 mV
Width: 100, 70, 120 ms
Rate: 80, 30, 210 BPM

**Set 1 Complete Test Sequence**

| Amplitude (mV) | Width (ms) | Rate (BPM) | Time (sec) |
|---|---|---|---|
| 0.5 | 100 | 80, 30, 210 | 20 |
| | 70 | 80, 30, 210 | 20 |
| | 120 | 80, 30, 210 | 20 |
| 2.0 | 100 | 80, 30, 210 | 20 |
| | 70 | 80, 30, 210 | 20 |
| | 120 | 80, 30, 210 | 20 |
| 5.0 | 100 | 80, 30, 210 | 20 |
| | 70 | 80, 30, 210 | 20 |
| | 120 | 80, 30, 210 | 20 |

As the test progresses, the indicated heart rate displayed on the patient monitor should be within ± 10% or ± 5 BPM whichever is greater of the applied rate.

**Set 2**: Variable Parameters
Amplitude: 0.15 mV
Width: 70, 120 ms
Rate: 30, 210 BPM

**Set 2 Complete Test Sequence**

| Amplitude (mV) | Width (ms) | Rate (BPM) | Time (sec) |
|---|---|---|---|
| 0.15 | 70 | 30, 210 | 20 |
| 0.15 | 120 | 30, 210 | 20 |

The monitor will not respond to the waveforms in this sequence Set.

**Set 3**: Variable Parameters
Amplitude: 1.0 mV
Width: 10 ms
Rate: 30, 210 BPM

**Set 3 Complete Test Sequence**

| Amplitude (mV) | Width (ms) | Rate (BPM) | Time (sec) |
|---|---|---|---|
| 1.0 | 10 | 30, 210 | 20 |

The patient monitor will not respond to the waveforms in the Set 3 test sequence.

## TalT: Tall T Wave Rejection.

QRS and T waves are generated with the following values:

QRS: Rate 80 BPM
Amplitude 1 mV
Width 100 ms
T Wave Duration 180 ms

QT Interval 350 ms

T Wave Amplitude 0.0, 0.2, 0.4, 0.6, 0.8, 1.0, and 1.2 mV .

In the automatic test sequence the T Wave Amplitude steps through the changes at one minute intervals. The display indicates the T Wave Amplitude and the QRS Rate.

As the T wave amplitude increases, the first value at which the patient monitor counts the T wave at 80 ± 8 BPM should be noted. This value should match the patient monitor manufacturer's specification.

**PPR: Pacemaker Pulse Rejection**. The test sequence cycles through normal paced rhythm (AP), ineffective pacing (Asynchronous Pacing ASP), and pacemaker pulses alone (PCR).

For normal pacing (AP),QRS and pacer waves are generated with the following values:

| | | |
|---|---|---|
| QRS: | Amplitude | 1 mV |
| | Width | 100 ms |
| T wave: | Amplitude | 0.2 mV |
| | Duration | 180 ms |
| Q-T Interval | | 350 ms |
| R-R Interval | | 1 Sec |
| Pacer: | Amplitude | 2 mV, -2 mV |
| | Width | 2 ms, 0.1 ms |

For ineffective pacing (ASP), the values of the QRS and pacer waves are the same as normal pacing except for the QRS rate that becomes 30 BPM and the pacer rate that becomes 80 BPM.

During the ASP and AP test sequences the display will show the pacer amplitude, the pacer width, and the QRS rate.

For pacemaker pulses alone (PCR) the values generated are:

| | | |
|---|---|---|
| Pacer: | Rate | 60 BPM |
| | Width | 2.0 ms, 0.1 ms |
| | Amplitude | 2 mV, -2 mV |

During the PCR test sequence the display will show the pacer amplitude, the pacer width, and the QRS rate.

Each set of values in the test sequence is generated and displayed for 20 seconds.

**TAC: Time to Alarm for Tachycardia**: The TAC test is designed to measure the time it takes for the patient monitor to alarm after the onset of ventricular tachycardia. The low and high alarms on the patient monitor should be set at 60 BPM 100 BPM before starting the test.

This auto test sequence generates a QRS wave form at the rate of 80 BPM alternating with a ventricular tachycardia waveform with rates of 206 and 195 BPM and amplitudes of 1.0, 0.5, 2.0, and 4.0 mV.

Each waveform is generated for 20 seconds and the display will show the amplitude and the rate of the waveform being generated.

The following is the sequence of waveforms:

| QRS | | Ventricular Tachycardia | | |
|---|---|---|---|---|
| Rate (BPM) | Amp (mV) | Width (ms) | Rate (BPM) | Amp (mV) |
| 80 | 1 | 100 | 206 | 1.0 |
| 80 | 1 | 100 | 206 | 0.5 |
| 80 | 1 | 100 | 206 | 2.0 |

| QRS | | Ventricular Tachycardia | | |
|---|---|---|---|---|
| Rate (BPM) | Amp (mV) | Width (ms) | Rate (BPM) | Amp (mV) |
| 80 | 1 | 100 | 195 | 2.0 |
| 80 | 1 | 100 | 195 | 1.0 |
| 80 | 1 | 100 | 195 | 4.0 |

## RESPIRATION:

Select Resp in the Simulator Menu to access the Respiration selections.

| **Resp Menu** | | | |
|---|---|---|---|
| **Rate** | **Imp** | **dR** | **Apne** |

Respiration waveforms are generated with four selectable rates, baseline impedances, and delta impedance variations.

The Respiration default settings are:

| | |
|---|---|
| Respiration Rate | 30 BPM |
| Impedance | 500 Ohms |
| Delta Impedance | 1.0 Ohm |
| Apnea | Off |

The value changes that may be made are:

Rate: 15, 30, 60, 120 BPM.

Impedance: 250, 500, 750, and 1000 Ohms.

Delta Impedance: 0.1, 0.5, 1.0, and 1.5 Ohms.

**Apnea**:

| Resp/Apne=Off | | | |
|---|---|---|---|
| **Off** | **Cont** | **12s** | **32s** |

**Off**: Apnea is absent. Normal respiration waveforms are generated.

**Cont**: Continuous Apnea. No respiration waveforms are generated.

**12s**: No respiration waveform is generated for 12 seconds.

**32s**: No respiration waveform is generated for 32 seconds.

## BLOOD PRESSURE:

Select Bp in the Simulator Menu to access Blood Pressure selections.

| BP1 Menu | |
|---|---|
| **Dyna** | **Stat** |

Two blood pressure waveforms are generated with selections of 12 static and 6 dynamic values. BP1 values are selected from the listed choices and BP2 values are ½ of those selected for BP1.

The Dynamic pressure waveforms track the Normal Sinus Rhythm rates.

The default settings for pressure values are:

| | | |
|---|---|---|
| BP1 | Dynamic: 120/80 | Static: 0 |
| BP2 | Dynamic: 60/40 | Static: 0 |

The Dynamic pressure value selections are:

| | |
|---|---|
| 100/60 | 120/80 |
| 50/10 | 60/20 |
| 70/30 | 80/40 |

The Static pressure value selections are:

| | | | |
|---|---|---|---|
| 0 | 5 | 10 | 20 |
| 25 | 30 | 40 | 50 |
| 100 | 150 | 200 | 300 |

## TEMPERATURE:

Select Temp in the Simulator Menu to access Temperature value selections.


Temperature simulation is provided for both YSI 400 and YSI 700 standards. The temperature default setting for both is 25 degrees Centigrade.

The Temperature value selections are:

25°C 37°C for both YSI 400 and YSI 700

# Maintenance and Storage

## Maintenance

The mechanical assembly of the MiniSim 1000 Basic contains no parts that can be serviced by the user. The unit should be returned to Netech Corporation for repair or calibration.

The alignment and adjustment parameters are critical to the robust and efficient performance of the unit and can be performed only at the factory.

The unit is factory calibrated with NIST traceable standards and recommended to be calibrated once a year.

Netech maintains a complete repair and recalibration service at a very low cost and fast turnaround. Estimates for repair and recalibration are available upon request.

The MiniSim 1000 Basic contains NO USER SERVICEABLE PARTS and calibration/ service should be performed only by Netech. Attempt to repair / service the unit outside Netech voids the warranty.

# Warranty

*Netech warrants this instrument to the original purchaser, as purchased from a Netech distributor or dealer, will conform to the written specification as of the date of its manufacture, for two years from the date of purchase. The second-year warranty is contingent upon returning the unit to the factory for the annual recalibration at the end of the first year warranty. Netech warrants this instrument against defects in materials and workmanship. If the instrument fails to conform to these warranties, Netech will repair or replace the unit and/or its components within a reasonable period; if the MINISIM 1000 BASIC is returned, shipping prepaid, to Netech's facility at Farmingdale, NY, USA within the warranty period as expressed above.*

*These warranties are made upon the expressed condition that:*

1. *The purchaser promptly notifies Netech in writing of any nonconformity with the above warranty including a detailed explanation of the alleged deficiencies.*
2. *The MiniSim 1000 Basic is returned to Netech at the buyer's expenses only after obtaining the proper RMA authorization from Netech.*
3. *Netech will not be liable for any incidental or consequential damages.*
4. *In the opinion of Netech upon inspection, the MiniSim 1000 Basic has not been misused, altered, or damaged due to the abnormal handling and/or operation.*
5. *Repairs to the MiniSim 1000 Basic and/or its components have not been made by anyone other than Netech or one of its authorized repair agents.*
6. *The MiniSim 1000 Basic has not been modified, altered, or changed in any manner by anyone other than Netech or one of its authorized repair agents.*
7. *All shipping and handling charges will be billed to the purchaser.*

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# Appendix: A

*Current Revision: R2 09/18/25*

*Pages revised from the previous Revision (R1).*

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