	Title: ST WIN specification Document	Document no: NASAN-D&D-D-007
NASAN SIMPLE. RELIABLE.		**Rev no: 6**
		Date: 05-10-2024
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ST- Win Deluxe is a Windows based Stress Test System. It enables accurate computation of ST measurements, complying full frequency response of 0.05 Hz to 100 Hz

Technical Specifications

1. **Environmental**

    Operating Temp   : -5 ºC to +50 ºC

    Operating & Storage   : 0 to 95 % non-condensing

    Humidity

2. **Power supply**

    Input   : 230V AC+/- 10% @ 50Hz

    Power consumption   : < 10 Watt

3. **Performance**

    Display   : 1024 x 768 pixels OR MORE

    Language   : English

    Alarm   : Audio alarms for HR and ST level at pre-configured

                                             Values

    QRS Beep   : On each QRS

4. **Acquisition**

    Frequency response   : 0.05 Hz to 100 Hz with notch at 50Hz

    Filter   : DSP

    Input impedance   : 10 MΩ

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Time constant : > 3.2 sec

A/D conversion : 12 bit

Noise : < $20\mu V_{p\text{-}p}$

Leakage current : < 10 µA

Patient isolation : Optical isolation.

Gain : 5, 10 & 20 mm/mV selectable.

CMRR : > 120 dB

Sweep speed : 25.0 mm/S.

Accuracy of HR : +/- 2 BPM.

Sampling Frequency : 250 samples per second simultaneous

Storage : 12 lead unaveraged ECG, 10 second Rhythm strips

of 12 leads, Medians after every 8 sec along

with HR, BP and fiducial points, full disclosure of

entire test

Protocols : Pre-programmed protocol including BRUCE,

MODIFIED BRUCE, NAUGHTON, MODIFIED BALKE

and user editable protocols and Manual Protocol

Printouts : Automatic and manual online printing with grid

On/off facility. Print colour reports on color printer

5. Treadmill

Power : 200-240VAC,50Hz 6A,1 Ø

Power consumption : 1.5KVA

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Incline Range   : 0-22%

Dimension   : L X W - 2080 X 785 mm

Walking Area   : 1350 X 500m

Weight   : 100Kg

Patient Weight   : Up to 250kg

Belt Speed   : Smooth, 0-15Kmph

In-House manufacturing   : Yes

Treadmill features

1. Wide and long belt for stable and comfortable stride.
2. 20 mm thick wooden floating deck for longer life.
3. Anti-skid side steps.
4. Roller fitted with sealed dust proof ball bearings.
5. Strong steel platform design for shock absorption and enhanced cushioning.
6. Drive System: 2.0 HP continuous-duty Permanent Magnet DCmotor which ensures trouble-free running even under heavy loads.
7. Motor with 4 Kg dynamically balanced flywheel for smooth operation.
8. AC motor driven integrated front incline system with built in feedback for correct incline positioning.
9. Smooth, noise free operations.

6. Minimum Requirement of computer system for ST-Win system:

1. Operating system   : Windows 10 professional 64bit and above

2. Motherboard   : Intel core i5

3. RAM   : 4 GB

4. USB port   : working USB port for controller

5. Monitor   : 21 inches Color monitor.

6. Hard disk   : minimum 500 GB.

7. Display Settings   : Resolution - 1024X 768 and above.

8. Keyboard   : with 101 keys.

9. Mouse

10. Printer   : HP Laser Jet Pro P1108 plus

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11. 1 KVA Online UPS for PC and treadmill controller

12. Independent earthing connection for treadmill.

13. Servo Stabilizer 5KV for treadmill

Detailed features

1. **Acquisition**
   a. Body level acquisition of 12 lead ECG
   b. Simultaneous acquisition of 12 Leads of ECG @ 250 samples per second per channel with ADC resolution of 12-bit.
   c. Facility to store 12 lead unaveraged ECG
   d. Facility to record rhythm (10 second Rhythm strips of 12 leads)
   e. Beep on QRS
   f. Facility to Rerun test
   g. Facility to compare medians side by side and superimposing on each other by moving median

2. **Acquisition display modes**
   a. **12 lead display**
       i. Display 12 lead, 4 second ECG on First screen. Enlarged Medians next to each lead are displayed.
       ii. Configurable zoom factor for enlarged median: 2, 3, 4 times.
       iii. In exercise stage Basal Enlarged medians and current Medians are superimposed.
       iv. Facility to move superimposed medians.
   b. **3 lead display**
       i. 8 seconds display of 2 leads of ECG + 1 QRS detection Lead.
       ii. Facility to configure 3 leads to any of the 12 ECG leads
       iii. Display lead sets (I, II, III) OR (aVR, aVL, aVF) OR (V1, V2, V3) OR (V4, V5, V6)
       iv. An enlarged Exercise median of the minimum ST level lead with fiducial points marked is displayed. (The enlarged median can be any of the 12 leads in Manual Mode. In Automatic mode, the lead having maximum ST Depression is displayed by the system.)
       v. Along with enlarged median, basal median is displayed in exercise stage and peak exercise median is displayed in recovery for comparison

   c. **Online display of following parameter in all display modes**
       i. METS
       ii. Heart rate is updated every 4 seconds with symbol and Target heart rate with percentage of completion target heart rate.
       iii. BP in mmHg (manually entered)
       iv. ST measurement Mode (Manual / Auto)
       v. Current ST Level and ST Slope of enlarged median

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vi.   ECG gain with standardization pulse
vii.   Test and Phase duration in hh:mm format
viii.   Exercise protocol stage name

3. Online printouts

   a. Facility to print selected online reports
      i. Linked Median report (12 linked medians with ST Levels of selected long lead)
      ii. 12 lead Raw ECG report

4. Automatic Reports

   a. Facility to print selected stage reports automatically
      i. Linked Median report (12 linked medians with ST Levels 1 long lead)
      ii. 12 lead Unaveraged ECG report
      iii. 12 lead Raw ECG report
      iv. Rhythm report – 12 leads of 5 seconds or 6 leads of 10 seconds
      v. Mixed Median report with one Median complex + 2.5 seconds ECG of each lead
      vi. Advanced mixed median report.
      vii. Extended Mixed Median Report - One Median complex + One Basal Median complex + 2.5 seconds ECG of each lead
      viii. Selected median report

   b. Stage reports configuration includes
      i. Reports at stage end
      ii. At set interval in 'EXERCISE' and 'RECOVERY' stage
      iii. Automatic 'PEAK EXERCISE' Linked Median printout
      iv. 6 leads of 10 seconds OR 12 leads of 5 seconds selection for Rhythm Report
      v. Automatic 'PEAK EXERCISE' Linked Median printout (10 seconds after Exercise is stopped).
      vi. Grid On/Off

5. Acquisition settings

   a. Facility to enter BP 50 seconds before end of each exercise stage
   b. Relearn the median template
   c. Facility to enter a stage comment in each phase
   d. Gain: 0.5, 1.0, 2.0 mV/cm
   e. Change the QRS detection lead
   f. Automatic/Manual detection of fiducial points (E, J, Post J)
   g. Hold/Release treadmill stage
   h. QRS beep On/Off
   i. QRS Amp
   j. Menu
   k. Change display

6. Recovery

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       a. Facility to compare basal median is displayed in exercise stage and peak exercise median is displayed in recovery stage

7. **Review**
   a. Review data of selected patient
   b. Delete data of selected patient

8. **Review display modes**
   a. 12 medians screen
      i. 12 medians are displayed with ST-level
   b. Mixed Median report with one Median complex + 2.5 seconds ECG of each lead
   c. Facility to zoom median of selected lead and edit fiducial points
   d. Trends
      i. Trends of HR, BP, ST Level, ST Slope, J Amplitude
      ii. 8, 16, 32, 48, 56 seconds resolution.

   e. Facility to edit HR and BP of any stage
   f. Facility to edit Patient Details
   g. Grid/Graph/No grid option on all review screens

   h. View and print rhythm strips marked during acquisition. Facility to select 12 leads of 5 sec. OR 6 leads of 10 seconds for each printout
   i. View unaveraged ECG
   j. Superimpose medians of any 2 stages in different colours.
   k. Full wave disclosure of 1 minute of any lead
   l. Edit and print Summary Report using standard edit options

9. **Reports**
   a. 12 lead linked median (single / all stages)
   b. Mixed Median Report
   c. 6 lead Rhythm report of 10 seconds (single / all stages)
   d. 12 lead Unaveraged ECG report
   e. Extra Comments report
   f. Stage Report
   g. Brief Summary Report
   h. Trends Report (HR, BP, ST Levels / ST Slopes, J Amplitude of 3 configured leads
   i. Full wave disclosure of 1 minute of any lead
   j. Facility to print superimposed medians of any 2 stages in different colours
   k. Summary Report (Hospital Address and referring doctor designation to be printed in Summary reports)
   l. Advance Mixed Median Report
   m. ST-Levels & Slopes Table
   n. Extended Mixed Median Report
   o. Selected median report
   p. Max HR report

10. **Settings**

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a. Hospital details
b. Referring Doctor list
c. Standard Summary report option
d. ST-Win system configuration
e. Treadmill protocol
    i. Available standard protocols
        1. BRUCE
        2. MODIFIED BRUCE
        3. NAUGHTON
        4. MODIFIED BALKE
f. Printing details configuration
g. System configuration
    i. Speed in km/hr or m/s
    ii. TM speed at exercise stop (slow-0 km/hr,Fast-0 km/hr / 1.2 km/hr)
    iii. ST Level lead in Summary
    iv. Long lead in reports
    v. Screen Display leads (3)
    vi. 3 Leads in Trend Report
    vii. Stage Report Leads
    viii. Treadmill Support: Compact, Treadstar, TreadstarXP, Trackmaster
    ix. COM Port Selection for amplifier.
    x. Median update time is configurable to 1 to 8 sec.

11. Utilities
a. Test Treadmill
b. Test acquisition unit
c. Calibrate TM Speed
d. Calibrate TM Grade
e. Delete printout from printer queue

12. Help
About Stress test system- software version is displayed

*Due to our continuous product development program, the specification may change without prior notice.