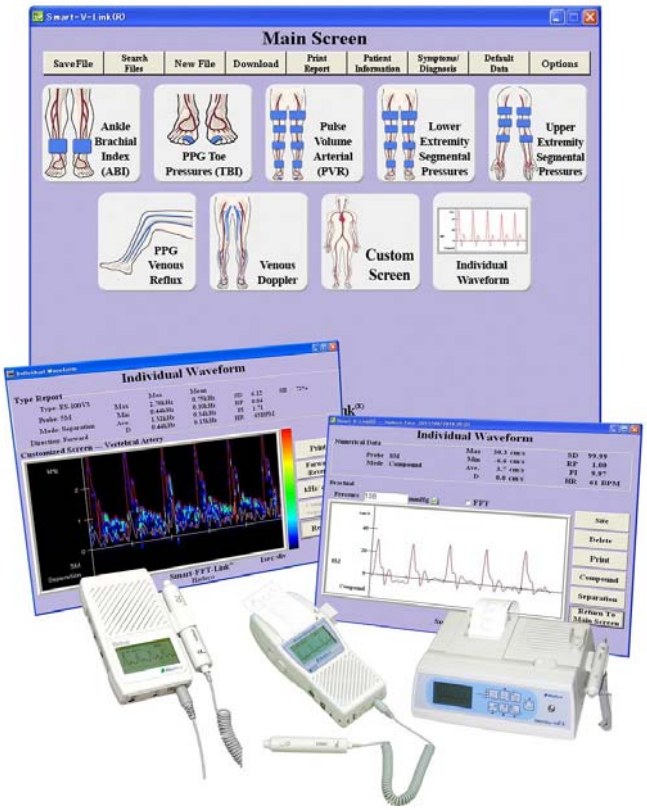
OPERATING MANUAL

Smart-V-Link™

Version 3.1 for Windows 7/ Vista / XP

Computer Communication Software
For
Hadeco Dopplers with USB Interface



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--- Notes ---

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Chapter 1: Introduction

Thank you very much for purchasing a Computer Communication Software, Smart-V-Link™ for Windows.

This manual explains the process for connecting Doppler to computer, installing software and using Smart-V-Link. For the operation of Doppler and PPG/PV probe, please refer to the operating manuals that come with your Doppler and PPG/PV probe.

Please read this manual carefully for complete product satisfaction.

To learn how to use Smart-V-Link quickly see "Chapter3: Quick Start".
It introduces a few essential and typical uses of Smart-V-Link.

Profiles

The Smart-V-Link allows you to implement easily the vascular studies using the bi-directional Doppler as well as the patient data filing.

- Operations of Doppler are remote controlled by computer
- Real-time vascular waveform display
- Data storage for future reference
  - Data can be stored in the internal hard disk drive as well as any storage devices on network computers.
  - Exporting to PDF and DICOM®*1 files is available for universal use of medical images.
- Standardized testing modules for easy operation and documentation
  - ABI, TBI and arterial blood flow velocity
  - PPG toe pressures & venous reflux
  - PV arterial
  - Venous compression
  - Lower and upper extremities
  - Individual test

*1 DICOM: Digital Imaging and Communications in Medicine
DICOM is the registered trademark of the National Electrical Manufacturers Association for its standards publications relating to digital communications of medical information.

System requirements

Doppler

Hadeco Doppler with USB interface.

- Bidop ES-100V3 (serial # 06010001 or more)
- Smartdop 30EX
- Smartdop 45
- Smartdop 50EX (including Smartdop 50EX-F) (serial # 07080100 or more)
- DVM-4300 (including DVM-4300T) (serial # 11080021 or less)*1

*1: Some of DVM-4300s with old serial numbers do not have USB interface.

*Smart-V-Link version 3.1 is not supporting the Dopplers with RS-232C interface.

Computer

- OS: Windows XP / Vista / 7
- CPU clock: Celeron 500 MHz or more
- Display: 800 x 600 dots or more
  256 colors or more
- Minimum memory requirements:
  RAM: 256 Mbytes
  HD: 40 Mbytes

Contents of package

- Software CD-ROM
- Dedicated USB cable

Technical data

Measurement range and accuracy:

- Blood flow velocity : Depends on Doppler connected.
- Heart rate : 30 - 300 bpm, ±5 %

Manufacturing data:

The first 2 digits and following 2 digits of the serial number represent the year and month of manufacturing, respectively.

The serial number is located on the CD-ROM case and it consists of 4 to 8 digits and may start with “Serial number” or “SN”.

Examples:

03020001:	Feb/2003
0401:	Jan/2004

Cautions of Connection to the computer:

(1) Any connected computer is not allowed to be in the patient area according to IEC60601-1.
(2) Use the computer confirming with IEC 60601-1 to connect to the unit.
(3) Connection of the Doppler device to a network/data coupling that includes other equipment could result in previously unidentified risks to patients, or operators and responsible organization should identify, analyze, and control such risks.
(4) Subsequent changes to network/data coupling introducing new risks and requiring new analysis; and changes to network/data coupling include.
(5) Changes in network/data coupling configuration.
   (a) Connection of additional items to network/data coupling
   (b) Disconnecting items from network/data coupling
   (c) Update of equipment connected to network/data coupling
   (d) Upgrade of equipment connected to network/data coupling

Chapter 2: Getting started

Installing Smart-V-Link

(1) Insert the Smart-V-Link CD-ROM into the drive of your computer.

(2) Installer dialog box will appear automatically. If it does not appear, open My Computer and double-click the CD-ROM drive in which Smart-V-Link CD is inserted, and double-click **Setup.exe** to install Smart-V-Link software. Follow the instructions of the installer.

(3) When installation process is completed, Smart-V-Link will start automatically with Default Data screen.

Note : USB cable driver should be installed. Refer to either Readme for Windows XP/Vista or Driver Installation for Windows 7 for the driver installation procedures which can be accessed via the program menu.

Installing USB cable driver

(1) Set the **Smart-V-Link V3.1 CD-ROM** on your CD-ROM drive.

(2) If automatic installer **Smart-V-Link Ver3.1 installation** pops up, click on **Cancel.**

(3) Connect the Doppler to your computer by using the USB cable enclosed. See the Doppler operating manual of your Doppler for more information. The following procedures depend on your Windows version:

Windows XP (Go to #4 in next page for Windows Vista/ 7)

(4) When **Add New Hardware Wizard** is shown, select **Install from a list or specific location (Advanced)** and click **Next**.

(5) Select **Search for the best driver in these locations** and check **Search removable media (floppy, CD-ROM)** and click **Next**.

(6) If caution dialog **Hardware installation (Compatibility with Windows XP)** is shown, make sure the hardware is **USB High Speed Serial Converter** and click **Next**.

(7) The USB cable driver will be installed.

(8) When completion dialog is shown, click **Finish**.

(9) If another "New Hardware Wizard" pops up after completing up to step #8, repeat step #4 to 8. After the end of work, set the COM port of SV-Link. (Refer to the section “Option”.)

Windows Vista

(4) When **Found New Hardware** is shown, click **Locate and install driver software (recommended)**.

(5) If **Found New Hardware - Unknown Device** is shown, click **Don't search online**.

(6) Windows Security Window alerts you that the publisher of the driver cannot be verified. Click **Install this driver software anyway**.

(7) The USB cable driver will be installed.

(8) Then completion dialog is shown, click **Close**.

(9) If another "Found New Hardware" pops up after completing up to step #8, repeat step #4 to 8. After the end of work, set the COM port of SV-Link. (Refer to the section “Option”.)

Windows 7

(4) A shortcut for "Windows 7 Driver Install" will be created automatically on the desktop when Smart-V-Link installation is completed. Click it and follow the instructions.

Cautions for CommPort setting:

It has been reported in a rare case when using with Doppler with USB I/F that Search Comm cannot search the Doppler for the first time you run after installing USB cable driver.

To solve this problem, restart your computer once.

Uninstalling Smart-V-Link

(1) Before uninstalling Smart-V-Link, copy all the waveform data saved on the WaveData folder for future reference.

The original **WaveData** is located in **C: / Hadeco/ SVLink3.1/**. (Default)

(2) Select **Hadeco / Smart-V-Link Ver3.1 / Uninstall** on Program menu to uninstall Smart-V-Link.

Connections

(1) Make sure that the Doppler probe is connected to the Doppler.

(2) Connect the USB cable to the Doppler.

(3) Connect the other side of the cable to the computer.

(4) Turn the Doppler on.

Caution

*** Do not turn off the power both the computer and the Doppler while using the software.**
*** Do not disconnect the cables while using the software.**
*** Do not leave the Doppler probe near the computer.**

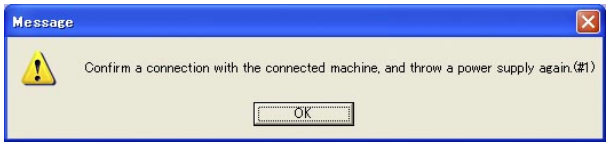
Starting Smart-V-Link

(1) Select **Hadeco / Smart-V-Link Ver3.1 / Smart-V-Link Ver3.1** on Program menu to start the Smart-V-Link and Patient Information screen will appear automatically.

(2) Input patient information data and click **Return to Main Screen** to go to Main Screen. If you wish to do it later, simply click **Return to Main Screen**. If a Smart-V-Link data file is double-clicked directly, Patient Information screen and dialog box will not displayed and Smart-V-Link will start with Main Screen.

(3) When you start the Smart-V-Link for the first time, click on **Options** button on the Main Screen and do the CommPort setting. (See the section “Option” for the details.)

Note: After clicking on Options, the dialog box below may be shown.
Click **OK** and be sure to do the CommPort setting in this case.



Chapter 3: Quick start

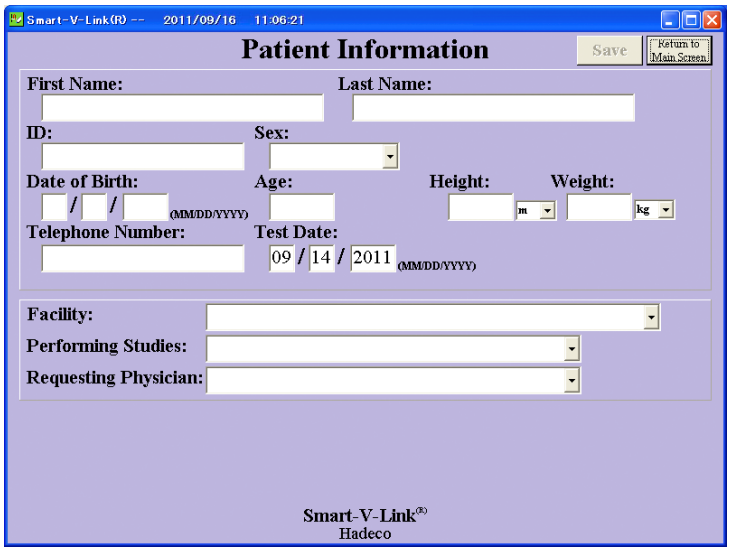
1.Starting Smart-V-Link

(1) Connect the USB cable to the unit.

(2) Connect the other side of the cable to USB port of the computer.

(3) Turn the unit on.

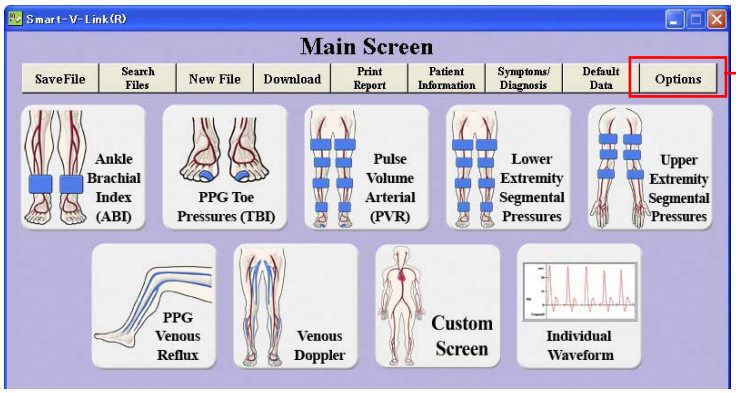
(4) Start the Smart-V-Link and **Patient Information** screen will appear.



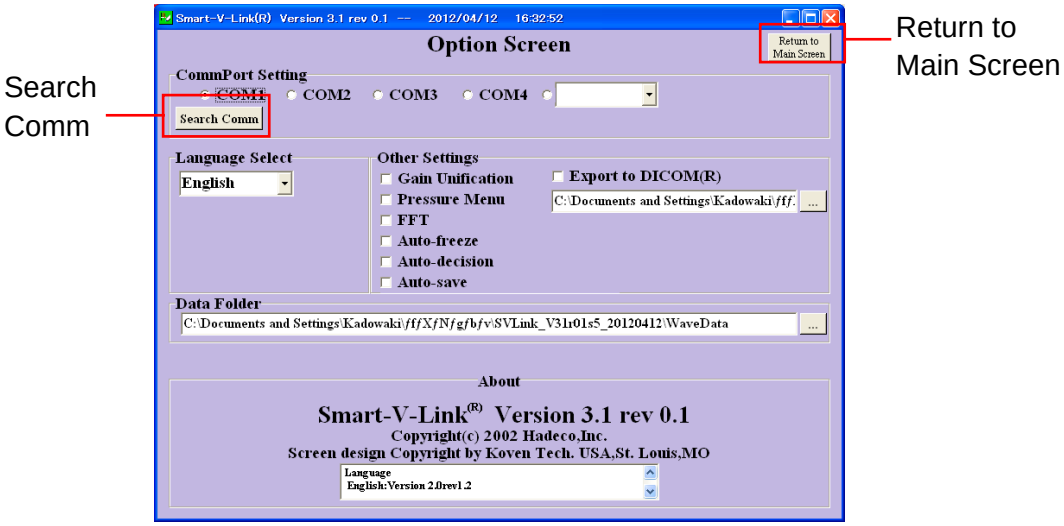
(5) Type the patient information or you may do it later.

(6) Click **Save** to save the information and **Return to Main Screen**.

(7) Click **Options** in the menu to go to Option Screen.



Options



(8) Click **Search Comm** in the CommPort Setting section to search for COM port Doppler device is connected. Smart-V-Link will show the COM port # and model # of connected Doppler.

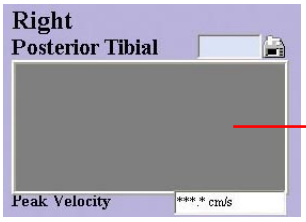
⇨ We recommend turning off other devices connected to COM port beforehand. The message dialog box shown right will appear. Click **OK** to proceed.

(9) Click **Return to Main Screen**.

2. Measuring blood velocity

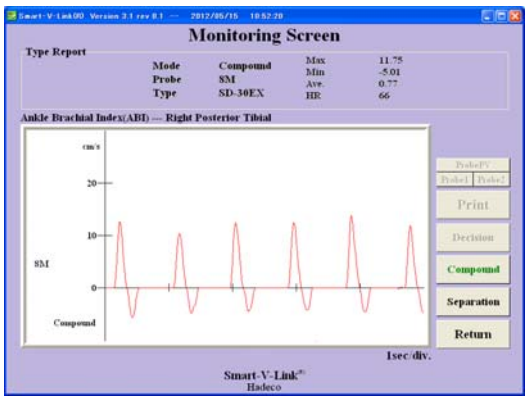
This is to show typical operation of measuring blood velocity on ABI screen.

(1) Go to ABI screen and click the waveform window for Posterior Tibial to start monitoring the blood velocity waveform on posterior tibial artery taken with the Doppler.



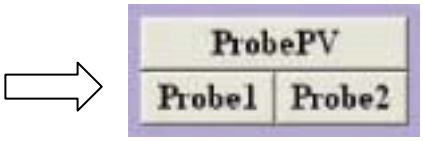
Monitoring Screen will appear and the real-time waveform and numerical data received from the Doppler will be shown.

Monitoring Screen in measurement mode



Click either Probe1 or Probe2 to select the probe used for the measurement when Smartdop 30EX is connected.

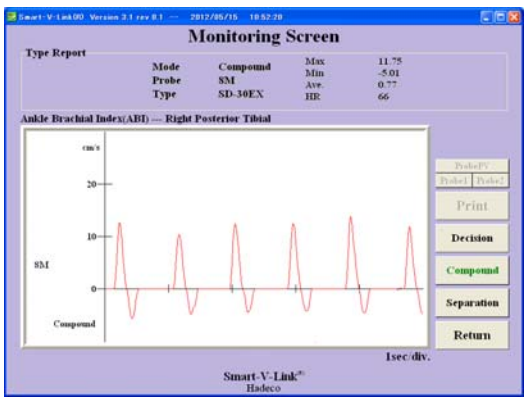
Click either Probe PV, Probe1 or Probe2 to select the probe used for the measurement when Smartdop 30EX with built-in PV is connected.



Note: SVL will automatically show either of the probe selection buttons depending on which Smartdop 30EX is connected and revert to the probe mode that was selected in previous testing on Monitoring Screen.

(2) Press **Compound** or **Separation** to set the waveform mode for combined bidirectional waveform or directionally separated dual-trace waveforms, respectively.

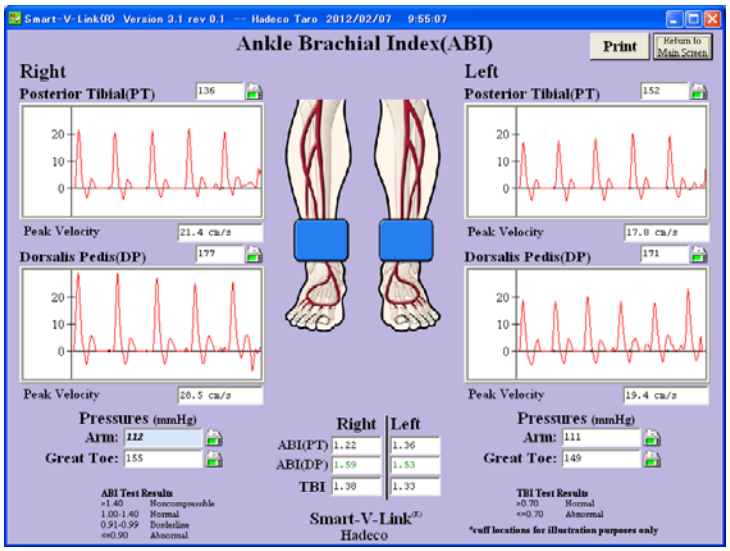
(3) Wait at least 5 seconds after the waveform becomes stable and press the probe button or the space bar on the keyboard to freeze the waveform for the latest 5 seconds.



Freeze mode on Monitoring Screen

(4) Click **Decision** to save the data on patient data if the frozen waveform is satisfactory and it'll go back to ABI screen. Press the probe button or the space bar to go back to monitoring mode again if it's not satisfied. Click **Return** to go back to ABI screen without saving the data.

(5) Repeat steps #1 to #4 for the next site.



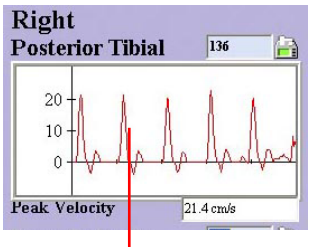
(6) Enlarging waveform

Right-click one of the waveform windows to enlarge the waveform and the **Individual Waveform** screen will appear with enlarged waveform and numerical parameters. See Numerical data table on **Individual Waveform** for details.

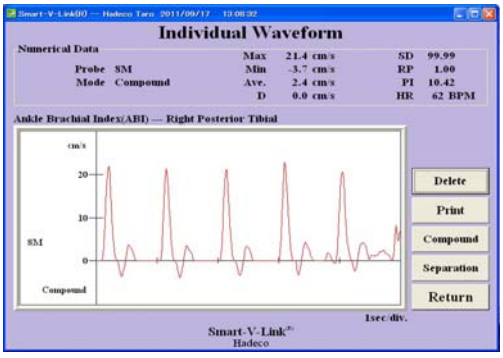
Click **Compound** or **Separation** to change the waveform mode.

Click **Print** and follow the instructions to print out the report.

Click **Return** to go back to the previous screen.



Right click on waveform window.



Enlarged waveform

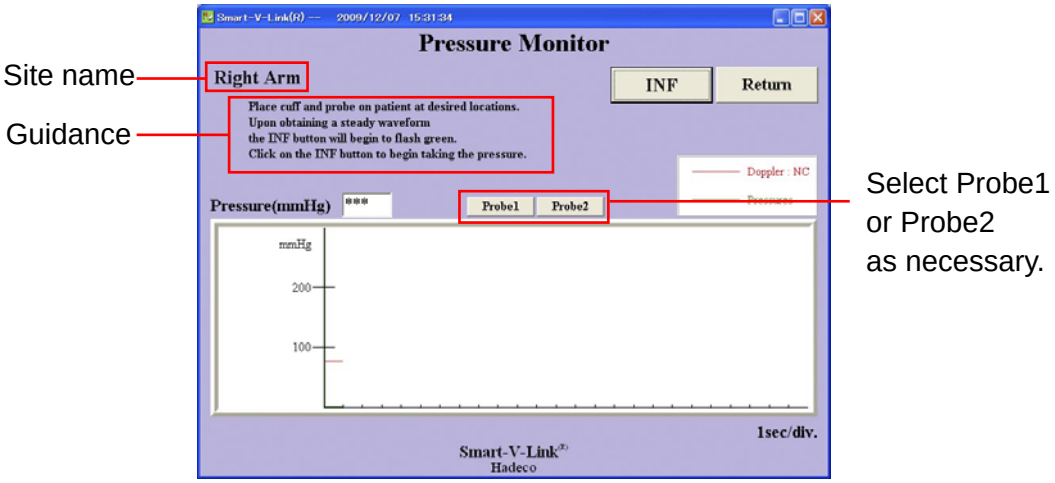
3. Measuring blood pressure

If you're using non Smartdop 30EX Doppler, blood pressure should be taken manually with Doppler and sphyg and typed on each pressure box on ABI screen.

If you're using Smartdop 30EX, go to Option Screen and check **Pressure Menu** check box and it will allow you to take blood pressure with Smartdop 30EX for each site as follows:

(1) On ABI screen, click arm pressure icon and select **Take Pressure** on pull-down pressure menu to go to Pressure Monitor screen.

Pressure Menu



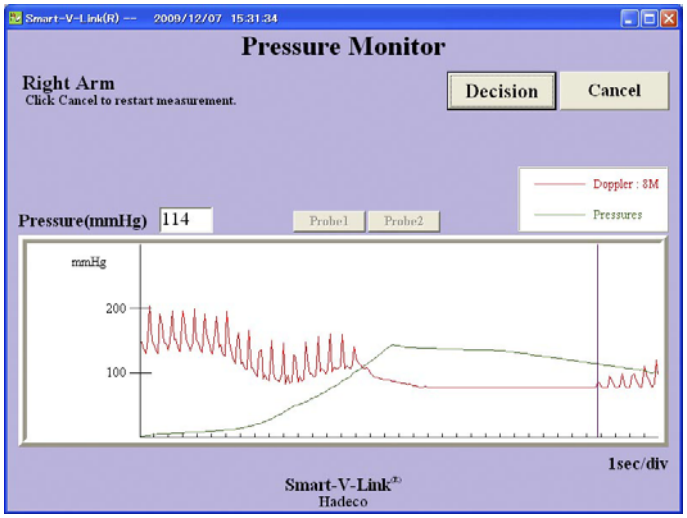
Select Probe1 or Probe2 as necessary.

(2) Set the cuff on the patient and connect the tubing to the unit, and place the probe on radial or brachial artery.

(3) When velocity waveform becomes stable, the unit will automatically inflate the cuff approx. 30 mmHg above the sound cessation and then deflate it at 2 to 3 mmHg per second.
Click **DUMP** to cancel the measurement and dump the cuff.

Note: For manual measurement due to arrhythmia, click **INF** button to inflate the cuff straightway and then click **DEFLATE** to start the deflation.

(4) When the measurement is completed, the blood pressure data and waveforms will be displayed as shown below:



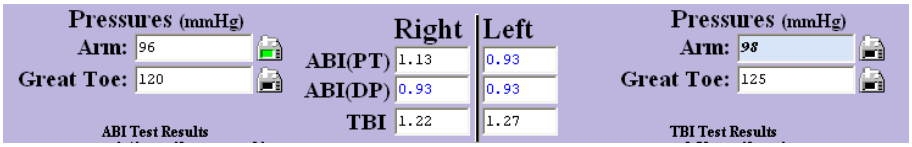
Click **Decision** to save the data on patient data if the result is satisfactory and it'll go back to previous screen and blood pressure value will be shown in the pressure box there.

Press the probe button or the space bar, or click **Cancel** to go back to monitoring mode again if it's not satisfied.

(5) Repeat steps #1 to 4 for the next site.

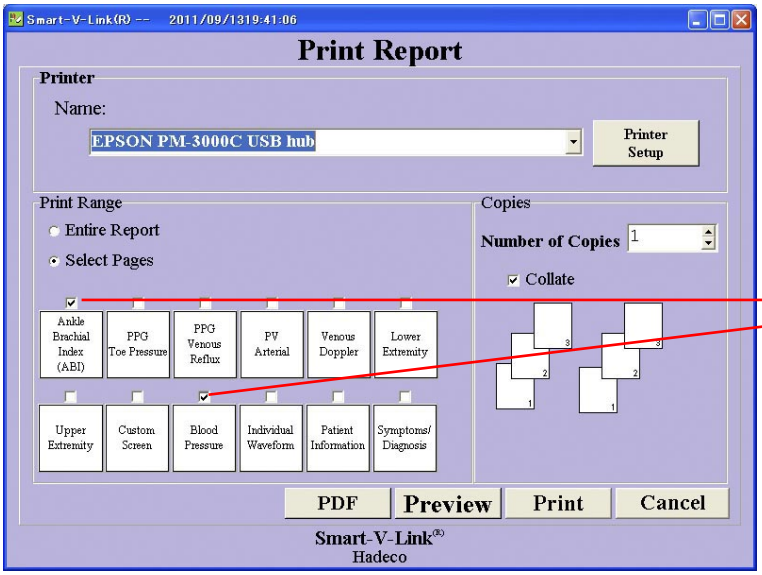
Note: Toe pressure should be measured with PPG probe.

(6) ABI (PT/DP) and TBI will be automatically calculated when all pressures are taken.



4. Printing Report

(1) Click Print Report on Main Screen to show the Print Report screen.



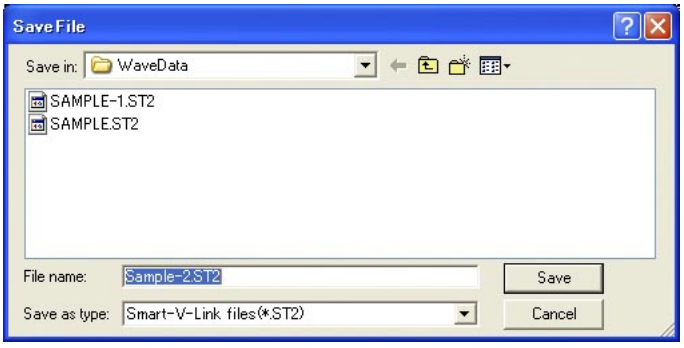
Click the check boxes for printing report.

(2) Choose the printer and check all the check boxes you wish to print out.

(3) Click **Print** to print out report(s) or **PDF** to create PDF report file.

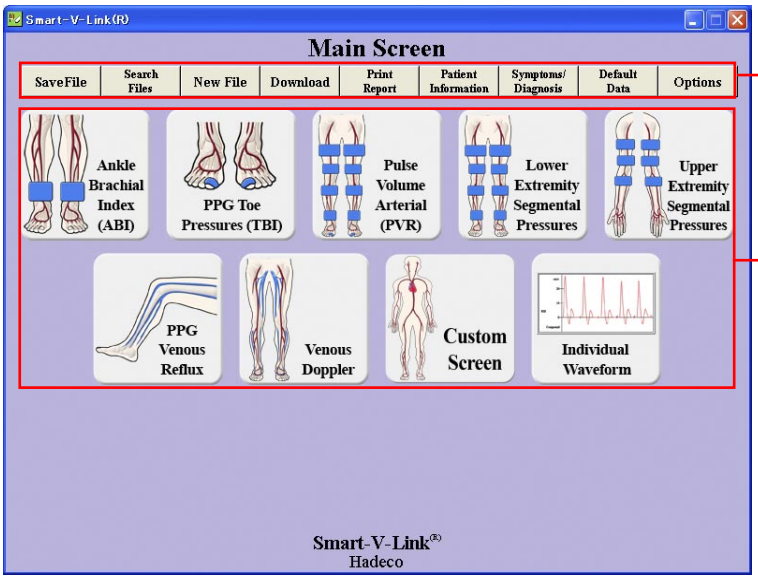
5. Saving Data

(1) Click **Save File** on Main Screen to save data to local or network disk drive and Save File window will pop up.



(2) Click **Save** to save the data.

Chapter 4: Menu & Testing screens



Menu bar

Save File: To save data file.

Search Files: To search data files to open.

New File: To create new patient file.

Download: To download waveform memory data from Doppler to Smart-V-Link.

Print Report: To print report or export it to PDF file.

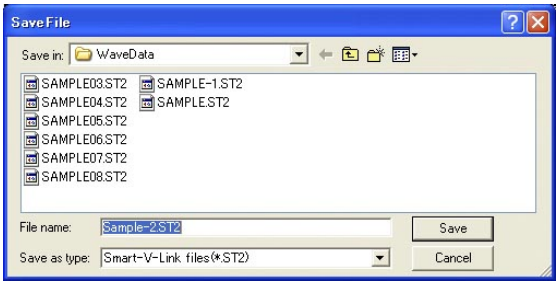
Patient Information: To input patient data.

Symptoms / Diagnosis: To input symptoms and diagnosis for patient.

Default Data: To input and/or revise Default Data: Facility data, Performing Studies and Requesting Physician.

Options: To set optional settings for CommPort, Language, Data folder, DICOM, test mode and others.

Save File



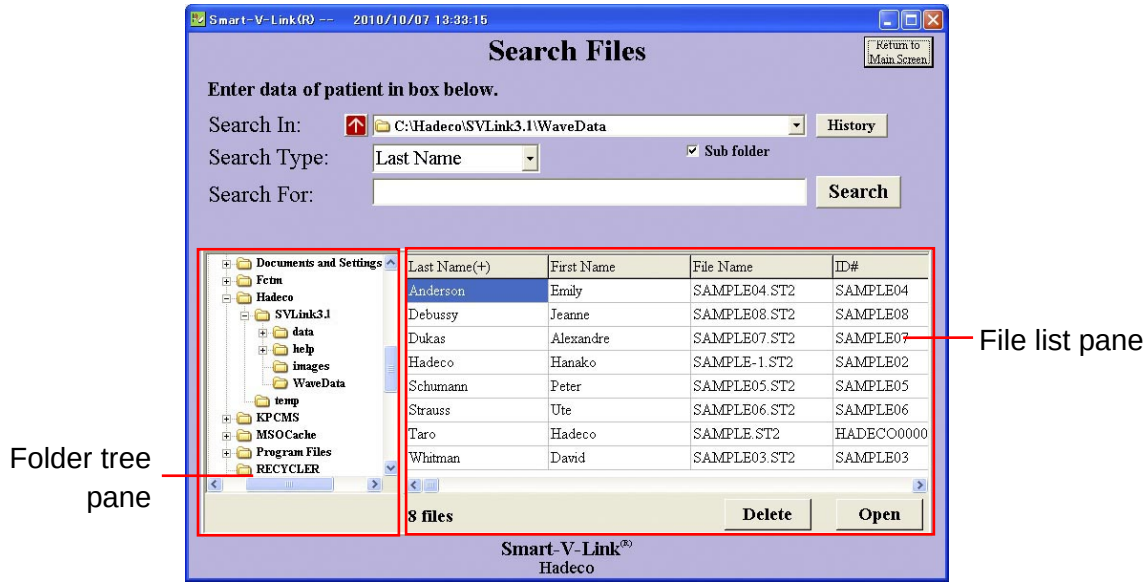
(1) Click **Save File** on Main Screen to save the testing data and Save File window will pop up with a file name of Patient ID, or name if ID is not typed, along with extension "ST2". e.g. ID0001.ST2

Note: Default data folder can be specified on Option Screen.

(2) Change the file name if necessary and click Save.

Note: If the check box of **Export to DICOM** on Option Screen is being checked, Smart-V-Link will automatically export all the report images of each test module to DICOM.

Search Files



.

(1) Click **Search Files** on Main Screen to open Search Files screen and it will

show Smart-V-Link data files stored on the data folder specified on Option Screen. (Default: C: / Hadeco / SVLink3.1 / WaveData)

(2) Select the file you wish to open and double-click on it or click **Open** to proceed.

Folder selection

1. Click other folder on folder tree where you wish to search files and the folder path and Smart-V-Link files found will be shown on “Search In" path box and file list pane, respectively.
2. Click the up arrow to go to upper folder.
3. Check **Sub folder** check box to include sub folders for searching.
4. Click **History** to show a list of folder paths you have searched before.

Search options

1. Select Search Type from pull-down menu, and type a search word in the Search For text box.

Note: Search Type includes patient name, ID, file name, requesting physician, and test date.

2. Select a file you wish to delete and click **Delete** to proceed.

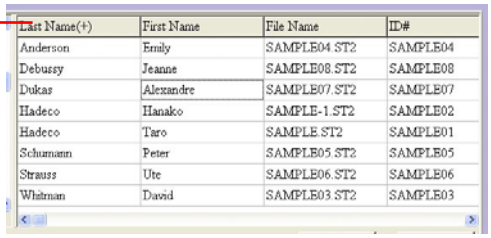
Advanced operation

1. Folder tree pane and file list pane can be resized by dragging the splitter bar between the 2 panes. Columns in file list pane can also be resized.

2. Click the column name to sort files alphabetically and click it the second time to sort anti-alphabetically.

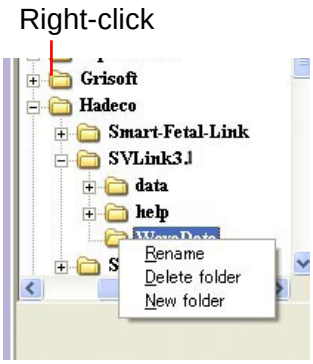
3. Right-click on folder in folder tree to show a context menu of Rename, Delete folder and New folder and select the one you wish to proceed.

Click here



Last Name(+)	First Name	File Name	ID#
Anderson	Emily	SAMPLE04.ST2	SAMPLE04
Debussy	Jeanne	SAMPLE08.ST2	SAMPLE08
Dukas	Alexandre	SAMPLE07.ST2	SAMPLE07
Hadeco	Hanako	SAMPLE-1.ST2	SAMPLE02
Hadeco	Taro	SAMPLE.ST2	SAMPLE01
Schumann	Peter	SAMPLE05.ST2	SAMPLE05
Strauss	Ute	SAMPLE06.ST2	SAMPLE06
Whitman	David	SAMPLE03.ST2	SAMPLE03

Right-click



Note: Old data files with extension “ST1” created by previous Ver. 1.0/1.1/1.2/1.3 of Smart-V-Link can be opened depending on data format differences as follows:

1. Testing data of Posterior Tibial (PT) on ABI Screen and Lower Extremity screen.

a. In case both data exist on old file, it displays both data on each screen.
b. In case only either data exists on old file, it displays the data on both screens as common PT.

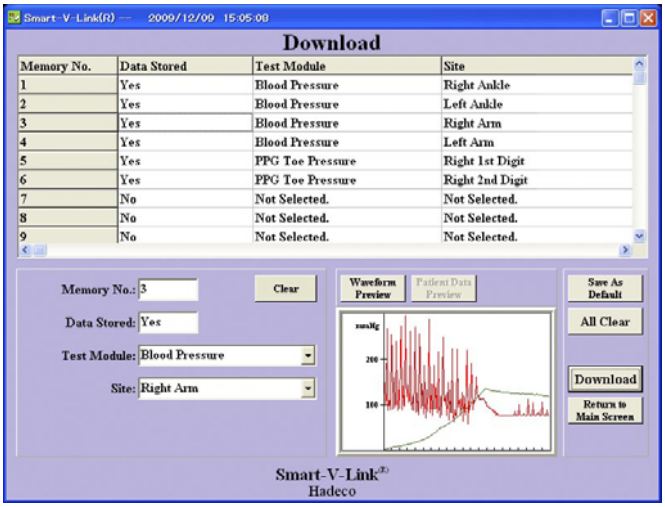
2. Measurement data of Dorsalis Pedis (DP) on ABI screen and Lower Extremity screen: Same behavior as PT above.

3. Symptoms and Diagnosis: Previous version of Smart-V-Link had 2 text boxes for Symptoms and Diagnosis, but version 3.0 or greater has only one text box for Notes. Therefore the contents of Symptoms and Diagnosis on old file will be combined and displayed in Notes.

New File

Click on **New File** to create a new patient file and **Patient Information** screen will be shown. Type all the patient data and click **Save** to save the information.
If previous data has not been saved when **New File** is clicked, a confirmation dialog box shown left will appear. Click **Yes** to save the previous data, **No** to erase it or **Cancel** to cancel New File process.

Download



Waveform memory data on the following Dopplers can be downloaded to the testing modules assigned on this screen:

Bidop ES-100V3, Smartdop 30EX, Smartdop 45 and **Smartdop 50EX**

Note: Spectrum data on SPEC mode for Smartdop 50EX-F cannot be downloaded.

1. Assigning download location

(1) Connect Doppler and click **Download** and a table of waveform memory will be displayed on Download screen.

(2) Click memory number with saying Yes and select **Test Module** and **Site** from the pull-down menus where each data should be downloaded.
Click **Preview** to preview the waveform before downloading.
After getting all the memory numbers assigned for test module and site, click **Save As Default** to set it as default for future uses.

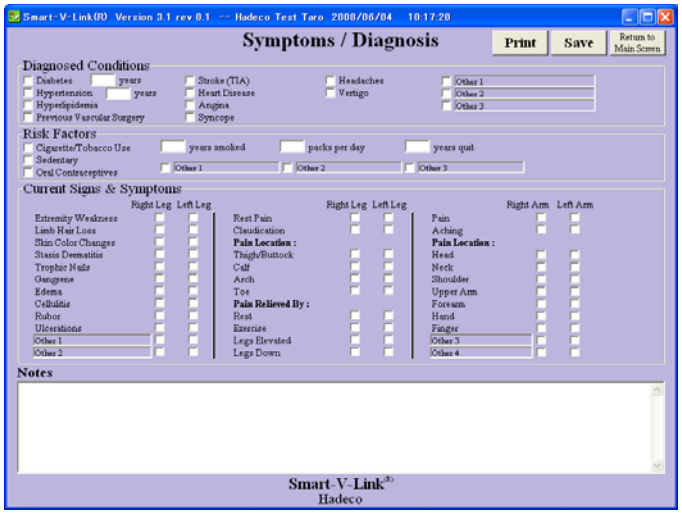
2. Downloading

(3) Click **Download** to download all the data to Smart-V-Link when the assignments are completed.
If data includes patient information stored on Smartdop 45, a dialog box will pop up to confirm details. Follow the instructions.

Patient information

See the section “§1. Starting Smart-V-Link” in Chapter 3.Quick start.

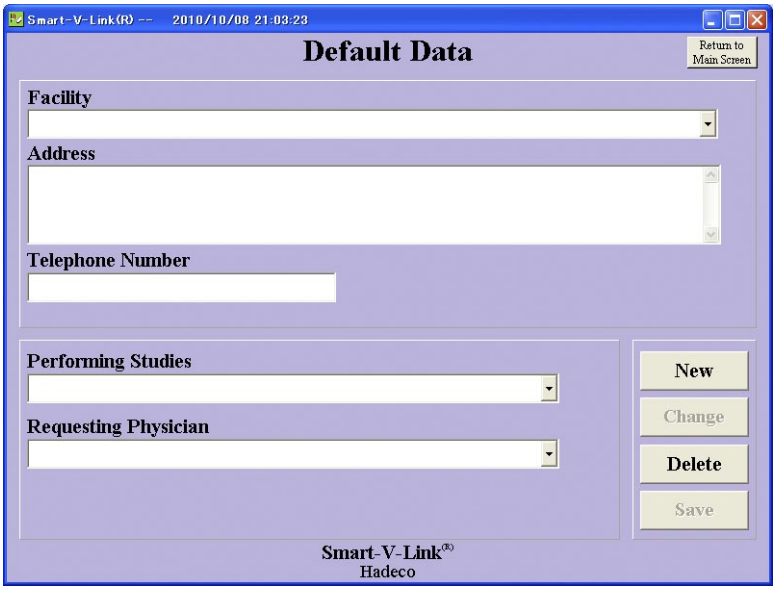
Symptoms / Diagnosis



(1) Check the appropriate check boxes and type information in text boxes and then click **Save** to proceed.

Note: **Other 1** to **3** can be overtyped with your own word for Diagnosed Conditions if desired.

Default data

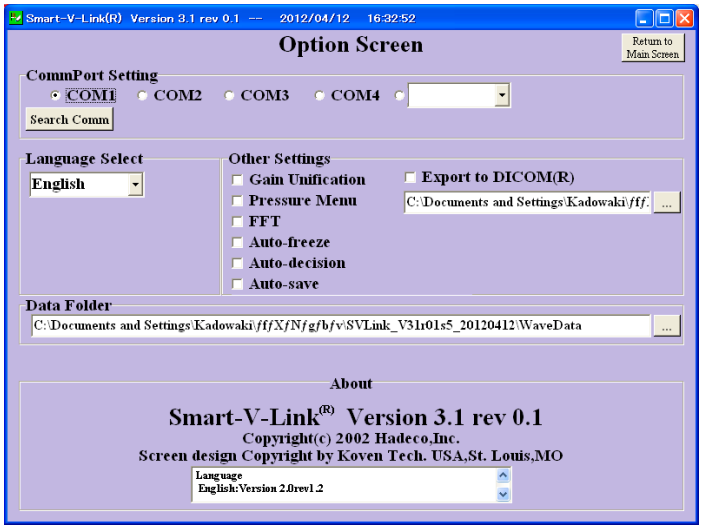


Default data saved on this screen can be used in the pull-down menus on Patient Information screen.

(1) Type each default data for **Facility, Address, Telephone number, Performing Studies and Requesting Physician**.
Select the data and overtype other word and then click **Change** to revise.
Select the data and click **Delete** to delete it.

(2) Click **Save** to proceed when all data have been typed.

Option Screen



(1) CommPort Setting

Trun on Doppler and connect it to computer. Go to Options and click **Search Comm** to search COM port connected to Doppler. Model# of Doppler will be shown next to **Search Comm** when it's been found.

(2) Language Select

Select your language from the pull-down menu and restart Smart-V-Link to activate the new language.

(3) Gain Unification

Check it to unify all the amplitude scales of waveforms in each testing module.

Note: This function is not available on FFT mode using with ES- 100V3 serial#11090001 or over.

(4) Export to DICOM

Check it to export the report images to DICOM when data file is saved. Set the DICOM folder under the check box where DICOM files should be exported.

(5) Pressure Menu

For Smartdop 30EX only, check it to activate the pressure menu to take pressures with Doppler and the icon will be shown on each testing screen available to control pressure measurements.

(6) FFT

For only the latest ES-100V3, Serial# 11090001 or over, check it to add FFT check box on each arterial Doppler screen if you wish to perform FFT analysis with 100V3.

(7) Auto Freeze

Check it to freeze waveform automatically when waveform becomes stable.

(8) Auto Decision

Check it to load waveform data into the memory automatically when it's frozen.

Note: **Auto Freeze/ Decision** for Auto-testing with Smartdop 30EX has to be set on Auto test settings separately from Option Screen.

(9) Auto save

Check it to save the data file automatically every time any testing is completed once Save File has been implemented for the file.

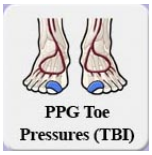
Note: Be careful to activate it since **Auto save** will overwrite the file straightway without showing any warning dialog box.

(10) Data Folder

Click the button "..." and select the folder where you wish to save Smart-V-Link files regularly and then click **OK.** The folder path will be shown in the path box and it will be used on Search Files and Save File as a default folder.

Launcher icons

Ankle Blachial Index (ABI): To go to **Ankle Brachial Index** screen.

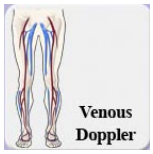


PPG Toe Pressures (TBI): To go to **PPG Toe Pressures** screen.

Pulse Volume Arterial (PVR): To go to **PV Arterial** screen.

Lower Extremity Segmental: To go to **Lower Extremity** screen.

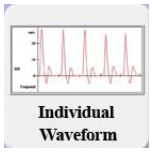
Upper Extremity Segmental: To go to **Upper Extremity** screen.



Venous Doppler: To go to **Venous Doppler** screen.

PPG Venous Reflux: To go to **PPG Venous Reflux** screen.

Custom Screen: To go to **Custom Screen** to customize your own test module.

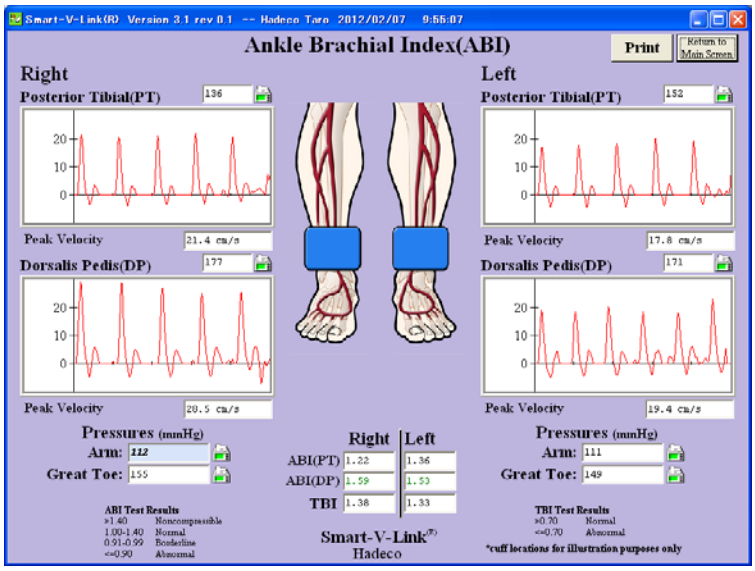


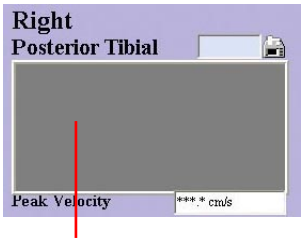
Individual Waveform: To go to **Individual Waveform** screen to perform testing of individual site with Doppler, PPG or Pneumo.

Testing screens

Ankle Brachial Index (ABI)

1. Measuring Blood Velocities





Waveform window

(1) Posterior Tibial

Click the waveform window to measure blood velocity on posterior tibial artery taken with the Doppler and Monitoring Screen will appear and the real-time waveform and numerical data received from the Doppler will be shown.

The peak velocity is calculated based on the 3 beat average and will be displayed on the ABI Screen after freezing real-time waveform.

(2) Dorsalis Pedis

Click waveform window to measure blood velocity of dorsalis pedis artery. Monitoring screen will appear and you can operate same way as posterior tibial.

(3) Side change

Repeat (1) to (2) on the other side.

(4) Enlarging waveform

After freezing waveform, right-click the waveform window to observe it in large window.

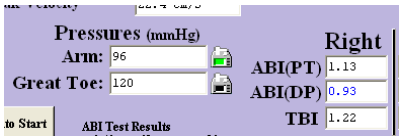
Note1: Gain unification

To unify all the amplitude scales of waveforms in waveform windows, go to Options and check the check box of **Gain Unification** in Other Settings.

Note2: See Chapter 5: FFT analysis with latest ES-100V3, Serial# 11090001 or over.

2. Measuring Blood Pressures and ABI / TBI

For all the Doppler models to type in pressures:



(1) Pressures

Type each pressure for Arm, Posterior Tibal, Dorsalis Pedis and Great Toe and ABI (PT/DP) and TBI will be calculated automatically.

Note 1: Once you input or change these pressure data, they are reflected simultaneously in pressure boxes on PPG Toe Pressures, PV Arterial and Lower Extremity screens.

Definition of ABI & TBI

ABI = (Systolic pressure at PT or DP) / (Brachial systolic pressure)

TBI = (Toe systolic pressure) / (Brachial systolic pressure)

Note: The greater arm pressure on the right or left is used for calculation of ABI/TBI. The number used for this calculation is shown in bold.

Taking blood pressure with Smartdop 30EX:

Go to **Options** and make sure check box for Pressure Menu is being checked.

(1) Click Arm Pressure icon and select "Take Pressure", "Show Waveform", or "Delete" on Pressure Menu to take, show, or delete the pressure data taken with Smartdop 30EX, respectively.

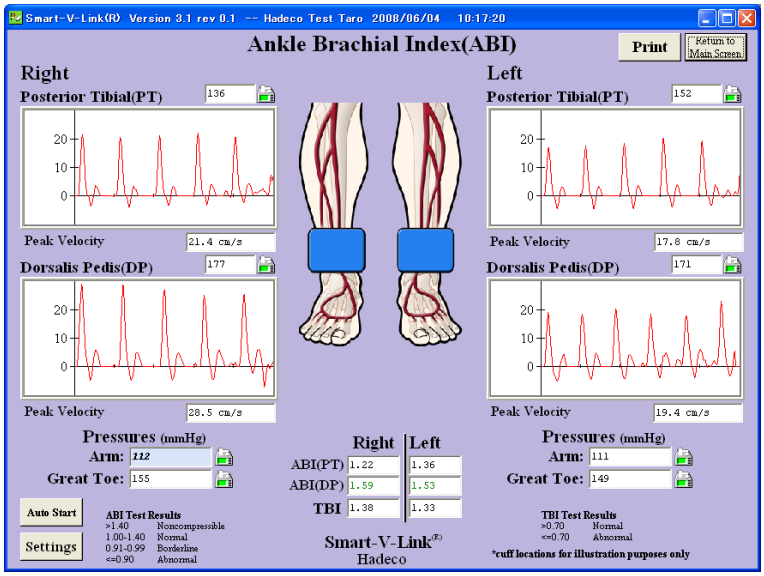
(2) Click on Pressure icon for Posterior Tibial / Dorsalis Pedis to get ankle pressure in the same manner above and ABI will be automatically calculated.

(3) Click on Great Toe Pressure icon to get toe pressure in the same manner above and TBI will be calculated automatically.

(4) Repeat the steps #1 to #3 on the other side.

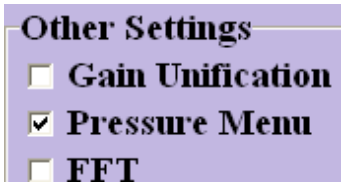
3. Auto-testing with Smartdop 30EX

Auto-testing is available if you're using Smartdop 30EX that allows you to simplify entire testing as automatically as possible for ABI screen as well as PV Arterial and Lower Extremity screens.

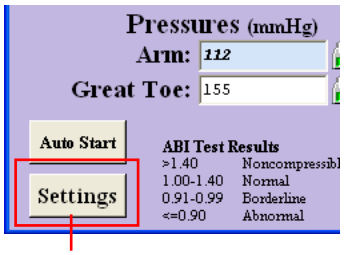


Preparation

(1) Wrap cuff at each testing site and connect tubing to the right arm cuff.

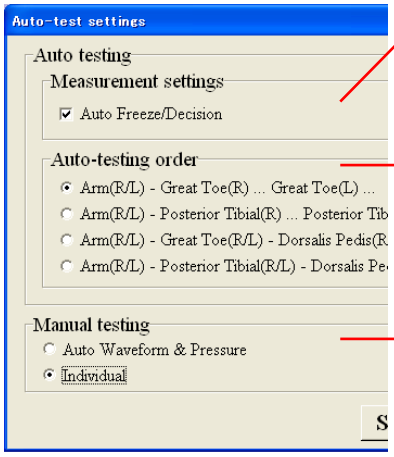


(2) Go to Option Screen and make sure **Pressure Menu** check box is being checked.



Settings button

(3) Click **Settings** on ABI screen and set the Auto-test settings as follows:



Auto Freeze / Decision:
Check it to freeze and save waveforms automatically.

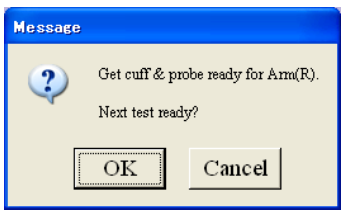
Auto-testing order:
Select a favorable order for Auto-testing.

Manual testing:
Auto Waveform & Pressure:
To take velocity waveform and blood pressure automatically for each site of manual testing.
Individual:
To take velocity waveform and blood pressure individually for each site of manual testing.

List of **Auto-testing order** for ABI as follows: Default setting: #1

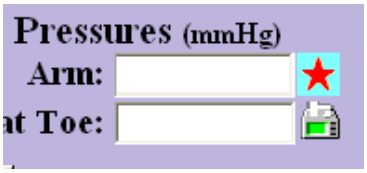
Number	Auto-testing Order
1	Arm(R/L) - Great Toe(R) - DP(R) - PT(R) - Great Toe(L) - DP(L) - PT(L)
2	Arm(R/L) - PT(R) - DP(R) - Great Toe(R) - PT(L) - DP(L) - Great Toe(L)
3	Arm(R/L) - Great Toe(R/L) - DP(R/L) - PT(R/L)
4	Arm(R/L) - PT(R/L) - DP(R/L) - Great Toe(R/L)

Operation

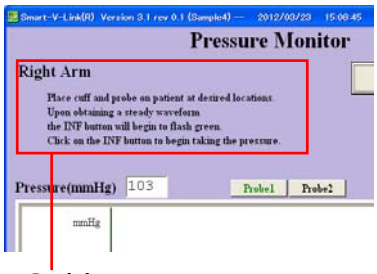


(1) Click **Auto Start** on ABI screen to start Auto-testing and a dialog box will appear as shown left.

(2) Connect the tubing to the right arm cuff and click **OK** and Pressure Monitor screen will open for Right Arm.

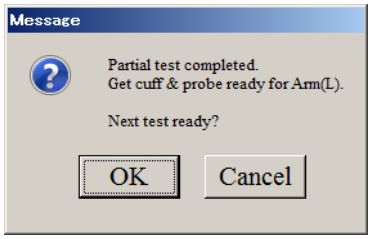


Note: At beginning of each testing, a **red star mark** appears to let you know which site the testing should be performed on.



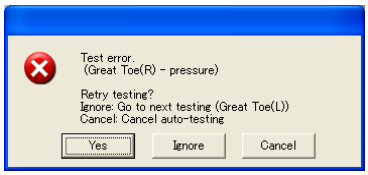
Guidance

(3) Follow the guidance with site name shown on upper left of monitoring screen to perform the testing.



(4) When testing is completed and cuff connection and/ or probe placement has to be changed, a dialog box will appear as shown left. Disconnect the tubing from the cuff and connect it to the next cuff where the red star is indicating for and then click **OK** or press **Space bar** or **Enter** to proceed the next testing.

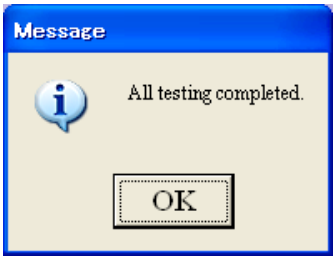
Note: Auto-testing can be always restarted by re-clicking **Auto Start** from where any testing has been cancelled.



Error message:
In case of test error message as shown left, click **Yes** to retry testing, **Ignore** to go to next testing or **Cancel** to cancel auto-testing.

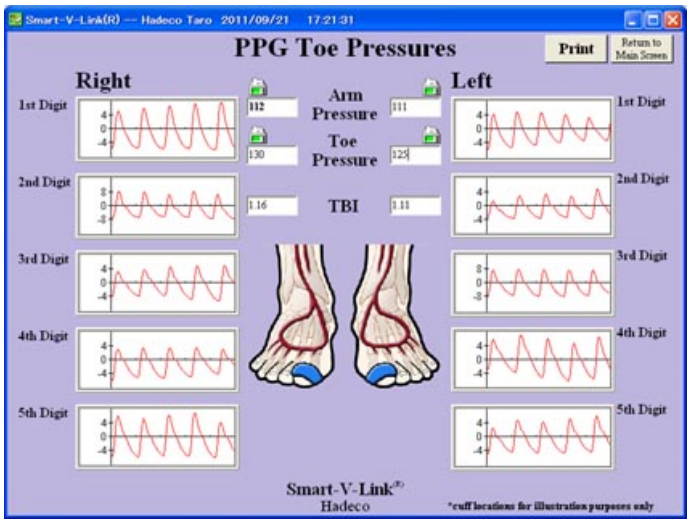
(5) Repeat steps #2 to 4 for the next site.

Note: Toe pressure should be measured with PPG probe.



(6) When all testing is completed on ABI screen, the message as shown left will appear. Click **OK** to close it and ABI (PT/DP) and TBI will be calculated automatically.

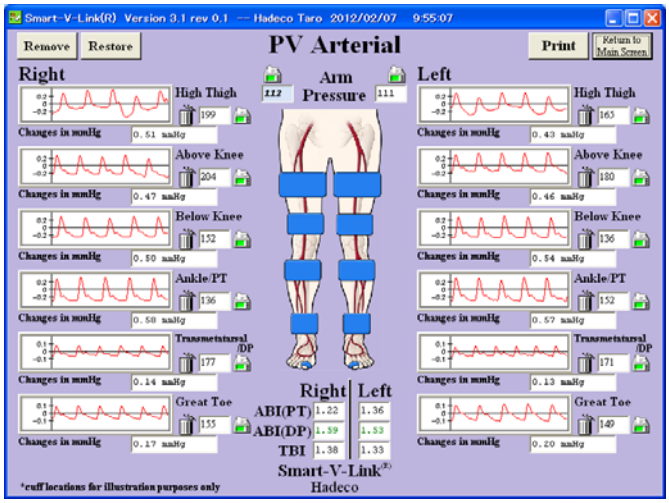
PPG Toe Pressures (TBI)



(1) Place PPG probe on testing site and take PPG waveform and blood pressure in the same manner as ABI screen.

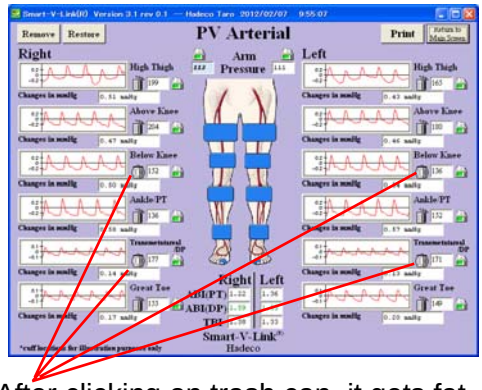
PV Arterial

This function is not available for Bidop ES-100V3.

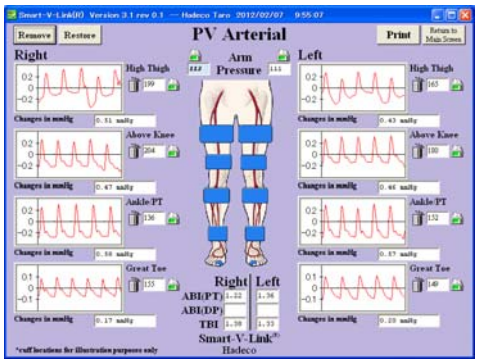


(1) Wrap a cuff at testing site and connect tubing from cuff to cuff port.
(2) Take PV waveform and blood pressure in the same manner as ABI screen

Note: Any of PV waveform windows you don't use can be removed from the screen. Click each trash can next to the window and click **Remove** to proceed. Click Restore to get them back.



After clicking on trash can, it gets fat.

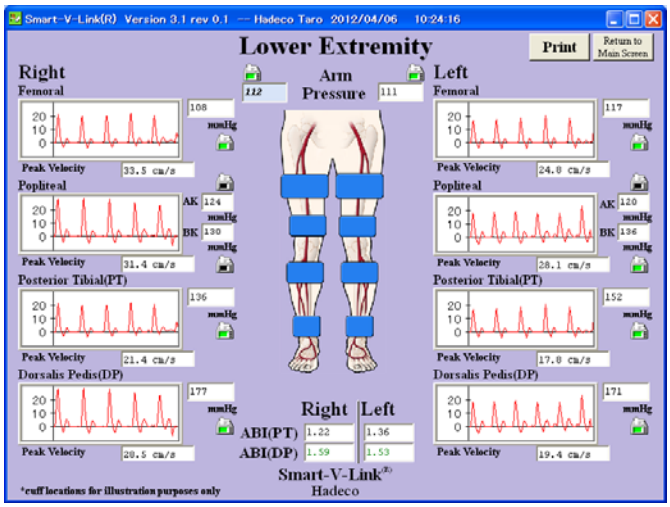


After clicking Remove

Auto-testing with Smartdop 30EX:

See the section “§3. Auto-testing with Smartdop 30EX” of ABI Screen in Chanpter.4 for details.

Lower Extremity segmental



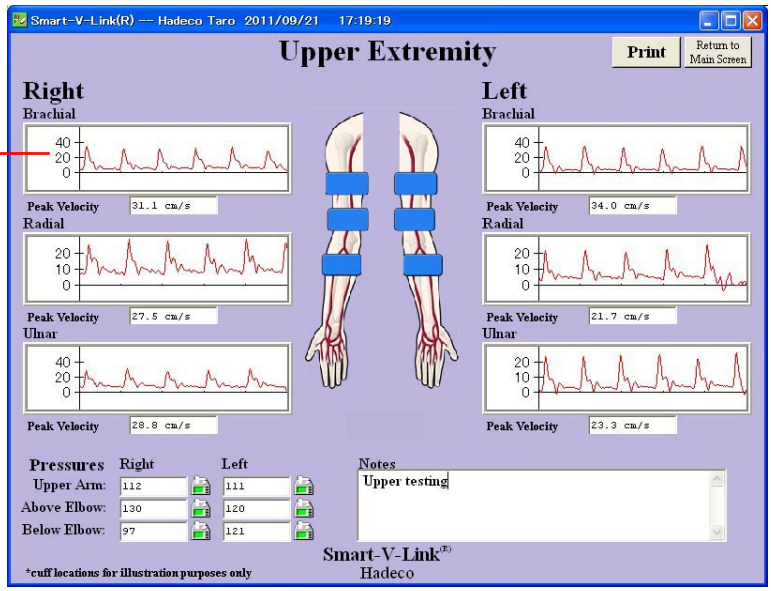
(1) Place Doppler probe on testing site and take velocity waveform and blood pressure in the same manner as ABI screen.

Auto-testing with Smartdop 30EX:

See the section “§3. Auto-testing with Smartdop 30EX” of ABI Screen in Chanpter.4 for details.

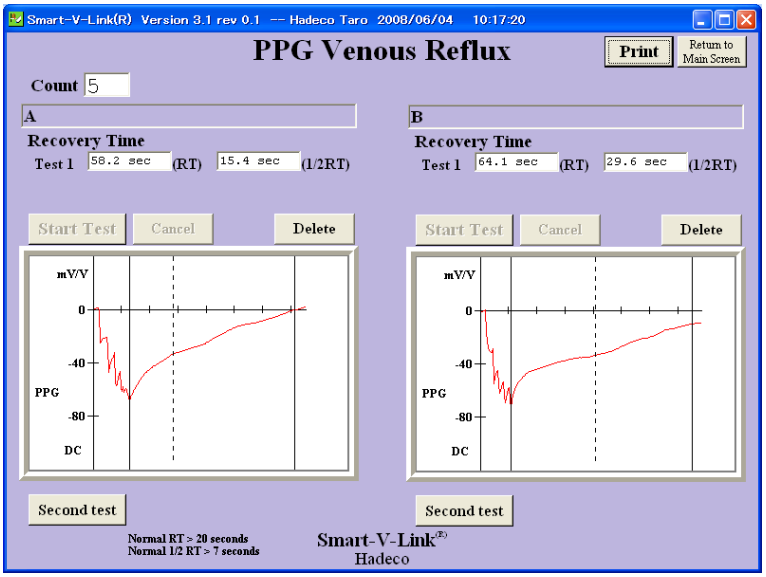
Upper Extremity segmental

Waveform window



(1) Place Doppler probe on testing site and take velocity waveform and blood pressure in the same manner as ABI screen.

PPG Venous Reflex



(1) Connect PPG probe to the Doppler and set it on PPG-DC mode.
(2) Change the Count number for patient dorsiflexes and site name if desired.

(3) Place the probe on testing site and click one of waveform windows and it will start showing PPG-DC signals received from Doppler.

(4) When patient is ready, click **Start Test** or press space bar or the probe button (PG-21) to start venous reflux study.

(5) Ask patient to flex his foot synchronizing with each beep sound on the computer. First long beep is a cue to get ready and short beep will follow as many times as Count number being set.
Click Cancel or press space bar or probe button to cancel the testing.

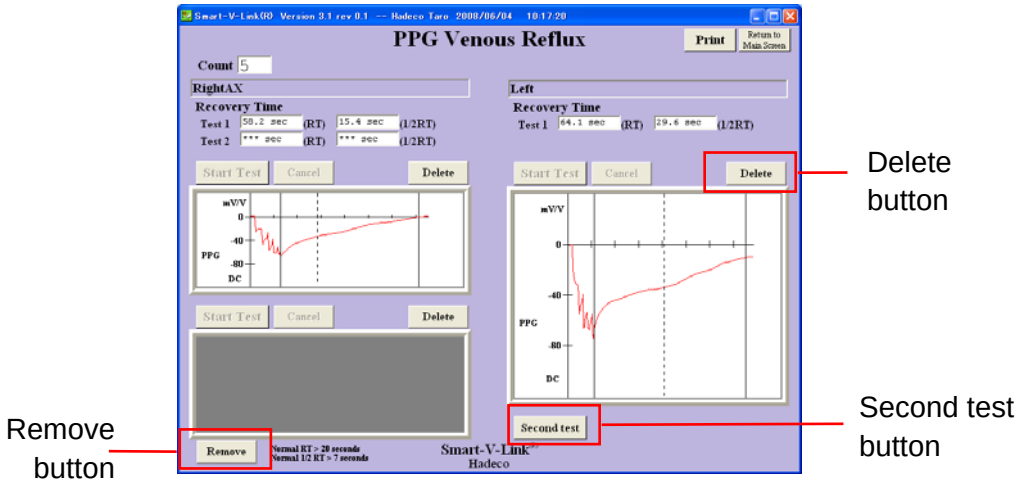
(6) When an appropriate waveform returns to the base-line amplitude, Smart-V-Link will automatically freeze the waveform and show Recovery Times.

Note: 1/2 RT is the half recovery time to return to 50% of refilling amplitude where vertical dotted line is shown.

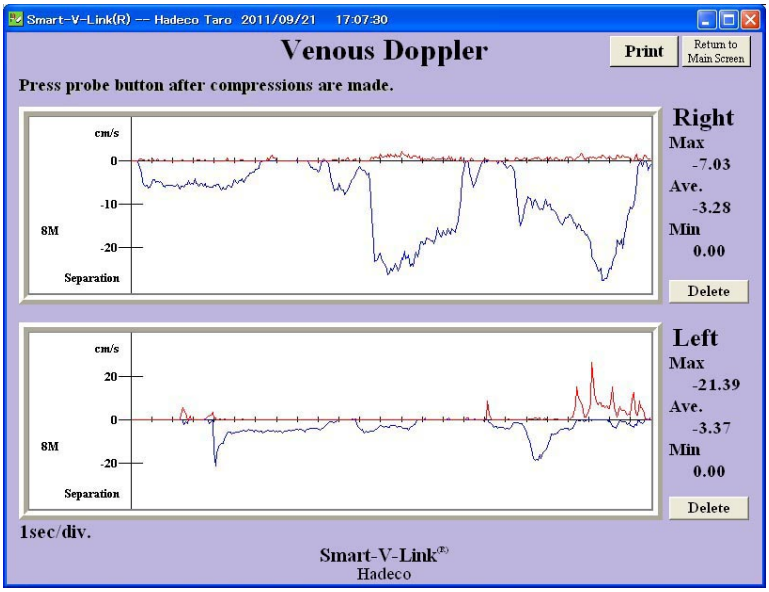
(7) Click Decision to save the waveform on patient data. If the measured waveform is not satisfactory, press Cancel to measure again.

(8) Repeat steps #3 to #7 on the other side or on the second test.

Note: Click **Second test** to add 2nd test window(s) if necessary.



Venous Doppler



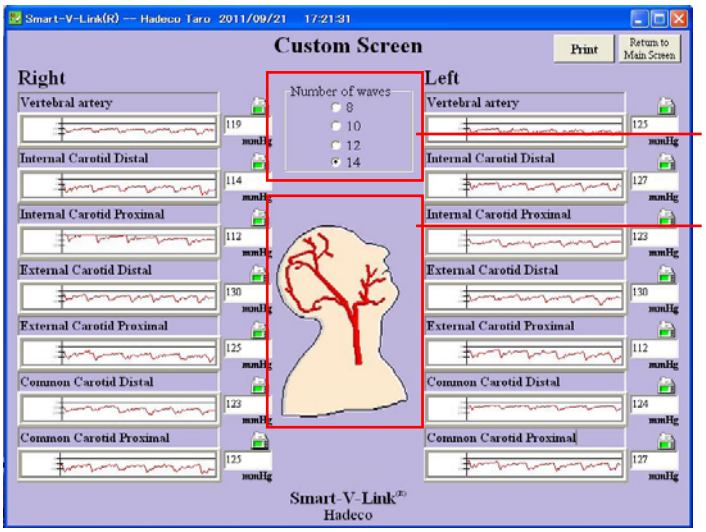
(1) Place Doppler probe on testing site and click waveform window to start monitoring venous blood flow.

(2) Perform venous compression study and press probe button or space bar to freeze the waveform of latest 25 seconds.

Note: Parameters are calculated based on either every second or first 10 seconds when on monitoring mode or on freeze mode, respectively.

(3) Repeat steps #1 to #2 for the other side.

Custom Screen



Custom Screen allows you to create your own test module with favorable site names and number of sites, 8, 10, 12, or 14.

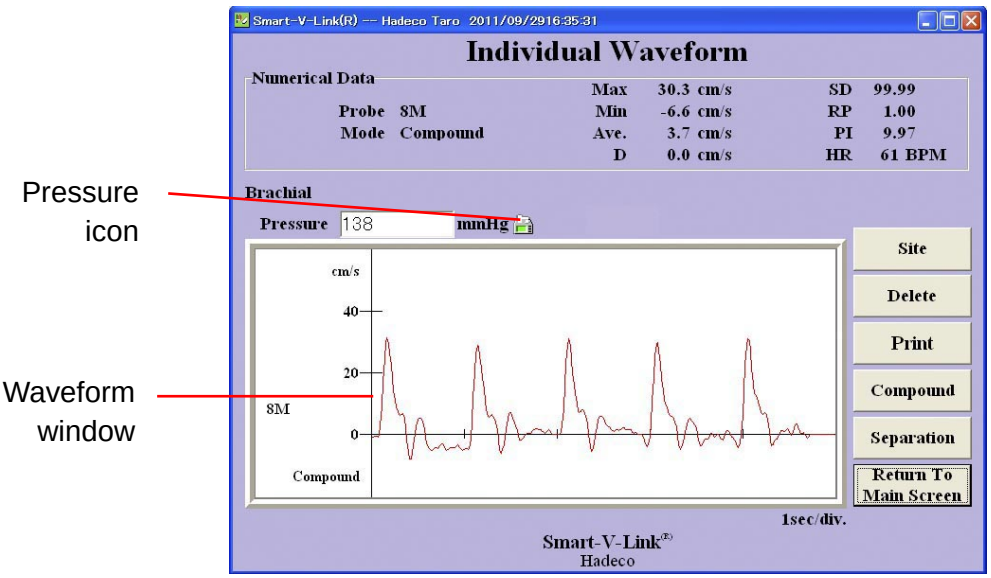
(1) Overtype the name of site you wish to test in site name box.

Note: Using same name for multiple sites on same side may cause trouble on downloading.

(2) Click **No image** and select **Open** to put a desired image on center of the screen.

(3) Place the probe on testing site and take waveform and blood pressure in the same manner as ABI screen.

Individual Waveform



(1) Click **Site** and type site name and then click **OK** and it will be shown on the screen.

Note: All site names that have been saved there will be listed on pull-down menu for future input.

(2) Place the probe on testing site and take waveform and blood pressure in the same manner as ABI screen.

Numerical data

Parameters	**Abbrs.**	**Definitions**
Systolic velocity [cm/s] or Doppler shift [kHz]	Max	
Minimum velocity [cm/s] or Doppler shift [kHz]	Min	
Mean velocity [cm/s] or Doppler shift [kHz]	Ave.	
End diastolic velocity [cm/s] or Doppler shift [kHz]	D	
S/D ratio	SD	SD = S / D
Resistance Parameter	RP	RP = (S - D) / S RP = 1 if waveform goes below base line.
Pulsatility	PI	PI = (Peak-to-Peak) / MN PI ≤ 99.99
Heart rate [bpm]	HR	

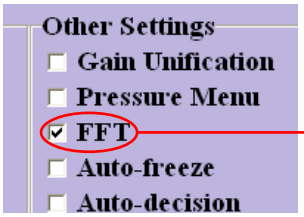
Chapter 5: FFT Analysis with ES-100V3

1. System requirements

(1) ES-100V3 with FFT raw data output, serial# 11090001 or over.
(2) Smart-V-Link V3.1 or over with standard accessories.

2. Preparations

(1) Go to Options and check the FFT check box to add FFT check box to each arterial Doppler screen and click Return to Main Screen.



Check box for FFT in Option Screen.

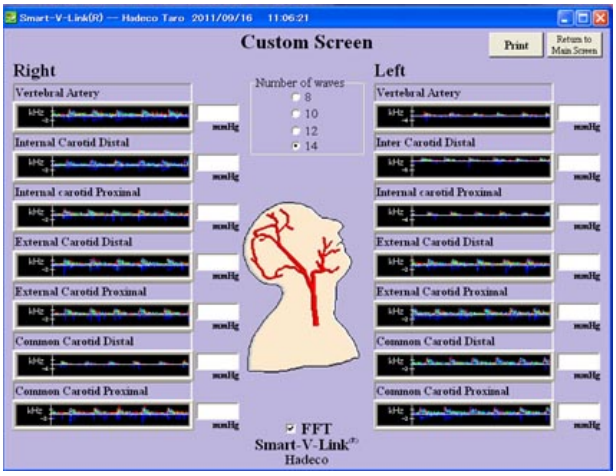
(2) Open each of arterial Doppler screens where you wish to perform FFT analysis and check the FFT check box to activate FFT. Subsequence Smart-V-Link use will revert to each check box status.

Check box for FFT
in each arterial Doppler screens.

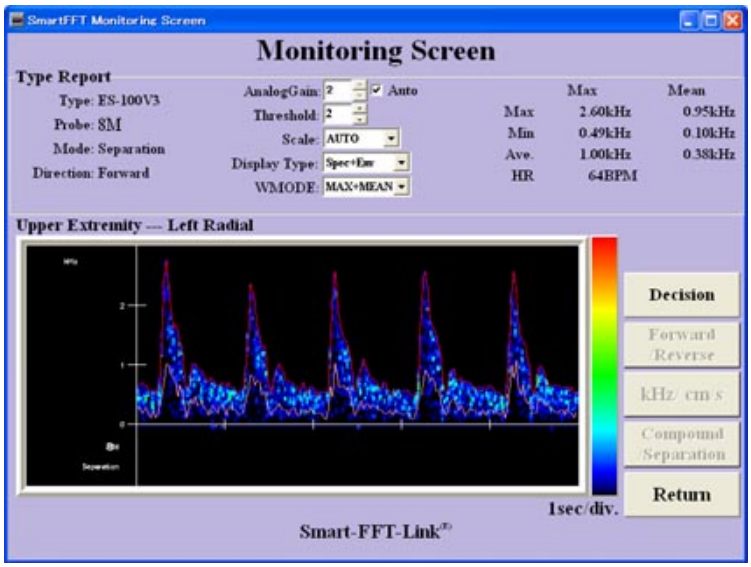
3. How to perform FFT analysis with ES-100V3

This section explains how to do it on Custom Screen for carotids as an example:

(1) Go to Custom Screen and type the name of site you wish to do FFT analysis in each site name box. See "Custom Screen" for details.



(2) Place the probe on site and click on waveform window to start FFT monitoring.



(3) Adjust value of each settings in the screen to get optimal waveform as follows:

Check Auto check box for Auto-Analog Gain control. Set optimal Threshold, 4 to 7 for carotids, see next page for recommended settings. Choose Scale, Display Type and Waveform Mode (WMODE) on each pull-down menu.

Note: Press Forward/ Reverse and kHz/ cm/s to change the polarity and the unit, respectively. See next page for meaning of the numerical data.

(4) Wait at least 5 seconds after the waveform becomes stable and press the probe button or the space bar on the keyboard to freeze the waveform of latest 5 seconds.

(5) Click **Decision** to save the data on patient data if the frozen waveform is satisfactory and it'll go back to Custom Screen. If it's not satisfied, press the probe button or the space bar to go back to monitoring mode again.

Click **Return** to go back to Custom Screen without saving the data.

(6) Right-click the waveform window to observe it in large window. See next page for meaning of the numerical data.

Note1: FFT analysis is available on each arterial Doppler screen of ABI, Lower Extremity, Upper Extremity, Custom and Individual.

Note2: When Spectrum (Spec) of Display Type is selected on the screen, Mode is fixed on SEPARATION automatically.

4. Recommended settings

Parameters	Abbrs.	Description	Recomended ettings
Analog Gain		Analog gain selected (AUTO, 1 to 8)	AUTO
Threshold	TH	Threshold of noise reducing selected. (1 to 20)To reduce noise set the threshold level higher	8 to 13 (Carotid arteries) 6 to 11 (Lower extremity arteries) 6 to 11 (Digit arteries)
Scale		Depends on UNIT [cm/s or kHz] AUTO or 2.5 to 160.0 [cm/s] AUTO or 0.25 to 16.0 [kHz]	AUTO
Display Type		Selected from Spectrum, Envelope and Spectrum+Envelope	
Waveform mode	WMODE	Selected from MAX+MEAN, MAX and MEAN	

5. Numerical data

Parameters	**Abbrs.**	**Description**
MAX Max	Max	Maximum of MAX envelope
MAX Min	Min	Minimum of MAX envelope
MAX Ave	Ave.	Average of MAX envelope
MAX D	D	End diastole of MAX envelope
MEAN Max	Max	Maximum of MEAN envelope
MEAN Min	Min	Minimum of MEAN envelope
MEAN Ave	Ave.	Average of MEAN envelope
MEAN D	D	End diastole of MEAN envelope
S/D ratio	SD	S/D= S(MAX Max) / D(MAX D)
Resistance Parameter	RP	RP=(MAX Max - MAX Min) / MAX Max Note: RP=1 if waveform goes below baseline.
Pulsatility Index	PI	PI=(Peak-to-Peak) / MAX Ave Note: Peak-to-Peak of MAX envelope Note: PI<=99.99
Heart rate [bpm]	HR	
Spectral Broadening	SB	SB = (MAX Max – MEAN Max) / MAX Max x 100 [%]

Chapter 6: Supplemental information

Data synchronization

Some of testing data are synchronized with ones on other testing modules, therefore changing any of the data changes all of other synchronized data as follows:

Test module	Site	Type		Test module	Site	Type
ABI	Posterior tibial	Waveform	<->	Lower extremity	Posterior tibial	Waveform
ABI	Dorsalis pedis	Waveform	<->	Lower extremity	Dorsalis Pedis	Waveform
ABI	Arm	BP	<->	PPG toe pressure	Arm	BP
			<->	PV arterial	Arm	BP
			<->	Lower extremity	Arm	BP
			<->	Upper extremity	Upper arm	BP
ABI	Posterior tibal	BP	<->	Lower extremity	Posterior tibial	BP
			<->	PV arterial	Ankle	BP
ABI	Dorsalis pedis	BP	<->	Lower extremity	Dorsalis pedis	BP
			<->	PV arterial	Tramsmet atarsal	BP
ABI	Great toe	BP	<->	PPG toe pressure	Toe	BP
			<->	PV arterial	Great toe	BP
PV arterial	High thigh	BP	<->	Lower extremity	Femoral	BP
PV arterial	Above knee	BP	<->	Lower extremity	Above knee	BP
PV arterial	Below knee	BP	<->	Lower extremity	Below knee	BP
PV arterial	Transmeta tarsal	BP	<->	Lower extremity	Dorsalis pedis	BP

Data file formats

1. Data files created by Smart-V-Link
Smart-V-Link saves and exports measured data files depending on data structure as follows:

Ordinary data
Ordinary data set for a patient or a set of test module data, except FFT analyzed data with new 100V3, will be saved in one file, and the file name consists of extension of "ST2".

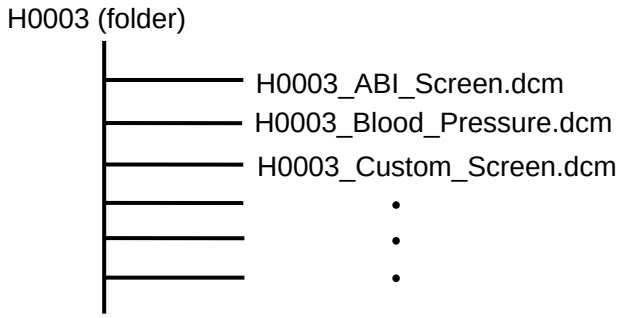
Example for the data set Patient ID is H0001: H0001.ST2

FFT analyzed data with new 100V3
Data will be divided in 2 files for each data set.

Example for the data set Patient ID is H0002: H0002.ST2 and H0002.sf1

Exporting DICOM files
If the check box of **Export to DICOM** on Option Screen is being checked, Smart-V-Link will also export all the report images of each test module to DICOM automatically while saving data.
DICOM file will be created for each module in the folder which will be automatically created with name, "SVLink file name". Each DICOM file name is "SVLink file name"_"test module name".dcm.

Example for the data set Patient ID is H0003:



Note: These DICOM files are not displayed on Search File window.

2. Data file compatibility

Smart-V-Link data files and exported DICOM files can be opened on the other PC with Smart-V-Link and DICOM software installed as follows:

Smart-V-Link “ST2” data files

(1) Copy the files you wish to open to other PC or network server.
(2) They can be opened on Smart-V-Link installed in the PC.

FFT analyzed data taken by latest 100V3

(2) Copy both the "ST2" and "SF1" files to the same folder on other PC or network server.
(3) They can be opened on Smart-V-Link installed in the PC.

DICOM files

(1) Copy the “DCM” files you wish to open to other PC or network server.
(2) They can be opened on DICOM software installed in the PC.

Chapter 7: Troubleshooting

Troubleshooting

1. Smart-V-Link cannot be executed.

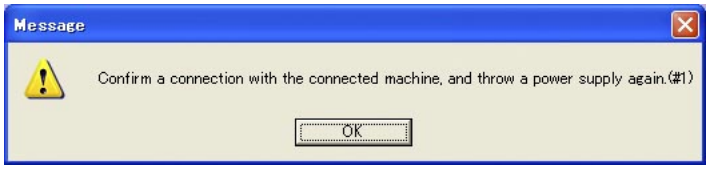
a. Refer to the section "System Requirements" of this manual to make sure that your computer system meets the requirements of the Smart-V-Link software.

b. Uninstall the Smart-V-Link, and reinstall it.

2. Search Comm command does not work correctly. (CommPort setting)

It has been reported in a rare case when using with Doppler with USB I/F that Search Comm cannot search the Doppler for the first time you run after installing USB cable driver.

To solve this problem, restart your computer once.



3. Communication Error 1

a. Make sure if the Doppler unit is turned on.

b. Check the connection from computer to Doppler and that the USB cable is proper for the Doppler and the computer.

c. Refer to the section “Option” of this manual for the COM port setting.

d. Click Return on the Monitoring Screen to go back to previous screen, and then go to Monitoring Screen again.

4. Communication Error 2

a. Go to Option Screen.

b. Connect Doppler to the computer and turn it on.

c. Do the CommPort setting.

See the section “Option” of this manual for the details.

5. The report cannot be printed out.

a. Make sure the printer is turned on.

b. Check the connection from computer to printer. If you use a network printer, check the network and the print server as well.

c. Refer to the section "Print Report" of this manual, and set the settings again.

6. Windows Explorer can not find SVLink data on Data Folder.

a. Go to Options and if Data Folder is set in any system folder like “Program Files”, set it in non-system folder.

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