OPERATING MANUAL Smart-V-Link™

Version 4.1 for Windows 10 / 8.1

Computer Communication Software for Hadeco Doppler with USB Interface



Excellence in Human Service and Technology

Table of Contents

| 5-3. How to display FFT waveforms (Fast Fourier Transform) | . 39 |
|--|------|
| 5-4.Recommended settings | . 41 |
| 5-5. Numerical data table for FFT | . 41 |
| Chapter 6: Supplemental information | . 42 |
| 6-1. Data synchronization | . 42 |
| 6-2. Data file formats | . 43 |
| Chapter 7: Troubleshooting | . 44 |
| 7-1. Smart-V-Link cannot be executed. | . 44 |
| 7-2. Search Comm command does not work correctly(CommPort setting) | . 44 |
| 7-3. Communication Error 1 | . 44 |
| 7-4. Communication Error 2 | . 44 |
| 7-5. The report can't be printed out | . 44 |
| 7-6. Windows Explorer can't find Smart-V-Link data on Data Folder | . 44 |

--- Notes ----

The contents of this document and the associated Smart-V-Link software are the property of Hadeco, Inc. and are protected by copyright. Any reproduction in whole or in part is strictly prohibited without the express written permission of Hadeco, Inc.

The contents of this document are subject to change without notice and do not represent a commitment on the part of Hadeco, Inc.

Hadeco is a registered trademark and Smart-V-Link is a trademark of Hadeco, Inc.

Windows is registered trademarks of Microsoft Corporation.

Celeron is a registered trademark of Intel Corporation.

All other product names or trademarks are property of their respective owners.

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 probe, please refer to the operating manuals that come with your Doppler and PPG 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.

1-1.Profiles

The Smart-V-Link allows you to implement easily the vascular studies using the bidirectional 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
 - 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.

1-2.System requirements

Doppler

Bidop 7/ DVM-4500/ Bidop ES-100V3/ Smartdop 45/ Smartdop 30EX

Computer

- OS: Windows 10 / 8.1 (Except Tablet PC)
- CPU clock: Core i3 1.3GHz or more
- Display: 800 x 600 dots or more, 256 colors or more
- USB: USB2.0
- Drive USB, CD or DVD

1-3.Contents of package

- Software USB Stick
- Designated USB cable

1-4.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 USB flash memory 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 IEC60601-1 to connect to the unit.
- (3) Connection of the connected computer to a network that includes other equipment such as network printer could result in previously unidentified risks to patients, or operators and the user of the unit should identify, analyze, and control such risks.
- (4) Subsequent changes to network could introduce new risks and require new analysis; and changes to network include:
 - a) Connection of additional items to network
 - b) Disconnecting items from network
 - c) Update of equipment connected to network
 - d) Upgrade of equipment connected to network
- (5) To maintain security, always keep the latest OS and install anti-virus software on your computer. Use the virus scanned USB for transferring the data.

Chapter 2: Getting started

2-1.Installing Smart-V-Link

- (1) Connect the Smart-V-Link USB Stick to your computer.
- (2) Double-click **Setup.exe** in the USB drive in which Smart-V-Link is connected, 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.

2-2.Installing USB cable driver

- (1) Connect the Smart-V-Link V4.1 USB Stick to your computer.
- (2) If automatic installer Smart-V-Link Ver4.1 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 8.1

(4) A shortcut for "Windows 8 Driver Installation" will be created automatically on the desktop when Smart-V-Link installation is completed. Click it and follow the instructions.

Windows 10

(4) USB Driver will be installed automatically.

2-3.Uninstalling Smart-V-Link

 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\SVLink4.0\. (Default)

The following procedures depend on your Windows version:

Windows 8.1

(2) Select Hadeco\Smart-V-Link Ver4.1\Uninstall on Program menu to uninstall Smart-V-Link.

Windows 10

(2) Select Hadeco\Uninstall on All apps to uninstall Smart-V-Link.

2-4.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.

2-5.Starting Smart-V-Link

- (1) Select Hadeco\Smart-V-Link Ver4.1\Smart-V-Link Ver4.1 on All apps (for Windows10) or Program menu (for the other version) 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.)

Chapter 3: Quick start

3-1. 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.

| Mart-V-Link(R) Version 4.1 rev 1.4 2020 | /01/06 14:39:14 | | | | <u></u> | |
|---|-----------------|---------------------|-----------------|------|---------|--------------------------|
|] | Patient | Infor | mation | L. | Save | Return to Main Screen |
| First Name: | | Last Na | me: | | | |
| Taro | | Hadec | :0 | | | |
| ID: | Sex: | | Age: | | | |
| HADECO0000001 | MALE | • | 40 | | | |
| Date of Birth: | Heig | ght: | Weight: | - | | |
| 01 / 01 / 1980 MM/DD/YYY | • 18 | 80 m | - 75 | kg 💌 | | |
| Telephone Number: | Test Date | e: | | | | |
| | 01 / 06 | 5 / 2020 | (MM/DD/YYYY) | | | |
| | | | | | | |
| Facility: | | | | | | • |
| Performing Studies: | | | | | + | |
| Requesting Physician: | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | Sm | art-V-Lin Hadeco | ık [®] | | | |

- (5) Type the patient information or you may do it later.
- Note: Click the pull-down menu next to "Date of Birth" and select the date format you desire for Patient Information and it will be used for both "Date of Birth" and "Test Date" of all patient information. Default setting is MM/DD/YYYY.



- (6) Click Save to save the information and Return to Main Screen.
- (7) Click **Options** in the menu to go to Option Screen.

| SaveFile Sea | urch Files Nownload | iew File | Patient Information | Symptoms/ Diagnosis | Print Repo | ort | |
|-------------------------------------|--|----------|--------------------------------------|--|---|---------------------------------------|---------|
| D | ownload | Site | D.C. M.D. | | 12 Carlos - | | |
| | A REAL PROPERTY AND A REAL | Sare | Delault Data | Options | | | Options |
| Ankle Brachial Index (ABI) | PPG Toe Pressures (TBI) | | Pulse Volume Arterial (PVR) | Lower Extremity Segmental Pressures | U Ext Seg Pro | ipper tremity mental essures | |



 (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.

3-2. 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.



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



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



a) Vessel diameter and blood flow:

| |] | Monito |
|----------------|------------|---------|
| Numerical Data | | |
| Probe | 8M | |
| Mode | Separation | |
| Diameter | 2.0 | mm |
| Flow(Max) | 40.00 | ml/min. |
| Flow(Ave.) | 0.00 | ml/min. |

Check **Diameter/ Flow** check box on Option Screen and the vessel diameter & blood flow will be shown on Monitoring Screen. Change the diameter by clicking the up and down buttons in ext to diameter value.

See "Chapter4. Option Screen" for more details.

Change the diameter value by clicking up and down buttons :

b) Probe selection buttons:

| Probel Probe2 | Click either Probe1 or Probe2 to select the probe used for the measurement when Smartdop 45 or DVM4500 with dual probe is connected. |
|---------------|--|
| ProbePV | Click either Probe PV , Probe1 or Probe2 to select the probe used for the measurement when Smartdop 30EX |
| Probel Probe2 | with built-in PV is connected. |

c) Compound / Separation buttons

| Compound | С |
|------------|----|
| | m |
| Separation | se |

Click either **Compound** or **Separation** to set the waveform mode for combined bidirectional waveform or directionally separated dual-trace waveforms, respectively.

- (2) Wait at least 5 seconds after the waveform becomes stable and freeze the waveform by any of the following procedures:
 - Press the probe button
 - Press the space bar on the key board
 - Click the white open area of waveform window on Monitoring screen as shown below.

| Ankle Brachial Index(ABI) - | Right Posterior Tibial | - | |
|-----------------------------|-------------------------------------|--------------------------|-------------------------------|
| cm/s | 4 | ProbePV Probel Probe? | Click here to freeze waveform |
| 40- | | Decision | Click here to heeze wavelonn. |
| 20-1 | And An Am An | Compound | |
| 0 | | Separation | |
| Compound | | Return | |
| | Smart-V-Link ^m 1sec/div. | - | |

Note: When **Auto-freeze** check box is checked on Option Screen, Smart-V-Link will freeze the waveform automatically when it becomes stable.

(3) 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.

- Note: When **Auto-decision** check box is checked on Option Screen, Smart-V-Link will automatically save the waveform when it's frozen.
- (4) Repeat step # (1) to # (3) for the next site.

Enlarging waveform:

Right-click one of the waveform windows to see the enlarged waveform and the numerical parameters on Individual Waveform screen. See Numerical data table on §4-2-9. 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.

3-3. 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 i and select Take Pressure on pulldown pressure menu to go to Pressure Monitor screen.



- (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 to 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 after the sound cessation.

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

| 🔛 Smart-V-Link(R) Version 4.1 rev 1.4 Taro Hadeco 2014/07/29 10:45:11 | | - 🗆 🗙 |
|---|----------|-------------|
| Pressure Monitor | | |
| Right Ankle | Decision | Cancel |
| Click Cancel to restart measurement. | | |
| | | Domler - 8M |
| Pressure 118 mmHg Probel Probe2 | _ | Pressures |
| mmHg | | |
| 200 - AMAMAMAMAMA | | |
| 100- | ~ | |
| | | |
| Smart-V-Link ^{®)} Hadeco | | 1sec/div. |

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.



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.

| Pressures | (mmHg) | | Pressures (mmHg) |
|------------|---------------------------|----------------------|--------------------|
| Arm: | 112 | Right Left | Arm: 111 |
| Great Toe: | 155 🔒 🍈 | ABI(PT) 1.21 1.35 | Great Toe: 149 🔒 湔 |
| | | ABI(DP) 1.58 1.52 | |
| ABI Test R | esults Noncompressible | TBI 1.38 1.33 | TBI Test Results |

3-4. Printing Report

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



- (2) Choose the printer and check all the check boxes for the reports you wish to print out.
- (3) Click either Print to print out report(s) or PDF to create PDF report file.

3-5. Saving Data

(1) Click **Save File** on Main Screen to pop up SaveFile window for saving data to local or network disk drive.



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



Chapter 4: Menu & Testing screens

<u>4-1. Menu</u>

| Save File: | To save data file. |
|----------------------|--|
| Search Files: | To search data files to open. |
| New File: | To create new patient file. |
| Patient Information: | To input patient data. |
| Symptoms/ Diagnosis: | To input symptoms and diagnosis for patient. |
| Print Report: | To print report or export it to PDF file. |
| Download: | To download waveform memory data from Doppler to Smart-V-Link. |
| Site: | To input abbreviated site & test module to enhance mobility of specific Doppler model(s). |
| 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. |

4-1-1. Save File

| | SaveFil | e | |
|-----------------------|---------------------|------------------|--------|
| Save in : 🌗 Way | veData | → ← 1 → 1 | • |
| 20140729 | | 2014/07/29 10:48 | 8 ST2 |
| SAMPLE HADECO | | 2014/09/10 11:11 | 1 ST2 |
| SAMPLE | | 2013/06/11 10:57 | 7 ST2 |
| E SAMPLE3 | | 2014/08/28 16:19 | ST2 |
| SAMPLE4 | | 2014/08/04 8:38 | ST2 |
| < | | | > |
| File name: | | | Save |
| Save as type : Smart- | V-Link files(*.ST2) | • (| Cancel |

(1) Click Save File on Main Screen for saving 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 changed on Option Screen if desired.

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

4-1-2. Search Files

| | Smart-V-Link(R) Version 4.1 rev 1. | 4 Taro Hadeco 2014/07/2 | 9 10:45:11 | | - 🗆 🗙 |] |
|-----------|---|-------------------------|-------------------------|--|--------------------------|----------------|
| | | Sea | rch Files | | Return to Main Screen | |
| | Enter data of patient | in box below. | | | | |
| | Search In: 🚹 | C:\Hadeco\SVLink4. | .0\WaveData | • | History | |
| | Search Type: | ast Name | • | Sub folder | | |
| | Search For: | | | | Search | |
| | | | | | | |
| | Smart-V-Link(R) Version 4.1 rev 1.4 Taro Hadeco 2014/07/29 10.45:11 Search Files Enter data of patient in box below. Search In: C:Hadeco/SVLink4.0/WaveData History Search Type: Last Name Sub folder Search For: Search Windows (C:) Ast Name(+) First Name File Name D# Badeco Taro 20140729 ST2 20140729 Hadeco SAMPLE ST2 HADECO000 First Name(+) First Name File Name D# Stlink4.0 SVLink4.0 SVLink4.0 SVLink4.1 SVLink4.1 SVLink4.1 Stlink | | | | | |
| | B2SE | Hadeco | Taro | es Return to Main Screen File Name D# 20140729 ST2 20140729 SAMPLE.ST2 HADECO000 SAMPLE3.ST2 HADECO000 SAMPLE3.ST2 HADECO000 File list pane | | |
| Folder | Hadeco | Taro | Hadeco | SAMPLE.ST2 | HADECO000 | |
| | Drivers | Taro | Hadeco | SAMPLE3.ST2 | HADECO000 | |
| tree pane | ∎] data | | | | | |
| | images | | | | | Eile list pane |
| | WaveDat | | | | | |
| | E SXTLink1.0 | U . | | | | |
| | < > | < | | | > | |
| | | 3 files | | Delete | Open | |
| | ¥ | Sm | art-V-Link [®] | | | |
| | | | Hadeco | | | |

- 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\SVLink4.0\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 1 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.

| Last Name(+) | First Name | File Name | ID# |
|--------------|------------|--------------|-----------|
| Hadeco | Taro | 20140729.ST2 | 20140729 |
| Taro | Hadeco | SAMPLE.ST2 | HADECO000 |
| Taro | Hadasa | CANDLES STO | HADECOOO |
| 140 | Indeco | SAWFLES.512 | TIADECOUL |
| 1410 | nadeco | SAMPLES.S12 | IIADECOM |



4-1-3. 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 as shown below will appear. Click **Yes** to save the previous data, **No** to erase it or **Cancel** to cancel New File process.



4-1-4. Site

This function is available for the following Doppler models:

```
*Bidop 7
*Smartdop 45 (serial# 14110001 or over)
*Bidop ES-100V3 (serial#15020001 or over)
```

To input abbreviated site & test name up to 15 letters for each waveform memory on any of the specific Doppler model(s) connected.



1. Input Abbreviated site & test name Simple Input:

(1) Select the Memory No. you wish to input the abbreviated site & test name for.



(2) Click **Simple Input** button to show the Test Module list for setting the template data of site & test name as shown in below.

| Memory No.: 1 Simple Input | Site Screen Simple Input |
|---|--|
| Memory No. 1 Simple Input Test Module: Not Selected Site: Not Selected Site: File Clear All Clear | Test Module Ankle Brachial Index(ABI) PPG Toe Pressures PPG Venous Reflux PV Arterial Venous Doppler Lower Extremity Upper Extremity Individual Waveform Custom Screen |

Select your test module from the list and click OK and the template data for each test module will be set on the Site Screen table automatically as shown below.

| Memory No. | Test Module | Site | Abbreviated site | |
|------------|---------------------------|-------------------------------|------------------|--|
| 1 | Ankle Brachial Index(ABI) | Right Dorsalis Pedis | ABI R DP | |
| 2 | Ankle Brachial Index(ABI) | Right Posterior Tibial | ABI R PT | |
| 3 | Ankle Brachial Index(ABI) | Left Dorsalis Pedis | ABI L DP | |
| 4 | Ankle Brachial Index(ABI) | Left Posterior Tibial | ABI L PT | |
| 5 | PPG Toe Pressures | Right 1st Digit | PPG R 1st | |
| 6 | PPG Toe Pressures | Right 2nd Digit | PPG R 2nd | |
| 7 | PPG Toe Pressures | Right 3rd Digit | PPG R 3rd | |
| 8 | PPG Toe Pressures | Right 4th Digit | PPG R 4th | |
| 9 | PPG Toe Pressures | Right 5th Digit | PPG R 5th | |

Note1: To change data of **"Test Module**" and **"Site**", click 🖵 button at the right end of each box on Input pane of the screen and select optimum one from each pull-down menu.

| Memory No.: | 2 • | Simple Input |
|------------------|---------------------------|--------------|
| Test Module: | Ankle Brachial Index(ABI) | - |
| | Ankle Brachial Index(ABI) | ~ |
| Site | PPG Toe Pressures | |
| | PPG Venous Reflux | 1 |
| Abbreviated site | PV Arterial | |
| | Venous Doppler | |
| | Lower Extremity | |
| | Upper Extremity | |
| | Individual Waveform | ~ |

Note2: To edit each abbreviated site & test name, overtype the data on abbreviated site box directly and press Enter or \checkmark button to proceed.

| Site: | Right Dorsalis P | edis | • |
|-------------------|------------------|-----------|-------|
| Abbreviated site: | ABI R side | | |
| | File | Clear All | Clear |

2. Store input data to Doppler connected

Click **Store** and then "**Yes**" to store all the data to the Doppler connected as shown below.



Each of stored abbreviated site & test names will be shown for each memory # on the Doppler as shown below.

See the operating manual of Doppler for more details.



Memory menu on Smartdop 45

| ABI F | R DP | | #01 |
|-------|---------|-------|--------|
| S: | 30.6 | CM/ S | 5 |
| MN | 15.6 | cm/s | 5 |
| D: | 10.2 | Cm/ s | 5 |
| MIN: | 8.3 | cm/s | 5 |
| RP: | 0.66 | SD: | 3.00 |
| PI: | 1.42 | HR: | 85 BPM |
| | diaplay | mo | |

DATA display mode on Smartdop 45

3. Function of each button



a) File

To import or export text (.ini) files for all the input data on Site Screen. Click File and select either **Import** or **Export** and click OK to proceed.



Import: To import a site test (.ini) file already exported on your computer. **Export:** To export a site text (.ini) file on your computer for future import.

Note: The site INI files will be stored on the Data Folder set on Option Screen.

b) Clear All

To clear all the data on the Table pane of Site Screen.

| mory No. 1 fest Module Ankle Brachial Index(ABI) Ankle Brachial Index(ABI) Ankle Brachial Index(ABI) Ankle Brachial Index(ABI) PPG Toe Pressures PPG Toe Pressures | Site Right Dorsalis Pedis Right Posterior Tibial Left Dorsalis Pedis Left Posterior Tibial Right 1st Digit | Abbreviated site ABI R DP ABI R PT ABI L DP ABI L PT BBC D Lie |
|--|---|---|
| Ankle Brachial Index(ABI) Ankle Brachial Index(ABI) Ankle Brachial Index(ABI) Ankle Brachial Index(ABI) PPG Toe Pressures PPG Toe Pressures DPG To e Pressures | Right Dorsalis Pedis Right Posterior Tibial Left Dorsalis Pedis Left Posterior Tibial Right 1st Digit | ABIR DP ABIR PT ABIL DP ABIL PT PPC PLet |
| Ankle Brachial Index(ABI) Ankle Brachial Index(ABI) Ankle Brachial Index(ABI) PPG Toe Pressures PPG Toe Pressures PPG Toe Pressures | Right Posterior Tibial Left Dorsalis Pedis Left Posterior Tibial Right 1st Digit | ABI R PT ABI L DP ABI L PT BBC R Let |
| Ankle Brachial Index(ABI) Ankle Brachial Index(ABI) PPG Toe Pressures PPG Toe Pressures PPG To Pressures | Left Dorsalis Pedis Left Posterior Tibial Right 1st Digit | ABI L DP ABI L PT BBC P Let |
| Ankle Brachial Index(ABI) PPG Toe Pressures PPG Toe Pressures PPG Toe Pressures | Left Posterior Tibial Right 1st Digit | ABIL PT |
| PPG Toe Pressures PPG Toe Pressures PPG Toe Pressures | Right 1st Digit | DDC D 1.4 |
| PPG Toe Pressures | | FFGKISt |
| DDC T D | Right 2nd Digit | PPG R 2nd |
| rrG foe rressures | Right 3rd Digit | PPG R 3rd |
| PPG Toe Pressures | Right 4th Digit | PPG R 4th |
| PPG Toe Pressures | Right 5th Digit | PPG R 5th |
| Memory No.: 15 Test Module: Ankle Brachial Index Site: Left Posterior Tibial Abbreviated site: ABI L DP | (ABI) • • | Store Read Delete |
| File | Clear All | Keturn to Main Screen |

c) Clear

To clear the data shown on the Input pane of Site Screen.

| Memory No.: 1 | Simple Input |
|--|-----------------|
| Test Module: Ankle Brachial Index(ABI) | <u> </u> |
| Site: Right Dorsalis Pedis | _ |
| Abbreviated site: ABI R side | ب |
| File | Clear All Clear |

d) Store

To store all the data on Site Screen to the Doppler connected.

e) Read

To read the stored site & test data from the Doppler connected.

Note: The stored data is automatically loaded and shown every time Site Screen is opened and Read will be likely clicked to reload it without changing the data.

f) Delete

To delete all the site & test data stored on the Doppler connected.

g) Return to Main Screen

To go back to Main Screen.

<u>4-1-5. Download</u>

Waveform memory data stored on any of the following Dopplers can be downloaded to the testing module(s) assigned on this screen:

Note: Blood volume flow/ FFT waveforms are not applicable for Download.

1. Download Screen without abbreviated site & test names



- Connect to Doppler and click **Download** to open Download Screen. Table of waveform memory will be displayed on Download screen. Click memory number with saying "**Yes**" in data stored line.
- (2) 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 usage.

- (3) Click **Download** to download all the data to Smart-V-Link after the test and site assignments are completed.
- Note: Before downloading, make sure all the check boxes for memory data are checked.

| | Uncheck All | D |
|---|-------------|---|
| | ~ | Y |
| 1 | | Y |
| | | |

2. Download Screen with abbreviated site & test names

This function is available for the following Doppler models:

*Bidop 7 *Smartdop 45 (serial# 14110001 or over) *Bidop ES-100V3 (serial#15020001 or over)

Note: Go to the section "§4-1-4.Site" in advance to set the abbreviated site & test names for enhancing the Download capability.

| | | | Download | | | |
|------------|--|--------------------------------|---|-------------------------------|--------------------------|---------------------|
| Memory No. | Uncheck All | Data Stored | Test Module | Site | Abbreviated site | D |
| L | ~ | Yes | Ankle Brachial Index(ABI) | Right Dorsalis Pedis | ABI R DP | ZI |
| 2 | | Yes | Ankle Brachial Index(ABI) | Right Posterior Tibial | ABI R PT | Z١ |
| 1 | V | Yes | Ankle Brachial Index(ABI) | Left Dorsalis Pedis | ABI L DP | ZI |
| | ~ | Yes | Ankle Brachial Index(ABI) | Left Posterior Tibial | ABI L PT | Zı |
| ; | | Yes | Blood Pressure-Ankle Brachia | l In Right Arm | BP R Arm | ZI |
| i | Image: A start of the start | Yes | Blood Pressure-Ankle Brachia | d In Left Arm | BP L Arm | ZI |
| (| ~ | Yes | Blood Pressure-Ankle Brachia | l In Right Great Toe | BP R GT | ZI |
| 3 | ~ | Yes | Blood Pressure-Ankle Brachia | l In Right Dorsalis Pedis | BP R DP | ZI |
|) | Image: A start of the start | Yes | Blood Pressure-Ankle Brachial In Right Posterior Tibial | | BP R PT | ZI |
| 10 | Image: A start of the start | Yes | Blood Pressure-Ankle Brachia | d In Left Great Toe | BP L GT | ZI |
| 1 | | Yes | Blood Pressure-Ankle Brachial In Left Dorsalis Pedis | | BP L DP | Z١ |
| 12 | I | Yes | Blood Pressure-Ankle Brachia | l In Left Posterior Tibial | BP L PT | Z |
| Memor | y No.: 1 | | Clear Waveform Pati Preview P | ent Data review | Save | As |
| Data S | tored: Yes | 1 | | | Clea | r All |
| Test M | odule: Ankle Br Site: Right Do | achial Index(/ rsalis Pedis | ABI) • | | Down Return Main S | loa n to cree |
| | | | | _ | | |

- (1) Connect to Doppler and click Download to open Download Screen. If the data information of Test Module, Site and Abbreviated site for any of memory #s has been stored on Site Screen, it will be shown on the table of Download screen automatically as shown in the picture above.
- (2) If you have waveform data for 2 patients or more on the Doppler connected, make sure to check only the check boxes for the patient you wish to download for.
- (3) Click Download to download all the data to Smart-V-Link.

Note: If multiple patient data have been stored on Smartdop 45, type the memory # to preview each data and click "Yes" when the right patient data is found as shown below.

| Message | |
|--|---|
| Type memory# for patient data. | |
| OK Cancel | Smart-V-Link(R) Version 4.1 rev 0.5 Taro Hadeco 2014/07/29 10.45:11 |
| Message | Patient Information |
| DickAAA First Name: Date:2014/06/07 | ID: Sex: AAAA MALE |
| Time:10:23:57 Site: Patient data OK? | Date of Birth: Age: Height: We / / / MMDD/YYY 0 m Telephone Number: Test Date: 06 / 107 / 2014 |
| Yes No | <patient data="" downloaded="" informatic<="" on="" patient="" td=""></patient> |

4-1-6. Patient information

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

4-1-7. Symptoms / Diagnosis

| Diagnosed Condition Diabetes J years Hypertension 2 y Hyperlepidemia Previous Vascular Surgery | 1S ears 7 | ☐ Strol ☐ Hear ☐ Ang ☐ Sync | t Disease ina sope | Headac Vertigo | OSIS hes | Print Cother 1 | Save | Main Scr |
|---|------------------|--------------------------------------|---|-----------------------|-------------|--|-----------|----------|
| Risk Factors Cigarette/Tobacco Use Sedentary Oral Contraceptives | 10 | years s Other 1 | moked 2 p | oacks per day er 2 | ا ا | years quit | _ | |
| Current Signs & Syn Ri Extremity Weakness Limb Hair Loss Staris Demathis Trophic Nals Gangene Edema Cellulitis Rubor Ulcerations Other 1 | nptom ght Leg | S Left Leg | Rest Pain Claudication Pain Location : Thigh Buttock Calf Arch Toe Pain Relieved By : Rest Exercise Legs Elevated | Right Leg | Left Leg | Pain Aching Pain Location : Head Neck Shoulder Upper Arm Forearm Hand Finger Other 3 | Right Arm | |
| Votes Notes for symptoms & dia Diagnosed Conditions: test | gnosis 1 | | regs toom | | | JULIE 4 | | |

(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.

4-1-8. Default data

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

| Smart-V-Link(R) Version 4.1 rev 1.4 Taro Hadeco 2014/07/29 10:45:11 | > |
|---|-------------------------|
| Default Data | Return to Main Scree |
| Facility | |
| Hadeco Hospital | - |
| Address | |
| 2-7-11, arima, Miyamae-ku, Kawasaki | ^ |
| | |
| | v |
| Telephone Number | |
| 044-877-4361 | |
| | |
| Performing Studies | Now |
| - | |
| Poquesting Physician | Change |
| Requesting 1 hysician | |
| · · · · · · · · · · · · · · · · · · · | Delete |
| | Savo |
| | Save |
| Smart-V-Link [®] Hadeco | |

(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.

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

4-1-9. Option Screen



a) CommPort Setting

Turn 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.

b) Language Select

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

c) Other Settings

• 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 either Bidop 7, DVM-4500, ES-100V3 (serial #11090001 or over) and Smartdop 45 (serial#14110001 or over).

• Pressure Menu:

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

Note: When the Pressure Menu check box is checked on Option Screen, Foot Temperature launcher icon will not be shown on the Main Screen.

• FFT:

For Bidop7, DVM-4500, ES-100V3 (serial# 11090001 or over) and Smartdop 45 (serial# 14110001or over), check it to add FFT check box on each arterial Doppler screen if you wish to display FFT waveforms.

• Diameter/ Flow:

Check it to show the blood volume flow (Max and Ave.) on the waveform screen.

See the section "§2. Measuring blood velocity" in "Chapter 3.Quick Start" for details.

| | 1 | Monitor |
|-------------------------------------|------|---------|
| Numerical Data Probe 8 Mode S | M | |
| Diameter | 2.0 | mm |
| Flow(Max) | 0.00 | ml/min. |
| Flow(Ave.) | 0.00 | ml/min. |

• 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.

• Auto Freeze: Check it to freeze waveform automatically when waveform becomes stable.

• Auto Decision:

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

• Auto save:

Check it to save the data file automatically every time any testing is completed after 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.

Note: DICOM files is not available to Auto save and needs to be saved at the Save File on the Main menu.

d) 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.

4-2. Testing Screens

Launcher icons



Ankle Brachial Index (ABI)



PPG Toe Pressures (TBI)

Pulse Volume Arterial





Lower Extremity Segmental



Upper Extremity Segmental



Venous Doppler



PPG Venous Reflux

Custom Screen



Individual Waveform



Foot Temperature *This function is available except European Union countries.

4-2-1. Ankle Brachial Index (ABI)

4-2-1-1. Measuring Blood Velocities



(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 Waveform vaverage 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.

Note: 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.

Waveform window

4-2-1-2. Measuring Blood Pressures and ABI / TBI

1. For all the Doppler models to type in pressures: Pressures (mmHg) Pressures (mmHg) **Right** Left Arm: Arm: ABI(PT) Ď Ť Great Toe: Great Toe: ABI(DP) TBI **TBI Test Results**

Pressures

Type each pressure for Arm, Posterior Tibal, Dorsalis Pedis and Great Toe, 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 the other testing modules screens. See the section "§6-1.Data Synchronization" for details.

Definition of ABI & TBI

ABI Test Results

- Ankle Brachial Index (ABI); (Systolic pressure at PT or DP) / (Brachial systolic pressure)
- Toe Brachial Index (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 arm pressure box used for this calculation is colored in blue.

2. 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 with PPG probe in the same manner above and TBI will be calculated automatically.
- (4) Repeat the steps #1 to #3 on the other side.

4-2-1-3. Auto-testing with Smartdop 30EX (Except EU member nations)

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.
- Other Settings └ Gain Unification └ Pressure Menu └ FFT
- (3) Click **Settings** button on ABI screen and set the Auto-test settings as follows:



111i.....

Sav

Settings button

• Arm(R/L) - Great Toe(R) ... Great Toe(L)

Arm(R/L) - Posterior Tibial(R) ... Posterior Tibial(
 Arm(R/L) - Great Toe(R/L) - Dorsalis Pedis(R/L)

Arm(R/L) - Posterior Tibial(R/L) - Dorsalis Pedis(

Auto-test settings

Auto testing

Measurement setting

Auto-testing order

Manual testing

• Individual

🔽 Auto Freeze/Decision

○ Auto Waveform & Pressure

- 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.

| of | Auto-testing order for ABI as follows: | Default setting: #1 |
|----|---|---|
|). | Auto-testing Order | |
| | Arm(R/L) - Great Toe(R) - DP(R) - PT(R) - | Great Toe(L) - DP(L) - PT(L |
| | | Arm(R/L) - Great Toe(R) - DP(R) - PT(R) - |

| 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 right.
- (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.
- (3) Follow the guidance with site name shown on upper left of monitoring screen to perform the testing. Guidance
- (4) When testing is completed and cuff connection and/ or probe placement has to be changed, a dialog box will appear as shown right.
 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.
- (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 right will appear. Click OK to close it and ABI (PT/DP) and TBI will be calculated automatically.

Error message:

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





| ? | Message Get cuff & probe ready for Arm(R). Next test ready? |
|-----------|---|
| Summer of | OK Cancel |



Smart-V-Link(R) Version 4.1 rev

Right Ankle



Taking blood pressure. Click DUMP to dump cuff.

4-2-2. PPG Toe Pressures (TBI)



- (1) Affix the PPG transducer against the pad of the toe using Velcro strap.
- (2) Take PPG waveform and blood pressure in the same manner as ABI screen.

4-2-3. PV Arterial (Except European Union countries)

This function is available for Smartdop 30EX and Smartdop 45.



- (1) Wrap a cuff at testing site and connect tubing between cuff and 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.



Click each trash can for the window you don't use and it will get fat.

Click **Remove** to remove all the waveform windows you selected.

Auto-testing with Smartdop 30EX:

See the section "§4-2-1-3. Auto-testing with Smartdop 30EX" of ABI Screen in Chapter.4 for details.



4-2-4. 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 "§4-2-1-3. Auto-testing with Smartdop 30EX" of ABI Screen in Chapter.4 for details.

4-2-5. Upper Extremity segmental



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

4-2-6. PPG Venous Reflux



- (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/PG-30) 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: To remove the waveform window of second test, click **Remove**. To delete the waveform, click **Delete**.

| Smart-V-Link(R) Version 4.1 rev 1.4 Taro Hadeco 2014/07/29 1 | 0:45:11 | - • × | |
|--|----------------------|--------------------------------|-----------------------------------|
| PPG Ven | ous Reflux | Print Return to Main Screen | |
| Count 5 | | 10sec/div. | |
| A | В | | |
| Recovery Time | Recovery Time | | |
| Test 1 58.2 sec (RT) 15.4 sec (1/2RT) | Test 1 64.1 sec (RT) | 29.6 sec (1/2RT) | |
| Test 2 *** sec (RT) *** sec (1/2RT) | | | |
| | | | Click Delete to delete the |
| Start lest Cancel Delete | Start Test Cancel | Delete | |
| mV/V | wV/V | | waveform. |
| 0 14 | | | |
| PFC | 0 1 1 1 | | |
| | | | |
| | -40- | | |
| Start Test Cancel Delete | PPG W | | |
| | -80- | | |
| | | | |
| | | | |
| | | | |
| (| Second test | | |
| Remove Normal RT > 20 seconds Smart | -V-Link [®] | | |
| Н | adeco | | |

Click **Remove** to remove the 2nd test window.

Click **Second test** to add 2nd test window if necessary.

4-2-7. 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.

4-2-8. Custom Screen



Custom Screen allows you to create your own test module with favorable site names and number of sites, 4, 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.

4-2-9. 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.
- Note: Vessel diameter value can be changed by clicking up and down buttons . See the section "§2. Measuring blood velocity" in "Chapter 3. Quick Start" for details.



Numerical data table:

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

4-2-10. Foot Temperature (Except European Union countries)

Foot Temperature Screen is available for the following Doppler(s) to use with the optional temperature probe:

*Smartdop 45 (serial# 14110001 or over) *BIDOP ES-100V3 (serial# 15020001 or over)

This screen is to record several temperatures on each foot through temperature probe as well as typing in manually through keyboard. Extra temperature boxes are available if desired.



1. Preparation;

- (1) Connect the temperature probe, optional, to the Doppler.
- (2) Click Foot Temperature launcher icon on Main Screen to open it.
- (3) Click **Settings** button on the screen and set the settings as follows.

• Unit:

Select either **Celsius (°C)** or **Fahrenheit (°F)** for temperature unit.

• Extra temperatures:

Check the checkbox to show extra temperature boxes on the screen.

Note: Site name for each extra temperature box can be overtyped.

| Temp | perature settings |
|--------------------------------------|-------------------|
| Celsius (°C) | C Fahrenheit (°F) |
| Screen setting Extra Temperatures | |
| Delete all data | Save Cancel |



Click **Save** to set all the settings.

• Delete all data:

Click it to delete all temperature data on the screen.

2. Operation;

2-1. Measuring foot temperatures:

 Click "Click to Start" button on Foot Temperature Screen to go on-line and temperature box for right toe will be highlighted in light blue for the 1st site. Click "Click to Stop" button to go off-line.





- (2) Get the probe tip close to the measuring site less than 4 cm as shown in the right.
- (3) Press the probe button to measure and capture the temperature into the box and the next temp. Box will turn in light blue.
- Note: Hit space bar or Enter to skip the box where you don't measure.

2-2. Typing foot temperatures:

Click the temperature box where you wish to type the one taken by an external thermometer and it will turn into light blue.

Type the foot temperature in the box and press Enter.





Chapter 5: FFT waveforms

5-1.System requirements

- > Doppler
 - Bidop 7
 - DVM-4500
 - Smartdop 45 (SN: 14110001 or over)
 - ES-100V3 (SN: 11090001 or over)
- Smart-V-Link Smart-V-Link V3.1 or over

5-2. Preparations

(1) Go to Options and check the FFT check box and a FFT check box will be added to each arterial Doppler screen.

| Other Settings | | |
|--------------------|---------------|------------------------------|
| Gain Unification | Auto-freeze | |
| 🗆 Pressure Menu | Auto-decision | |
| FFT | - Anto-save | Check here on Option Screen. |
| Diameter/Flow | - Auto Sure | |
| Export to DICOM(R) | | |

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



5-3. How to display FFT waveforms (Fast Fourier Transform)

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

(1) Go to Custom Screen.

See the section "§4-2-8. Custom Screen" for typing the name of each site you wish to display FFT waveforms in each name box.



- Smart-V-Link(R) П X **Monitoring Screen** Numerical Data AnalogGain: 3 _ - Auto MAX MEAN Type: ES-100V3 Max 47.24cm/s 20.53cm/s Threshold: 8 Probe: 8M 22.94cm/s Ave. 9.85cm/s Mode: Separation Scale: AUTO • 13.85cm/s Min 3.71cm/s Display Type: Spectrum+Envelope Direction: Forward • HR 71BPM WMODE: MAX+MEAN -Customized Screen --- Site1 Probe1 Probe Decision Forward **Reverse** kHz/ cm/s Compound Return 1sec/div. Smart-V-Link® Hadec
- (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, 8 to 13 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 freeze the waveform by any of the following procedures:
 - Press the probe button
 - Press the space bar on the key board
 - Click anywhere on waveform window of the Monitoring screen.
- (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.
- Note: FFT waveforms are available on each arterial Doppler screen of ABI, Lower Extremity, Upper Extremity, Custom and Individual.
- Note: When Spectrum (Spec) of Display Type is selected on the screen, Mode is fixed on SEPARATION automatically.

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

5-4.Recommended settings

5-5. Numerical data table for FFT

| 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

6-1. 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 | Site | Туре | | Test | Site | Туре |
|----------|-------------|----------|-----|-------------|------------|----------|
| module | | | | module | | |
| ABI | Posterior | Waveform | <-> | Lower | Posterior | Waveform |
| | tibial | | | extremity | tibial | |
| ABI | Dorsalis | Waveform | <-> | Lower | Dorsalis | Waveform |
| | pedis | | | extremity | Pedis | |
| ABI | Arm | BP | <-> | PPG toe | Arm | BP |
| | | | | pressure | | |
| | | | <-> | PV arterial | Arm | BP |
| | | | <-> | Lower | Arm | BP |
| | | | | extremity | | |
| | | | <-> | Upper | Upper arm | BP |
| | | | | extremity | | |
| ABI | Posterior | BP | <-> | Lower | Posterior | BP |
| | tibal | | | extremity | tibial | |
| | | | <-> | PV arterial | Ankle | BP |
| ABI | Dorsalis | BP | <-> | Lower | Dorsalis | BP |
| | pedis | | | extremity | pedis | |
| | | | <-> | PV arterial | Tramsmetat | BP |
| | | | | | arsal | |
| ABI | Great toe | BP | <-> | PPG toe | Toe | BP |
| | | | | pressure | | |
| | | | <-> | PV arterial | Great toe | BP |
| PV | High thigh | BP | <-> | Lower | Femoral | BP |
| arterial | | | | extremity | | |
| PV | Above knee | BP | <-> | Lower | Above knee | BP |
| arterial | | | | extremity | | |
| PV | Below knee | BP | <-> | Lower | Below knee | BP |
| arterial | | | | extremity | | |
| PV | Transmetata | BP | <-> | Lower | Dorsalis | BP |
| arterial | rsal | | | extremity | pedis | |

6-2. 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 data, 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 data with Bidop 7, DVM-4500, ES-100V3 (serial# 11090001 or over) and Smartdop 45 (serial# 14110001 or over);

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, "Smart-V-Link file name". Each DICOM file name is "Smart-V-Link file name". Link file name". The standard statement of the statement of the

Example for the data set Patient ID is H0003:

H0003 (folder)



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 data;

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

Chapter 7: Troubleshooting

7-1. Smart-V-Link cannot be executed.

- (1) 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.
- (2) Uninstall the Smart-V-Link, and reinstall it.

7-2. 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.

| Message | |
|----------|--|
| <u>.</u> | Confirm a connection with the connected machine, and throw a power supply again (#1) |
| | <u>OK</u> |

7-3. Communication Error 1

- (1) Make sure if the Doppler unit is turned on.
- (2) Check the connection from computer to Doppler and that the USB cable is proper for the Doppler and the computer.
- (3) Refer to the section "Option" of this manual for the COM port setting.
- (4) Click Return on the Monitoring Screen to go back to previous screen, and then go to Monitoring Screen again.

7-4. Communication Error 2

- (1) Go to Option Screen.
- (2) Connect Doppler to the computer and turn it on.
- (3) Do the CommPort setting.

See the section "Option" of this manual for the details.

7-5. The report can't be printed out.

- (1) Make sure the printer is turned on.
- (2) Check the connection from computer to printer. If you use a network printer, check the network and the print server as well.
- (3) Refer to the section "Print Report" of this manual, and set the settings again.

7-6. Windows Explorer can't find Smart-V-Link data on Data Folder.

(1) Go to Options and if Data Folder is set in any system folder like "Program Files", set it in non-system folder.





Hadeco, Inc. 2-7-11 Arima, Miyamae-ku, Kawasaki, Kanagawa, 216-0003 Japan

January 2020 080-00064-5.0