

CE 2195

# DHD-1 Digital Hand Dynamometer User Manual

Includes Data Transfer Software Installation and Usage



Grip **SAEHAN**®



## Preparations

### Warnings

***“WARNING: No modification of this equipment is allowed”***

Do not use this device near equipment emitting strong electromagnetic waves (e.g. X-ray, MRI. etc.) which can affect measured values.

Do not disassemble, modify, or attempt to repair this device including the gauge cover and body, or replace the battery. If there is a problem, contact your supplier or Saehan Corporation. Saehan Corporation is not responsible for degradation of performance and operational errors due to any attempt to disassemble, modify, or repair the device.

### Cautions

The power of this device can be supplied by connecting to a PC and using the USB cable provided. The rated power of the PC to USB connection is 5V, 500mA. Check the rated power before use.

This device is designed to measure grip strength. Do not measure other parts of the body or other objects, or the device may be permanently damaged.

Use this device only after fully charging when '**Lobt**' is displayed at bottom left corner of the LCD. The button functions will not work before charging. If the LCD panel does not operate regardless of charging, contact your supplier or Saehan Corporation. Do not attempt to repair yourself.

To insure accurate measurements, avoid applying maximum load on the device. The most unfavorable condition to avoid is testing when first connecting the USB cable to a PC for charging when the battery is fully discharged. Allow the battery to charge before using.

## **DHD-1 Digital Hand Dynamometer - Operating precautions**

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Do not expose the equipment to high temperature over 60°C (140°F) and high humidity to reduce the risk of electric shock. Do not touch the device with wet hands.

The internal connections and external gauge cover are insulated with plastic and flame retardant materials to prevent induction of electrical current. In addition, the device body and the handle which are subject to contact with human body parts (hands) are also insulated.

The device can be cleaned by wiping the surface with a soft cloth dampened with water and then drying the surface thoroughly with a clean cloth. Do not use any of the following chemicals for cleaning the device or the protective case resulting in damage:

- Thinner, benzene, alcohol, insect repellent, pesticide, sunscreen, etc.

Do not touch the any part of the device with hands stained with any of the substances listed above.

Do not make contact of the USB cable and patients. This will prevent risk of slight electric shock.

## **Guidance**

This device should be only be used by professionals (or under the direction a professional) that fully understands the contents of the manuals before usage.

Although synthetic resins, with hardness in accordance with standards, are used in the protective gauge cover, avoid abnormal shocks to the gauge such as dropping from any height onto a hard surface.

The USB cable provided is USB A – mini B USB 2.0 cable (480Mbps) and is used to charge the battery and to transmit data. Be careful to avoid damaging the connector ends of the cable by forcing into the device or PC. Pay attention to the shape of the connectors and the shape of the receptacles on the device and PC.

## **DHD-1 Digital Hand Dynamometer - Operating precautions**

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Be aware that conductors delivering power are more likely to be damaged when the USB cable is stored with excessive bending. Replace a damaged USB cable with a USB cable with the same standard connectors on each end.

Use the instrument by combining the body and the adjustable handle by aligning the directional arrow labels to prevent incorrect placement of the handle.

One type of printed manuals is provided for the use of equipment. Users can download and use the electronic manuals (PDF files) from the manufacturer's website ([www.saehanmedical.com](http://www.saehanmedical.com)) as needed.

Keep the device in the hard case provided when not in use and when moving the device to prevent damage. Be sure the case is fully closed and the latch secured.

Press and hold the **PWR** button for a long duration for safe shutdown of the device.

The manufacturer will provide circuit diagrams, lists of components, descriptions, directions for correction, and other information to authorized service representatives as needed.

## Disposal of old Electrical & Electronic Equipment















(Applicable in the European Union and other European countries with separate collection systems.)

This symbol indicates that this device shall not be treated as household waste. Instead, it shall be handed over to the applicable collection point for the recycling of electrical and electronic equipment. By ensuring this device is disposed of correctly, you will help prevent potential negative consequences for the environment and human health which could otherwise be caused by inappropriate waste handling of this device. For more detailed information about recycling this device, please refer to local governing ordinances and recycling plans.

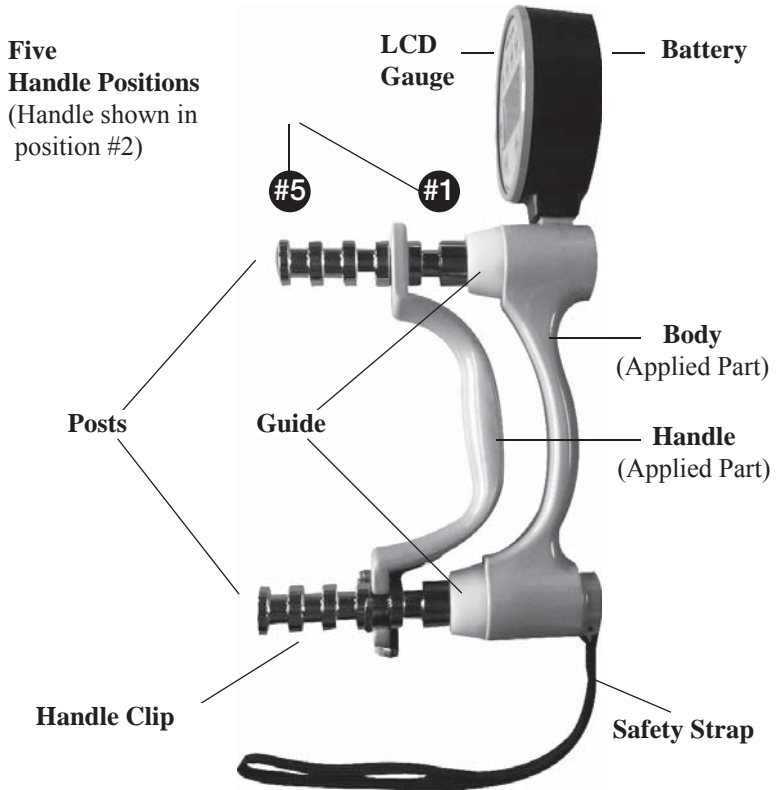
## **Information on Components**

1. Load Cell: FX1901 series (FX1901-0001-0100-L)
2. Battery: Lithium-Ion Polymer Re-chargeable Battery (BK053048AH 700mA)
3. Gauge Cover and Ring: Plastic Enclosure - ABS (Fire retardant)
4. Guide: Plastic Enclosure - PC (Fire retardant)
5. PCB Connector (Socket / Housing):  
12505WS-02/04 (Socket), 12505HS-02/04 (Housing)
6. Body and Handle: Die cast aluminum alloy
7. Posts: Aluminum Plating
8. Handle Clip: Stainless Steel
9. Safety Strap: Nylon
10. USB Cable: USB A - mini B USB 2.0 Cable (480Mbps)
11. Hard Case: HDPE

## Definition of using symbols

	CATALOGUE NUMBER
	DATE OF MANUFACTURE
	SERIAL NUMBER
	CONSULT INSTRUCTIONS FOR USE
	MANUFACTURER
	AUTHORISED REPRESENTATIVE IN THE EUROPEAN COMMUNITY
	TYPE BF APPLIED PART
	CAUTION
	A HANDLE DIRECTION ERROR PREVENTION STICKER
	CLASS II EQUIPMENT
	KEEP DRY
	FRAGILE, HANDLE, WITH CARE





## **DHD-1 Digital Hand Dynamometer**

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## Technical Specifications

Model Name	Digital Hand Dynamometer
Model Number	DHD-1 (SH1001)
Unit of Measure	U.S. pounds (lb.) or kilograms (kg)
Range	0 ~ 200 lbs. (0 ~ 90 kg)
Resolution	0.1 lb and 0.1 kg
Accuracy	± 1% of Full Scale
Expected Service Life	Five Year
Power Supply	Lithium-Ion Polymer Re-chargeable Battery
Warranty	One-Year Limited Warranty
Dimensions	138mm (W) X 258mm (L) X 75mm (H)
Weight	1.3 lb. (0.59 kg)
Operation Environment	a. Ambient temperature range : 10 ~ 40°C (50 ~ 104°F) b. Relative humidity range : 30% ~ 75% c. Atmospheric pressure range : 700hpa ~ 1,060hpa
Storage Environment	a. Ambient temperature range : 0 ~ 50°C (32 ~ 122°F) b. Relative humidity range : 10% ~ 90% c. Atmospheric pressure range : 700hpa ~ 1,060hpa
Altitude	Considered 3000m
Protection Type and Level Regarding Electric Impact	Internally Powered Equipment, Type BF Applied part

### Battery

Product Name	BK053048AH 700mA
Life	30% of original capacity after charging 250~260 times
Time for complete charging	8 hours
Time for continuous use after discharge	Approximately 43 hours
Note	Battery Cell (UL 1642 approved) Battery Pack (anti-overcharge and over-discharge circuits inside)

The DHD-1 includes a built-in Lithium Ion Polymer rechargeable battery. When connected to a PC using the USB cable, the PC provides power to the DHD-1 and charges the battery at the same time. A fully charged battery will operate the DHD-1 up to 43 hours before needing to be recharged, and it takes about eight hours to fully recharge the battery. The battery charge level appears on the upper right corner on the LCD display when operating on battery power, but does not appear when connected to a PC for power and recharging.

The battery can be recharged many times before needing to be replaced. If the battery quickly discharges or the charge level remains low after attempting to fully recharge, the battery should be replaced. Contact your supplier to arrange for replacement of the battery. Do not try to replace the built-in battery yourself.

**Note:** To prolong battery life, the DHD-1 will automatically power off after three minutes. When connected to the PC for power and charging, the DHD-1 will not automatically power off.

**Warning:** Replacement of the lithium battery by inadequately trained personnel could result in a risk of fire or explosion. Please contact your supplier to arrange for replacement of the battery.

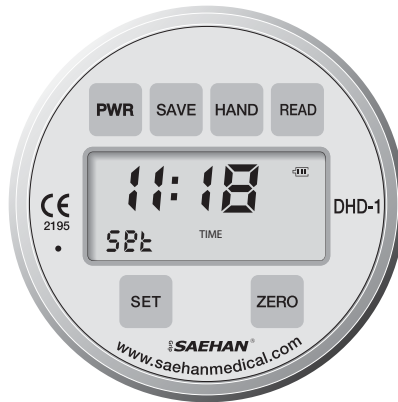
## Setting Mode



Setting Month / Day - mm.dd



Setting Year - yyyy



Setting Time - hh:mm

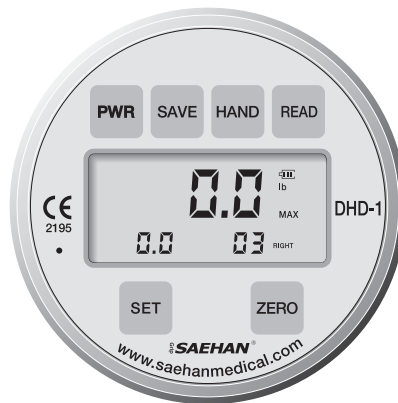
## Testing Mode



Right hand Test Number 02 saved  
Ready for next test



Right hand Test Number 03  
Ready to save

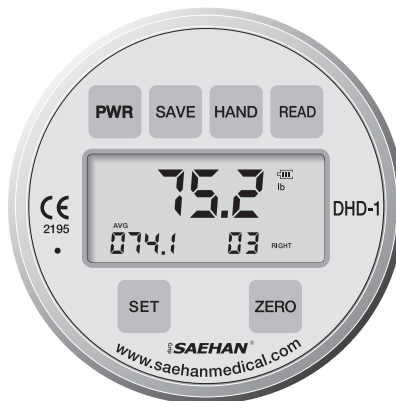


Right hand Test Number 03 saved  
Ready for next test

## Reading Mode



Time and Date for Test Number 03



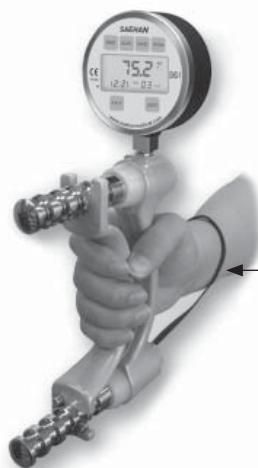
AVG, SD, CV sequentially displayed based on all 3 RIGHT hand tests

### Step 1: Select the Handle Position

Set the adjustable handle to the desired position (normally position #2). Make sure the handle clip is located at the lower post (furthest from the gauge) and is locked securely around the post. Failure to position the handle correctly will cause inaccurate readings.

### Step 2: Placing the DHD-1 in the Patient's Hand

While supporting the base to prevent accidental dropping, place the DHD-1 in the patient's hand with the safety strap around their wrist as shown below.



**Always Use  
the Safety Strap**

### Step 3: Preparing the Patient for Testing

With the patient sitting erect, have the patient arrange the device so it fits comfortably in their hand. The shoulder should be adducted and neutrally rotated, and the elbow should be flexed at a 90° angle. The forearm and wrist should be in a neutral position. Grip force should be applied smoothly, without rapid wrenching or jerking motion. Wrist extension from 0 to 30° is permissible as maximal grip is achieved. Wrist extension exceeding 30° should be noted in the chart.

### Step 4: Documenting Results

Generally, use handle position #2 (see DHD-1 Components) and alternately test each hand three times. Test the normal hand, followed by the injured hand. The mean of three trials is recorded in either pounds or kilograms (lbs. or kg).

To determine maximal effort, test each hand three times in all five handle positions. Test the normal hand followed by the injured hand and record the average for each hand. Repeating the tests after short rest periods helps determine if a patient is exerting maximal effort.

If the patient has performed the tests with maximal effort, there should be less than 10% variation in the results from the various grip positions. Greater than 10% variation between the tests indicates the patient has not exerted maximal effort.

For more information regarding testing procedures and results, refer to the following literature:

- (1) Fess EE. “Grip Strength”, *Clinical Assessment Recommendations*, 2nd Edition. Chicago, American Society of Hand Therapists, 1992.
- (2) Kellor M, Frost J, Silberberg N, et al. “Hand Strength and Dexterity”, *The American Journal of Occupational Therapy* 1971; 25:77-83.
- (3) Mathiowetz V, Federman S, Wiemer D. “Grip and Pinch Strength: Norms for 6 to 19 Year Olds”, *The American Journal of Occupational Therapy* 1986; 40:705-11.
- (4) Mathiowetz V, Kashman N, Volland G, Weber K, Dowe M, Rogers S. “Grip and Pinch Strength: Normative Data for Adults”, *Archives of Physical Medicine Rehabilitation* Vol. 66, February 1985.



## **DHD-1 Digital Hand Dynamometer – Grip Strength Testing Protocol**

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- (5) Schectman O, Taylor C. ‘The Use of Rapid Exchange Grip Test in Detecting Sincerity of Effort’, *Journal of Hand Therapy* 2000; 13; 195-202
- (6) Firrel J, Miller G. “Which Setting of the Dynamometer Provides Maximal Grip Strength?”, *The Journal of Hand Surgery* 1996; 21A:397-401.

**Note:** Normative data for children and adults may be found at [www.saehanmedical.com](http://www.saehanmedical.com). Under the “Customer Support” tab, click on “Dataroom” and “Score Table (Norms)” to view and download.

# DHD-1 Introduction

The Digital Hand Dynamometer, Model DHD-1 provides digitized Grip Strength measuring and Endurance Strength testing in real time. This device is used to measure the dysfunction of injured hands. Test results can be displayed in Kg (kilograms) or lb (Pounds).

The DHD-1 Digital Hand Dynamometer represents the latest electronic technology applied to the familiar design of hydraulic hand dynamometers. Utilizing electronic load cell transducers instead of hydraulic fluid mechanisms that are prone to leakage; the DHD-1 is extremely durable and designed to last for many years. Highly accurate grip strength measurement from 0-200 pounds (lbs.) or from 0-90 kilograms (kg) is digitally displayed on the LCD and up to 20 test results for each hand can be stored in memory. The built-in battery is long lasting and is easily recharged when connected to a PC using the USB cable included with the DHD-1. To transfer saved test results from the DHD-1 to a PC, see **DHD-1 Digital Hand Dynamometer - Data Transfer Software Installation and Usage** beginning on page 26.

The DHD-1 has three modes of operation: **Setting Mode**, **Testing Mode**, and **Reading Mode**. The buttons perform different functions depending on the current mode of operation.

**Setting Mode** is used for setting the date and time. The **DATE** and **TIME** of each test can be saved in memory with the corresponding test result.

**Testing Mode** is used for testing grip strength and measuring the maximum grip force applied. Up to 20 test results for each hand can be saved in memory and referenced by **Test Number**, which indicates the number of test results stored in memory for each hand.

**Reading Mode** is used to display the test results for each **Test Number** saved in memory. Test results include the maximum grip force (**MAX**), **DATE** and **TIME** of individual tests as well as the average (**AVG**), standard deviation (**SD**), and coefficient of variation (**CV**) based all tests for the selected **HAND**.

## **DHD-1 Digital Hand Dynamometer – Introduction**

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**Note:** When reading the following sections, refer to the Display Mode diagrams on pages 12-14 to quickly learn the operation and button functions in each mode, and to benefit using the many features of the DHD-1 Digital Hand Dynamometer.

# DHD-1 Operation

## Calibration

Press the **PWR** button to power on the DHD-1. Then press and hold the **ZERO** button to calibrate the DHD-1. After two beeps, the DHD-1 is calibrated and 0.0 is displayed. The DHD-1 is extremely sensitive such that the **0.0** current and maximum force readings on the display may increase if the handle is reclined due to the force of gravity, or if the handle is touched after the device is calibrated or reset.

**Note:** There is no difference in measured values due to unperformed zero correction except cases such as damages of Load Cell. Though zero correction (zero point) in advance of the measurement is not of absolute necessity, make measurement after executing electric zero correction (with “ZERO” button) if possible.

## Reset

Press inside the hole to the left of the LCD screen with a small pin or paperclip to reset the DHD-1. The firmware version is displayed and the calibration reset to **0.0**. Saved test results are not erased. However, the Month/Day, Year, and Hour/Minute settings are erased. See **Setting Mode** instructions for setting the Month/Day, Year, and Hour/Minute.

### Setting Mode

1. Press **PWR** button once to turn on the device (in **Testing Mode**).
2. Press and hold the **SET** button for **Setting Mode**. After two beeps, “**set DATE**” appears on the display and the value for the Month flashes.
3. Press the **READ** button repeatedly to advance to the desired Month number (**mm**).
4. Press the **HAND** button once and the value for Day flashes. Press the **READ** button repeatedly to advance to the desired Day number (**dd**).
5. Press the **SET** button once and the value for the first digit of the four-digit Year flashes. Press the **READ** button repeatedly to advance to the desired first digit of Year (**yyyy**).
6. Press the **HAND** button once and the value for the second digit of the four-digit Year flashes. Press the **READ** button repeatedly to advance to the desired second digit of Year (**yyyy**).
7. Press the **HAND** button once and the value for the third digit of the four-digit Year flashes. Press the **READ** button repeatedly to advance to the desired third digit of Year (**yyyy**).
8. Press the **HAND** button once and the value for the fourth digit of the four-digit Year flashes. Press the **READ** button repeatedly to advance to the desired fourth digit of Year (**yyyy**).
9. Press the **SET** button once. After one beep, “**set TIME**” appears on the display and the value for the Hour flashes. Press the **READ** button repeatedly to advance to the desired Hour number (**hh**).
10. Press the **HAND** button once and the value for Minutes flashes. Press the **READ** button repeatedly to advance to the desired Minute number (**mm**).
11. Press the **SAVE** button to save the **DATE** and **TIME**. “**SAVE**” appears briefly on the display, and the DHD-1 returns to **Testing Mode**.
12. Press and hold the **PWR** button to power off the DHD-1.

**Note:** The **DATE** and **TIME** settings as well as saved test results are retained after the DHD-1 is powered off. However, if the DHD-1 battery is completely discharged, saved test results are still retained when re-connected to a PC for power, but the **DATE** and **TIME** will be set to their initial values (06.15, 2011, and 12:00). Enter the **DATE** and **TIME** settings then keep the DHD-1 connected to a PC until the battery is fully recharged.

### Testing Mode

Prior to testing, create a file and record the subject's name, gender, age, dominant hand (right hand or left hand), and allow space to later record the test results for each hand.

1. Press the **PWR** button to turn on the device in **Testing Mode**.
2. Press the **SET** button to select the unit of measure as **lb** or **kg**.
3. Press the **ZERO** button to calibrate the device to **0.0**.
4. Press the **HAND** button to select the hand to be tested.
5. Instruct the patient to grip the DHD-1 according to proper testing protocol and to switch hands after each test.
6. Press the **SAVE** button to save test results by **Test Number** for the selected hand.
7. Repeat steps 4-6 for additional testing and saving up to 20 test results per hand.

**Note:** Accuracy of the maximum grip force measured is not affected if the beginning reading is not exactly **0.0**. See **Calibration** on Page 20 for more information.

### Reading Mode

1. Press the **PWR** button to power on the DHD-1.
2. Press the **READ** button to change into **Reading Mode**.
3. Press the **HAND** button to select test results for either the **RIGHT** or **LEFT** hand.
4. Press the **READ** button to display the **Test Number** and saved test result for the selected hand. Record the test result, then press the **READ** button again to display the next test result for the same hand in descending **Test Number** order. Either the **DATE** and **TIME** for each individually saved test result, or the **AVG**, **SD** and **CV** based on the total number of test results for the selected hand are displayed sequentially by pressing the **SET** button.
5. Repeat steps 3 and 4 for the other hand.
6. Press **ZERO** once to erase an individually displayed **Test Number** and test result. Press and hold **ZERO** to erase all saved **Test Numbers** and test results.

## DHD-1 Button Functions

### In Setting Mode

**PWR** Changes into **Testing Mode**.

**SAVE** Saves the **DATE** and **TIME**, and then returns to **Testing Mode**.

**HAND** Advances to the next date and time value to be set indicated by the flashing number for **mm.dd**, **yyyy**, and **hh:mm**.

**READ** Increases the value to be set for mm.dd, yyyy, and hh:mm

**SET** Press and hold for setting Month and Day (**mm.dd**). Then press once to advance to the next setting for Year (**yyyy**), and once again to advance to setting the Time (**hh:mm**).

**ZERO** No function in **Setting Mode**.

### In Testing Mode

**PWR** Press and hold to power off the DHD-1.

**SAVE** Saves the current test result in the next **Test Number**.

**HAND** Selects the hand to be tested.

**READ** Changes DHD-1 into **Reading Mode**.

**SET** Press once to switch the unit of measure from **lb** to **kg** or from **kg** to **lb**. Press and hold to change into **Setting Mode**.

**ZERO** Press once to erase the current test result displayed. Press and hold to calibrate the device and display **0.0**.

### In Reading Mode

- PWR** Press once to change into **Testing Mode**. Press and hold to power off the DHD-1.
- SAVE** No function in **Reading Mode**.
- HAND** Selects which hand to display saved test results
- READ** Press repeatedly to display individual test results in descending order for the selected hand.
- SET** Displays the **DATE** and **TIME** of each individually saved test result, or the **AVG**, **SD** and **CV** based on the total number of test results for the selected hand.
- ZERO** Press once to erase an individually displayed Test Number and test result. Press and hold to erase all saved **Test Numbers** and test results.



### Service Tips

The *SAEHAN* DHD-1 Digital Hand Dynamometer is designed to provide many years of dependable service with minimal maintenance. To make sure the device is reading accurately, we suggest occasionally making the few checks listed below. If you detect a problem, return the device for service. Store the device in a safe location to prevent inadvertent damage using the case provided with the DHD-1.

### LCD Display

The DHD-1 features digital load cell technology which eliminates the possibility of oil leakage associated with hydraulic hand dynamometers. However, if the LCD display does not work properly, the DHD-1 should be returned to your supplier or to *SAEHAN* for inspection and repair.

### Adjustable Handle

Hold the device normally and look carefully at the way the forks of the adjustable handle are supported on the posts. Each fork should touch the post close to its center. If they do not, return the device to your supplier or *SAEHAN* for inspection and repair.

### Annual Calibration and Repair

It is recommended that this device be checked for accurate calibration annually. If the device has been dropped or there is reason to suspect that calibration is required, the device should be serviced immediately. Contact your supplier or call *SAEHAN* at +82-55-294-0381, 24-hour phone support at +82-10-5282-0161, or send email to [saehancorp@naver.com](mailto:saehancorp@naver.com). Additional product and service information can be obtained at [www.saeHANmedical.com](http://www.saeHANmedical.com).

### One-Year Limited Warranty

*SAEHAN* warrants the DHD-1 to be free from defects in workmanship and materials for one year from the date of purchase. If this device is found to be defective during the one-year warranty period, *SAEHAN* at its discretion will repair or replace the DHD-1. Thereafter, if the DHD-1 is not working properly, there will be a service charge for repair.

**This One-Year Limited Warranty does not cover damage due to dropping this precision device. Please use the wrist strap to avoid accidental damage.**

## Data Transfer Software (DTS)

Once installed, DTS can be used to transfer saved test results to a PC whenever the DHD-1 is connected using the USB cable. This simple program creates text (.txt) files which can be easily accessed using any text editor such as Notepad, MS-Word, etc., for editing and printing.

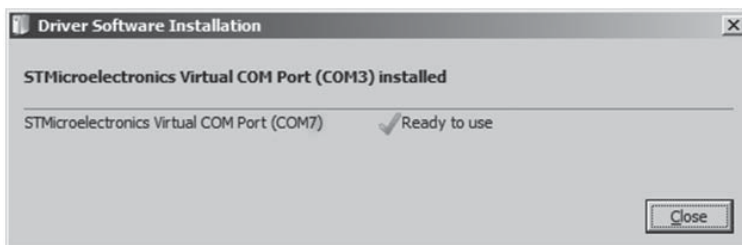
### Installation

#### Step 1: Download the current version of DTS

The current version of DTS can be obtained from [www.saehanmedical.com](http://www.saehanmedical.com). Under the “Customer Support” tab, click on “Dataroom” and select **DHD-1 DTS [SH1001] (“DHD-1 DTS (v1.0). zip” file)**. Click “Save” to download the compressed (zipped) file.

#### Step 2: Automatic installation of the USB Virtual COM Port driver for Windows7 and Windows Vista (for Windows XP, see **Note: Manual installation of the USB Virtual COM port driver below**)

Connect the DHD-1 to a PC using the USB cable, then press the **PWR** button to turn on the device. Microsoft Windows® should automatically detect a new hardware device and install the USB Virtual **COM** Port software. If the driver cannot automatically be found, click “Cancel”, disconnect the USB cable, and then follow the instructions below in **Note: Manual installation of the USB Virtual COM port driver**

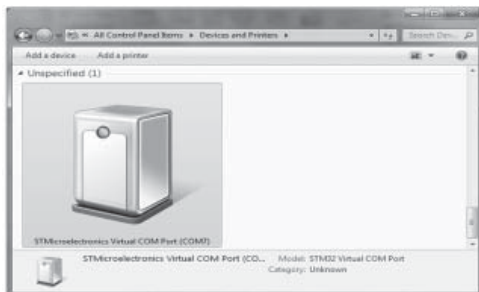


**Note: Manual installation of the USB Virtual COM port driver**

- a. The USB Virtual COM port driver can be obtained from [www.saehanmedical.com](http://www.saehanmedical.com). Under the “Customer Support” tab, click on “Dataroom” and select **DHD-1 DTS [SH1001] ("VCP v1.3.1 zip"file)**. Click “Save” to download the file.
- b. Double-click on the compressed file and run **VCP\_V1.3.1\_Setup (VCP\_V1.3.1\_Setup\_x64)**. The setup program will install the USB Virtual COM Port software and provide instructions when to connect the DHD-1 using the USB cable.

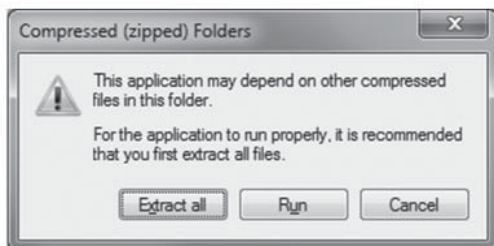
### Step 3: Identify the COM Port number assigned by the Virtual COM port driver

The COM port number will be uniquely assigned to your PC. Make note of the COM Port number during installation, or go to Control Panel → Devices and Printers to identify which COM Port number was assigned.




### Step 4: DTS Program Installation

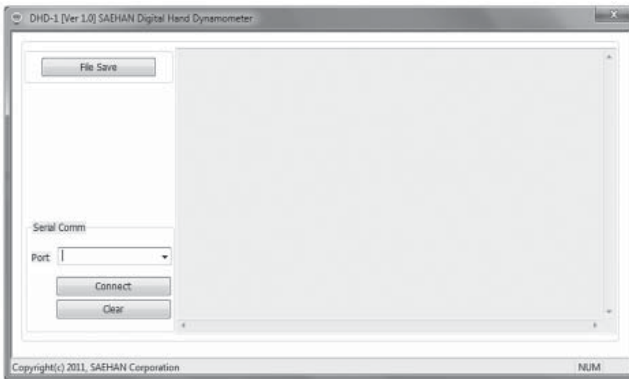
Double-click on the compressed file downloaded in Step 1. This will create a new folder with the DHD-1 V1.x compressed application file and other files. Double-click on the DHD-1 V1.x application file, then click **Extract all** and choose the folder to install the DTS program. This will also be the default folder where the transferred test results will be saved as text files.



# Using DTS to Transfer Saved Test Results From the DHD-1

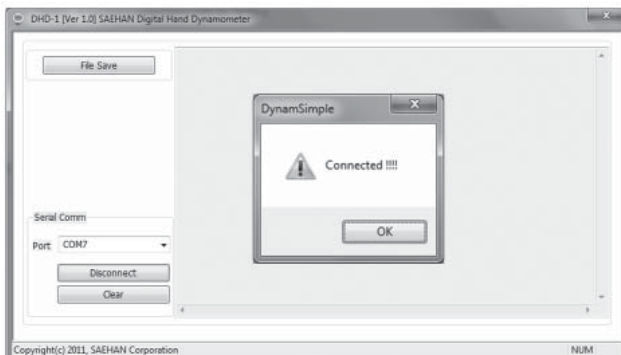
## Step 1: Run the DTS program

Go to the DTS folder and click on the DTS program file **DHD-1 V1.0** to start the program. Optionally, you may want to create  Desktop shortcut.



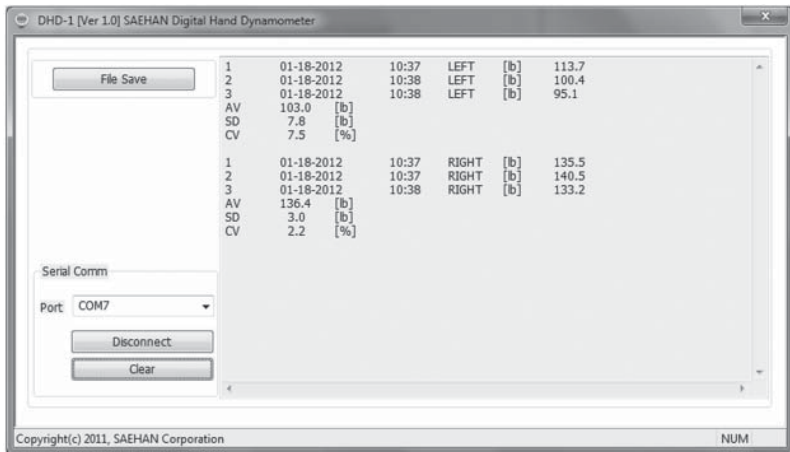
## Step 2: Establish a connection with the DHD-1

Connect the DHD-1 to the PC using the USB cable and press the **PWR** button to turn on the device. Select the COM Port number that was assigned during installation of the USB Virtual Com Port driver, click **Connect**, and then click **OK**. DTS is now ready to transfer saved test results from the DHD-1.



### Step 3: Transferring saved test results from the DHD-1

In **Reading Mode**, press and hold the **READ** button. After two beeps, the saved tests results will be displayed. Press **File Save** to save the transferred test results as a text (.txt) file. Press **Clear** to erase displayed test results. Press **Disconnect** to disconnect DTS communication with the DHD-1. Click on **X** in the upper right corner to close the DTS program.



**Note:** Although the unit of measure (**lb** or **kg**) can be set and saved individually for each hand and **Test Number** during testing, all transferred test results will be displayed in the unit of measure based on the current unit of measure setting.

## Problems and Symptoms

### When “0.0” is not displayed on the LCD after pressing the “PWR” button

- If any value other than 0.0 is displayed, press and hold the **ZERO** button to calibrate the DHD-1
- If unable to calibrate to 0.0 using the **ZERO** button, contact your supplier or Saehan for technical support as the load cell may be damaged.

### When 3-digit numbers are abnormally displayed

- Contact your supplier or Saehan for technical support as there may be a calibration error or the load cell may be damaged.

### When “Lobt” and “□□” are displayed on the LCD

- Charge immediately. Otherwise, the buttons will not function properly.

### When the battery level indicator is not displayed on the LCD

- When connected to the PC using the USB cable, the battery level indicator is not displayed. The battery level indicator only appears on the screen when operated using the charged battery for power.

### When three beeps are heard when pressing a button

- This indicates the button is not functional during the mode of operation. See the **Button Functions** section in the user manual in the user manual.

## General Information

### ME (Medical Electrical) Equipment Application Specifications

#### Medical Purpose

1. This device measures (evaluates) momentary maximum grip strength, and endurance grip strength.
2. Use during examination, diagnosis, treatment, and monitoring of patient disorders and diseases (hand injuries, etc.).

#### Patient Population

1. Ages: From children (at age 6) to the elderly
2. Nationality: Multiple
3. Patient state: Irrelevant except when patient feel nervous

#### Part of the Body or Type of Tissue in contact during usage

1. Measurement site: Both hands
2. Condition: Patient should be able to fold and spread out their fingers

#### Intended Operators - Professional Health Care Provider (Physical Therapists, etc.)

1. Education:
  - Those qualified with expertise in rehabilitation therapy and orthopedics
  - No maximum
2. Knowledge:
  - English or German (IFU languages provided)
  - Knowledge of IFU languages is not necessary
3. Experience:
  - Minimum: No special experience needed
  - No maximum
4. Permissible impairments:
  - Mild reading vision impairment or vision corrected to log MAR 0.2 (6/10 or 20/32)
  - 40% of disability causing 60% of normal hearing in the range of 500 Hz ~ 2 kHz

## **Environment**

### **General**

1. It is not designed to be used in households
2. It is used in physical therapy rooms, doctor offices patient rooms, etc.
3. The device can be permanently damaged if dropped on a hard surface
  - If dropped, the device should be checked for calibration accuracy

### **Conditions of visibility**

1. Ambient luminance range: 100 lux – 1, 500 lux
2. Viewing distance: 20 cm - 40 cm
3. Viewing angle: normal to the display  $\pm 20^\circ$

### **Physical**

1. Temperature range: 10°C ~ 40°C (50°F - 104°F)
2. Relative humidity range: 10 % ~ 90 %
3. Ambient pressure range: 700 hPa - 1,060 hPa

### **Usage Time**

1. No usage time limitations when connected using USB cable to PC for power
2. Continuous 45 hours of usage when using the charged battery for power

### **Mobility**

1. Portable equipment for usage with patients

**No additional training is required for the use of the device.**



# Introducing Digital Hand Dynamometers

It is my pleasure to introduce two, all-new Digital Hand Dynamometers from SAEHAN Corporation. The **DHD-1** Digital Hand Dynamometer which can upload saved test results to a PC, and the more advanced **DHD-3** Digital Hand Dynamometer with **G-STAR** (Grip Strength Testing And Research) software.

Both new models represent the latest electronic technology applied to the familiar design of hydraulic hand dynamometers. Utilizing electronic load cell transducers instead of hydraulic fluid mechanisms that are prone to leakage; the DHD-1 and DHD-3 are extremely durable and designed to last for many years. Highly accurate grip strength measurement from 0-200 pounds (lbs.) or from 0-90 kilograms (kg) are digitally displayed on the LCD, and up to 20 test results for each hand can be stored in memory during testing. The built-in battery is long lasting and can be recharged during usage when connected to a PC using the USB cable provided.

The **DHD-1 Digital Hand Dynamometer (SH1001)** is a stand-alone device developed to be used Just like our traditional hydraulic hand dynamometers. With the added capability to save strength testing results in memory, strength testing can be performed and the results reviewed and recorded after all tests are completed. When connected to a PC using the USB cable, the Data Transfer Software can transfer the stored test results from the DHD-1 memory into text (.txt) files which can be easily accessed using Notepad or MS-Word for editing and printing.

The **DHD-3 Digital Hand Dynamometer (SH1003)** provides the same features as the DHD-1 when used as a stand-alone device, but adds automated Rapid Exchange Grip Testing. Using Auto Mode, up to 10 test strength tests for each hand as well as the time allowed to switch hands can be configured to automate the testing procedure.

The **Grip Strength Testing and Research (G-STAR)** software extends the DHD-3 capabilities even further. G-STAR is an easy to use, yet powerful software tool which automates grip strength testing and endurance testing in both clinical and research environments. All patient information and their test results are stored in an Access database which includes normative score tables for comparison based on age and gender. Maximum grip strength and grip endurance tests are graphically displayed during testing and can be saved in the database with their associated patient information. In addition, tests saved in the DHD-3 itself when used as a stand-alone device, can be imported into the database when re-connected to the PC using G-STAR.

For more information on the new SAEHAN Digital Hand Dynamometers, visit [www.SaehanMedical.com](http://www.SaehanMedical.com). The DHD-1 and DHD-3 software and user manuals can be downloaded by selecting "Dataroom" under the "Customer Support" tab.

New

# DHD-1(DTS) & DHD-3(G-STAR)

## KEY FEATURES



- Load cell technology
- Rechargeable battery (Lithium-Ion Polymer)
- PC USB port for charging (USB cable included)
- Displays the battery charge level
- 43 hours continuous use and 460 hours continuous standby time after fully-charged
- Stored data is preserved even if battery is discharged
- Displays 0~200 lbs or 0~90 kg
- Electronic zero calibration system
- Power shuts off automatically after 3-minutes of inactivity (power saving function)
- Audible beep sounds based on function
- Settings for Year, Month, Date, and Time



- AVG, SD, CV sequentially displayed
- Up to 40 tests results (20 tests results for each hand) can be stored in memory
- Up to 20 Automatic Rapid Exchange tests results (10 tests results for each hand) (Auto Mode available only with DHD-3)
- DHD-1 DTS (Data Transfer Software) provides data transfer of test results into text files on connected PC
- DHD-3 G-STAR™ (Grip Strength Testing and Research) Software provides interactive grip strength and endurance testing, comparison with normative data, and research reporting by combining results from selected groups of patients.



# DHD-1 Digital Hand Dynamometer User Manual

## Includes Data Transfer Software Installation and Usage

[SH-UM-001, Rev.3, 2018, 5, 29]

<b>Manufacturer</b>	<b>EU Representative</b>
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