

3D-NEWTON

User Manual



An intelligent muscular strength evaluation system

Multidirectional muscular strength test

muscular strength for individual customized exercise

Comparison of results before and after exercise

With a user-friendly interface it has the functions of customized protocol and monitoring It collects objective data with its digital laser muscular strength evaluation system.

Controlling various rotation angles from 0 to 360 degrees

Controlling various slopes from 0 to 360 degrees

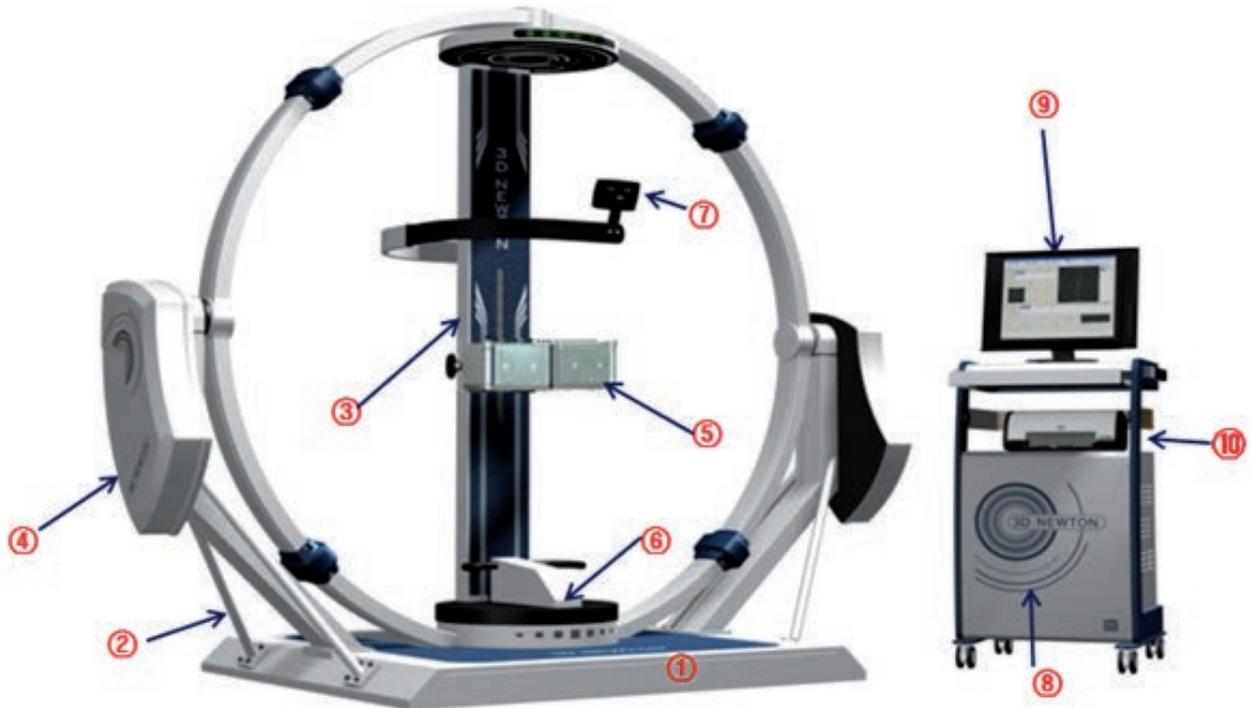
3-dimensional space motion system and real-time monitoring system of muscle change of body

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Chapte 1. Overall architecture and specification

(1) Appearance



Picture 1

- 1 Base structure supporting the main body of the device
(prop supporting the balance and weight of the entire device)
- 2 Prop for round-shaped slope
- 3 Prop for body
- 4 Cylinder motor running gear and motor cover for the adjustment of round-shaped slope
- 5 Device for fixing the body to the prop (fixing pelvis)
- 6 Prop for ankle - Device propping the lower body during the operation of the device
- 7 Distance-measuring sensor - Captures the movement of the body and transmits the measurement data captured in real time; also gives feedback through the mini-monitor
- 8 Part controlling the operation of the device (CONTROL BOX)
- 9 Monitor showing the adjustment and control of the overall device
- 10 Printer for printing the result after measurement

(2) Performance (Specification)

- 1 Rating Voltage and Frequency: AC220V, 60Hz
- 2 Power Consumption: 400W
- 3 Device exercising the body muscles against gravity
- 4 Angle slope function
 - Operating range: Front slope range - 0 degree
- 5 Side-to-side body rotating function
 - Right turn: 0~340° ±2°
 - Left turn: 0~340° ±2° Speed of left&right turn: 3~5 rpm ±10 minutes
- 6 Up-and-down adjustment of the place for pelvis fixing
 - Maximum: 0~300mm ±5mm

(3) Safety device

- 1 **Circuit Breaker:** Prevents overload
- 2 **Play/Stop emergency button:** This can be used when you have to stop the operation due to sudden accidents.
- 3 **Skip button:** This can be used when you move on to the next step after enduring as long as possible in the current stage.
- 4 **Safety belt:** Safety device fixing the body until it leaves the machine in an emergency such as blackout or sudden accidents
- 5 **Returning home device:** In case of wrong operations of the machine or accidents, you can push this button; all operations will stop, and all movements of the device will return to the starting point.
- 6 **Safety dapper:** When there is rapid rebound of rotation due to damage to the motor or gear, this can make the body go down slowly.

(4) Preparations before use

- 1 Check the voltage (220V) of the socket. (This device is designed for AC 220V only.)
- 2 Check if all connections of electric cords are properly and completely done.
(**Warning:** Loose or incomplete connections can generate heat and cause fire.)
- 3 Check whether the ground connection is complete.
- 4 Check the status of the switch connections.
- 5 Test-run by activating all kinds of controlling devices. (Refer to page 23.)
(Please do not use if there is serious noise or abnormality during the test run)
- 6 Do not use with other devices since they may affect the judgment of the device or pose other dangers.

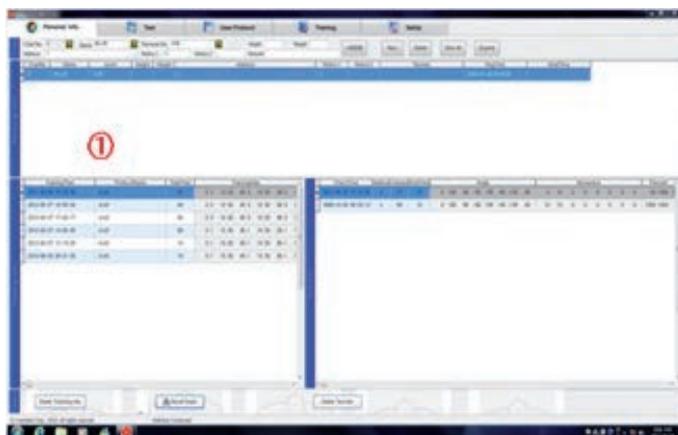
- 7 This device should be used by skilled people only.
- 8 Check if there are unstable objects around this moving device.
- 9 Prohibit other people from going near the device except the subject.
- 10 Install the main body of the device on a flat place.

(5) Cautions in Use

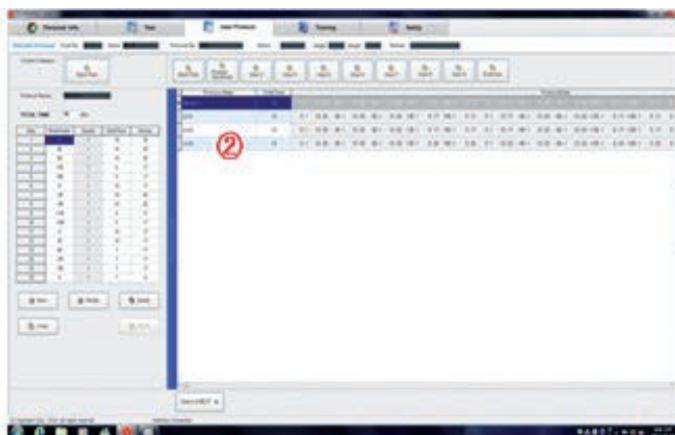
- 1 Check thoroughly for any abnormality across the device.
- 2 When you find any abnormality in the device, stop the operation immediately and ask the manufacturer to check after taking appropriate measures..
- 3 When you find any abnormality in the device or see unusual symptoms in the subject, take appropriate measures such as putting the subject on a flat place and stopping the device..
- 4 When a sudden blackout causes the device to stop during operation, unlock the fastening device for pelvis fixing with more than one helper to extricate the subject from the machine safely.
- 5 Prohibit other people from going near the device except the subject.
- 6 Do not remodel the device arbitrarily.
- 7 When the device breaks down, contact an expert after marking appropriately.
- 8 If the subject feels uncomfortable during operation, stop the operation and have the subject see a doctor, and then try again..
- 9 During operation, do not touch or manipulate the power-supplying part or parts in operation..
- 10 Prohibit other people from going near the device except the subject during operation..
- 11 Do not make the slope too steep at the beginning.
- 12 Do not apply external shock to the device during operation.

Chapter 2. Instructions and Operation Sequence

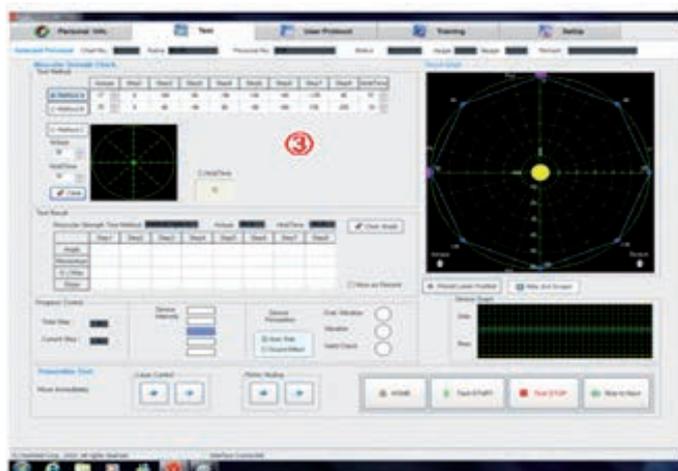
OPERATING WINDOW



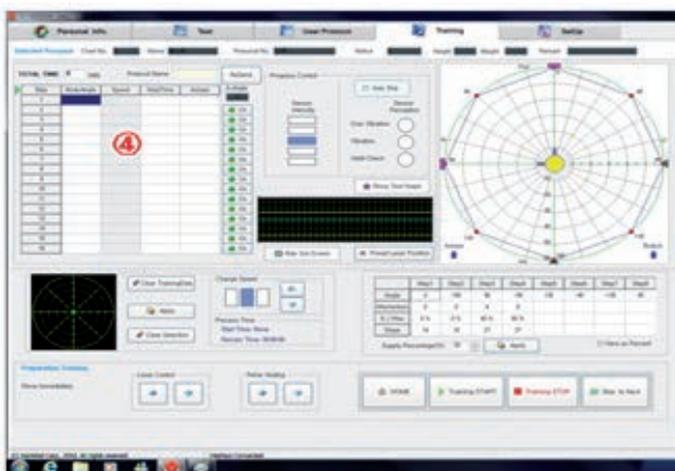
1) Basic input window



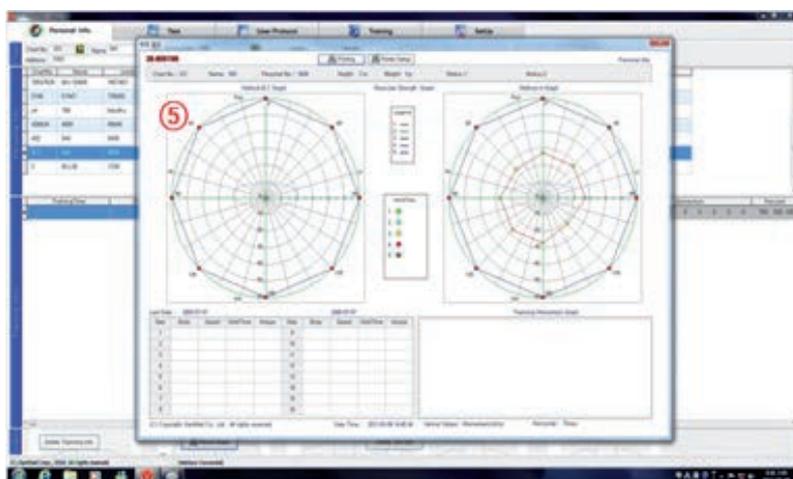
2) Muscular strength evaluation and training pattern setup window



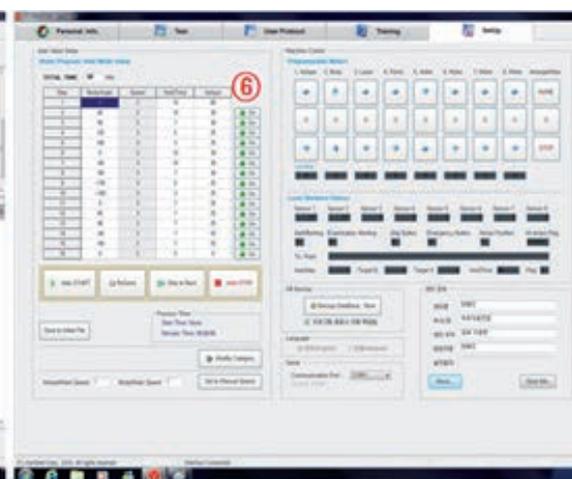
3) Muscular strength and endurance evaluation window



4) Muscle endurance measurement and training window



5) Muscle measurement and evaluation result window

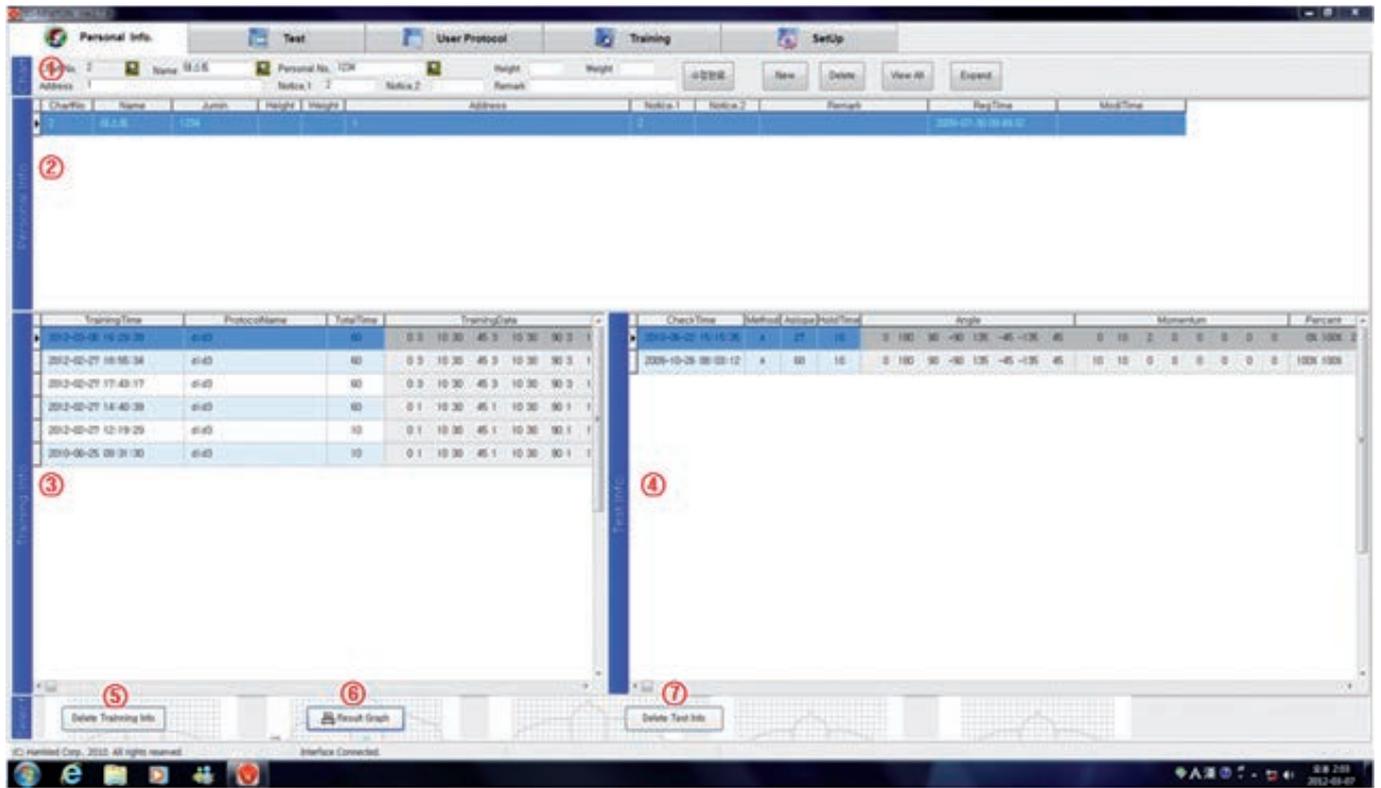


6) System checking window

Picture 2

1) Personal Info (Patient registration)

This is a patient list window showing information on the patients who been registered.



Picture 3

- 1 New patient roster
- 2 **Personal Info.:** Shows the list of patients who have been registered
- 3 **Training Info.:** Shows the individual training history
- 4 **Test Info.:** Shows the individual test history
- 5 **Delete Training Info.:** Button for deleting the individual training history
- 6 **Result Graph:** Button for displaying the result graph of individual muscular strength measurement
- 7 **Delete Test Info.:** Button for deleting the individual test history

(1) Patient chart input method



Picture 4

- 1 **Chart No.** Enter the chart no. by hospital.
- 2 **Name** Enter the name of the patient.
- 3 **Personal No.** Enter the resident registration number of the patient.

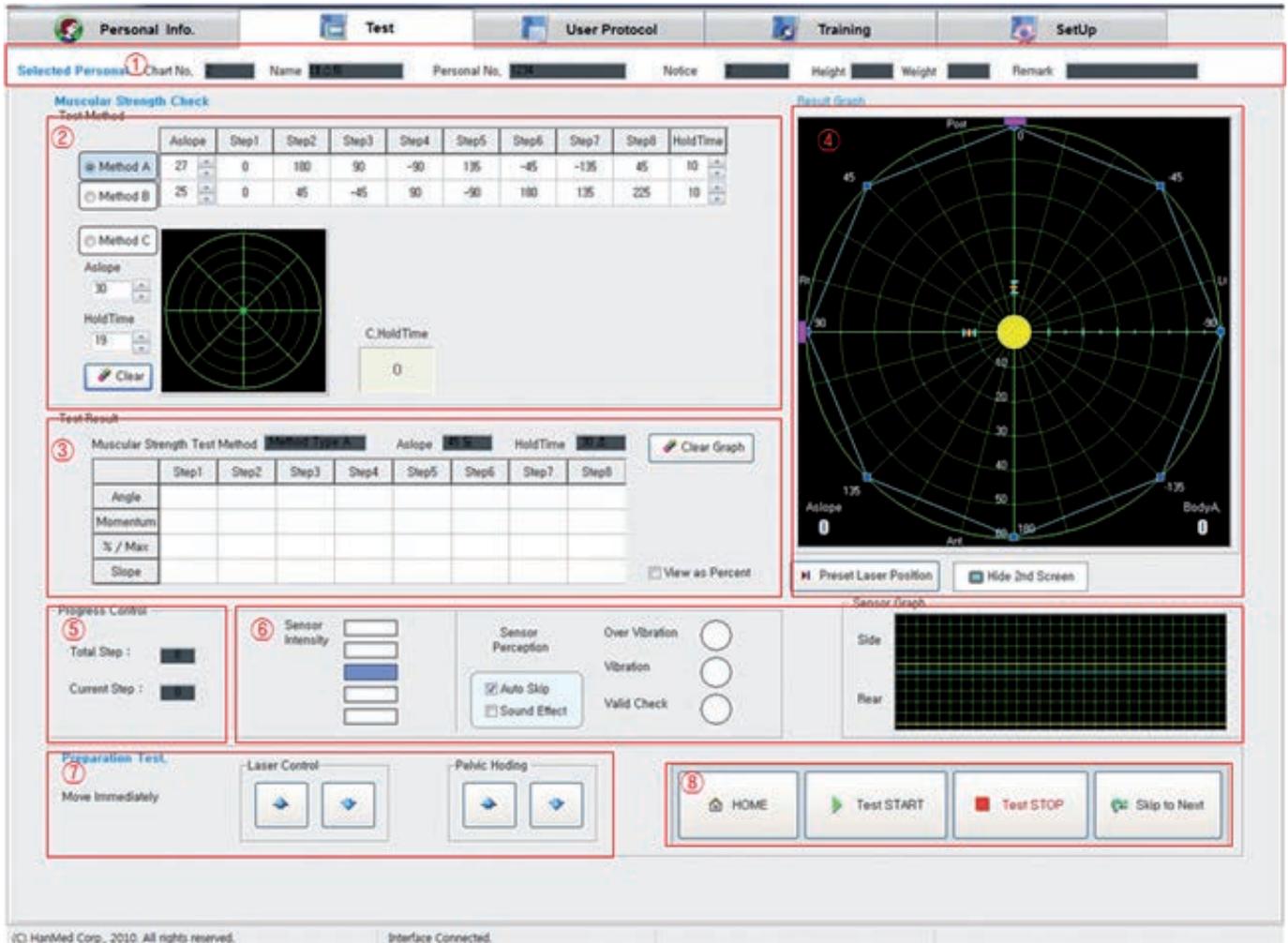
- 4 Enter the height of the patient.
- 5 Enter the weight of the patient.
- 6 Enter the address of the patient.
- 7 Enter the disease name of the patient.
- 8 Enter the disease name of the patient (when there is an additional disease).
- 9 Enter any unusual finding about the patient. Complete the registration process by clicking completion of input.

(2) Saving, changing, and deleting patient data

- 1 To change patient information, change the details and then click completion of change. (When you input the information of a new patient, completion of input will appear. When you change the information of existing patients, completion of change will appear.)
- 2 To add a new patient, click and input the information of the patient.
- 3 To delete the information of patients, choose the patient first and then click to delete.
- 4 Only some patients are displayed on the window since specific patients are searched. To view all patients, click .
- 5 Clicking the button enlarges the patient list window and changes the button to . If you click , it returns to its former state.

- 6 This window is used for selecting the test whose result you need to input; you can tick the boxes in **1**.
- 7 **Select All** is the button for the selection of all tests. Clicking it causes all boxes in **1** to be ticked.
- 8 **Clear Select** is the button used when you deselect the tests you chose. Clicking it causes the ticks in **1** to disappear.
- 9 Clicking the **OK** button after selecting the test causes another popup to display as shown below.

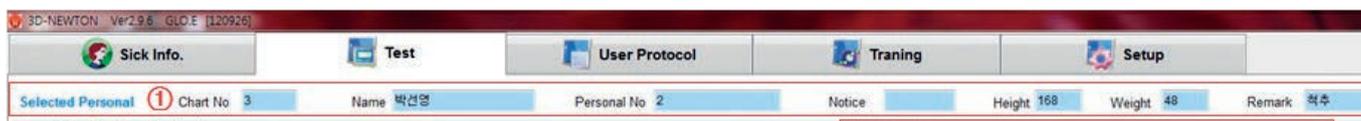
2) Test evaluation screen



Picture 7

- 1 This section shows the information of the selected patients
- 2 This section is for setting type and method of tests
- 3 This section shows the results of the test in numerical values
- 4 This section shows the position, angle, and sensor during test in coordinates. When the test is completed, the results are shown in graphs.
- 5 This section shows the overall test steps and progress stages
- 6 This section is for controlling the intensity and condition of sensor (wave and lamp)
- 7 This button is for controlling the movement of the pelvis up and down and sensor up and down
- 8 This button is for Start, Stop, Skip, and Home of test

(1) Section showing the information of the selected patients



Picture 7

1 Section showing personal particulars of the testees such as chart numbers, names, etc.

(2) Evaluation selection screen (evaluation of muscular power and sense of balance)



Figura 9

- 1 Method A mode is the 'sense of balance' mode which detects the angle where the body becomes unstable when the device tilts to each step (8 directions in 360 degree).
 - Set the Aslope at maximum tilting angle and find out the degree of the body instability at each Body Angle Step (8 directions) and detect the angle where the body becomes unstable within the set tilting angles..
- 2 Method B mode is the 'muscular evaluation' mode to detect the time (in seconds) after which the body of the testee becomes unstable after the device tilted to the set angle at each step (8 directions in 360 degree).
 - Set the Aslope at tilting angle and tilt the body of the testee to the given angle in Aslope at each step (8 directions) and measure how long the body can withstand at each step in seconds.
 - It is possible to designate the maximum holding time through Hold Time and it is possible to control according to the condition of the patients.
- 3 Method C mode is same measuring mode as Method B. But Method C mode measures the muscular power in the desired direction only, not all 8 direction at each step..

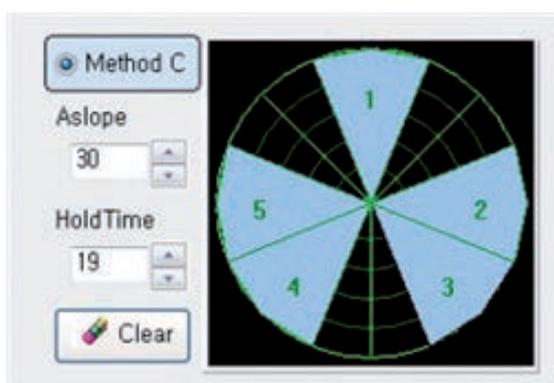


Figura 11

- As shown in Figure A-6, it is possible to test the necessary positions among 8 directions by clicking them for test. The tests are conducted in the order of clicking. (It is possible to release and reset the necessary positions using clear button.)

It is possible to set the tilting angle and holding time at Aslope and Hold Time..

(2) Test evaluation monitoring screen



Figura 12

- 1 **Muscular Strength Test Method:** The selected mode is displayed during testing.
- 2 **Aslope:** The set tilting angle is displayed during test. (unit: degree(°))
- 3 **Hold Time:** The set Hold Time is displayed during test. (Unit: sec)
- 4 **Angle:** The angle of the body by each step. (8 directions)
- 5 **Momentum:** The holdingtime of the body as tilted position in seconds.
- 6 **% / Max:** The ratio of the actual holding time to the set hold time in percentage (Momentum/Hold Time*100).
- 7 **Slope:** The actual tilting angle during test.
- 8 **Clear Graph:** This button is to delete the recorded results for restarting the test.
- 9 **View as Percent:** The ratio of the angle shown at Slope to the set angle in Aslope inpercentage..

(3) The measured data are shown in a circular graphs like as figures

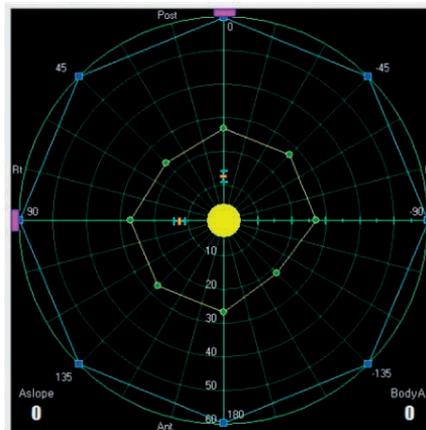


Figura 13-1

(4) Measured graph screen

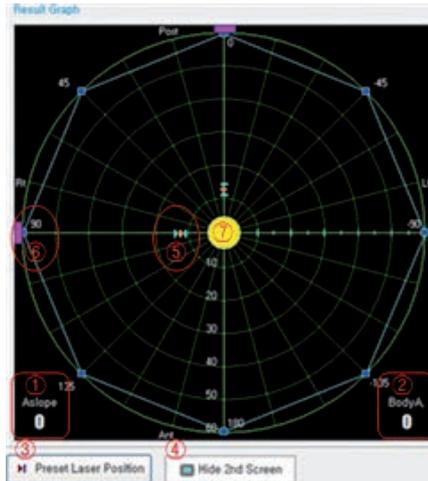


Figura 13-1

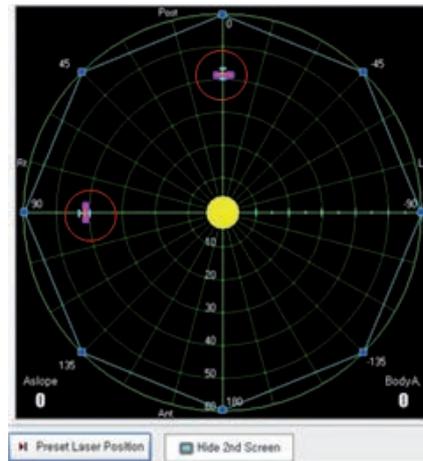


Figura 13-2

- 1 **Aslope:** The change of tilting value is displayed on real time basis.
- 2 **Body A:** The body angle (rotation angle of the body) is displayed on real time basis.
- 3 **Preset Laser Position:** This button controls the distance between ultrasonic sensor and patient.; When the button is clicked 5 e 6 become coincident with the display in Figure 13-2.
- 4 **Hide 2nd Screen:** If this is clicked, nothing appears on the mini monitor attached to the device.
- 5 **Posizione del sensore:** During test, position the patient and make the sensor position to coincide with the body position using button 3.
- 6 **Impostazione posizione corpo:** Position of body: Using the button 3, carry out the test after making the body position to coincide with the sensor position. If the body is out of the range of the sensor, i.e. 5 and 6 are out of the range, during test, move to the next process using Skip..
- 7 This shows the position of the device and moves over the coordinates of the screen depending on the Aslope and Body angle during the test. (The coordinates marked with circle represent the slope and those marked with line represent the rotation angle.)

(4) Test progress stage screen

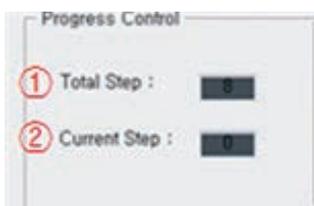


Figura 14

- 1 **Total Step:** This shows the overall progress stages
- 2 **Current Step:** This shows the current progress stage

(5) Sensor condition screen

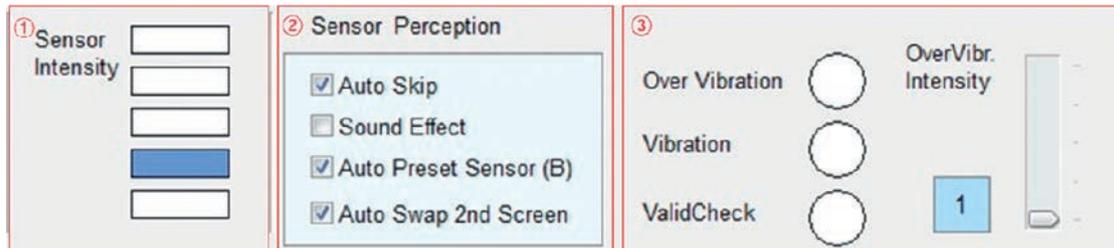
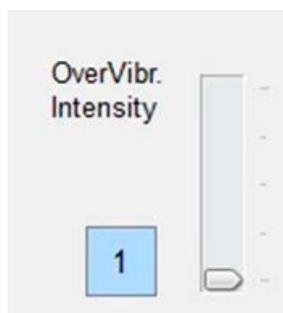


Figura 15

- 1 **Sensor Intensity:** Sensor Intensity: The sensor intensity can be controlled in 5 steps. It is possible to control the intensity by clicking the bar. The upper bar means the lower intensity and vice versa.
- 2 **Sensor Perception:** It controls the motion of the device which is operated by the sensor.
 - Auto Skip: If the body moves out of the range of the sensor during check, it moves to the next step.
 - Sound Effect: Alarm goes off when the body is out of the sensor during check.
 - Auto Preset Sensor (B): This is used in Method B Test. If the tilting and rotation angle reach the specified values, the position of the sensor is reset.
 - Auto Swap 2nd Screen: The 2nd screen for patient looks like the measuring graph screen during the movement to the set step when checking. But the 2nd screen for patient is changed to information screen when the set step rushes into the test.
 - In case of Method A, the min screen disappears after movement to the set Body Angle. Once the tilting motion is conducted and then the measuring graph appears when tilting is recovered.
 - In case of Method B, the graph screen of the min screen disappears after the body angle and tilting move to the set value and from the time when the hold time starts. The mini screen appears as the graph screen after test and moving to the next step.
- 3 **Over Vibration:** Sensor condition display
 - Over vibration: If the body is out of the range of sensor, the red lamp is on.
 - Vibration: If the body is just on the line of the sensor, the blue lamp is on.
 - Valid Check: If the body is positioned within the range of the sensor, the green lamp is on.
- 4 **Over Vibr. Intensity:** This controls the automatic skip time. This button controls the interval time of alarm and skip when the body is out of the range of the sensor. It can be set in five steps.



- **Step 1:** The alarm goes off in every 0.2 second and the Skip motion is performed at the same time.
- **Step 2:** The alarm goes off in every 0.4 second and the Skip motion is performed 0.5 second after the first alarm.
- **Step 3:** The alarm goes off in every 0.6 second and the Skip motion is performed 1.0 second after the first alarm.
- **Step 4:** The alarm goes off in every 0.8 second and the Skip motion is performed 1.5 seconds after the first alarm.
- **Step 5:** The alarm goes off in every 1.0 second and the Skip motion is performed 2.0 seconds after the first alarm.

(6) Test reparation screen



Figura 16

- 1 **Laser Control:** This button is used to adjust the height of the arm up and down where the sensor and mini monitor are attached. Adjust the height taking into consideration of the height of the patient's eyes and shoulder.
- 2 **Pelvic Holding:** This button controls the holding parts of the pelvis

(7) Test start, stop and skip screen



Figura 17

- 1 **Home:** This button moves the device to Home position before starting the test. (It is possible to move the device to home position during stop during the test.)
- 2 **Test Start:** This button starts the test.
- 3 **Test Stop:** This button stops the test.
- 4 **Skip to Next:** This button moves the test to the next step during the test by force.

(8) Metodo di Tes

Muscular Strength Check

Test Method	Aslope	Step1	Step2	Step3	Step4	Step5	Step6	Step7	Step8	HoldTime
Method A	27	0	100	90	-90	135	-45	-135	45	10
Method B	25	0	45	-45	90	-90	180	135	225	10

Test Result

Muscular Strength Test Method	Aslope	HoldTime	Step1	Step2	Step3	Step4	Step5	Step6	Step7	Step8
Method A	27	10								
Angle										
Momentum										
% / Max										
Slope										

3) How to measure A mode

- (1) Make patients stand upright and correct their postures in the device.
- (2) Adjust the sensor and pelvic holding parts of 7 in Figure A-1 by moving it up and down so that the bodies of the patients can be correctly set.



- (3) Adjust the pelvic holding parts so that it can be correctly set to the patient's pelvis.



- (4) Select Method A mode (evaluation test mode) and then set Aslope at 50 degree and Hold Time at 1 second taking into consideration the condition of the patient..

Test Method		Aslope	Step1	Step2	Step3	Step4	Step5	Step6	Step7	Step8	HoldTime
<input checked="" type="radio"/> Method A		50	0	45	-45	90	-90	180	135	225	1
<input type="radio"/> Method B		30	0	180	90	-90	135	-45	-135	45	20

- (5) Select sensor intensity and sensor perception in 6 of A-1.

Sensor Intensity

Sensor Perception

Auto Skip
 Sound Effect
 Auto Preset Sensor (B)
 Auto Swap 2nd Screen

Over Vibration

Vibration

ValidCheck

OverVibr. Intensity

-

-

- 1 Select the second bar of the sensor intensity
- 2 For sensor perception.
 - Check Auto Skip.
 - No check Sound Effect.
 - Check Auto Preset (B).
 - Check Auto Swap 2nd Screen.
- 3 Select 1 for the Over Vibr. Intensity

- (6) The doctor adjusts the body of the patient left and right, up and down for correct posture and then clicks the Preset Laser Position button to make the sensor coincides with the body



At this time, the doctor tells the patient to keep this posture and explains how the test will start.

- (7) Start the device by clicking Test Start button on 8 of Figure A-1.
 - In case of Method A, the graph screen of the mini screen disappears after movement to the set body angle. The mini screen appears as a measuring graph screen after test tilting motion is completed and tilting is recovered
- (8) If all steps are completed, the finish alarm goes off along with the pop-up window and all positions of the device return to their original positions

4) How to measure B mode

- (1) Select evaluation test mode (Method B) and confirm and set the Aslope at 30 degrees and hold time at 20 seconds considering the conditions of the patients.

Test Method		Aslope	Step1	Step2	Step3	Step4	Step5	Step6	Step7	Step8	HoldTime
<input checked="" type="radio"/> Method A		50	0	45	-45	90	-90	180	135	225	1
<input type="radio"/> Method B		30	0	180	90	-90	135	-45	-135	45	20

- (2) Select one sensor intensity and sensor perception in of Fig. A-1.

Sensor Intensity

Sensor Perception

Auto Skip
 Sound Effect
 Auto Preset Sensor (B)
 Auto Swap 2nd Screen

Over Vibration

Vibration

ValidCheck

OverVibr. Intensity

-

-

- 1 Select the second sensor intensity bar
- 2 For sensor perception
 - Check Auto Skip.
 - No check Sound Effect.
 - Check Auto Preset (B).
 - Check Auto Swap 2nd Screen.
- 3 Select 1 for the Over Vibr. Intensity

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- (6) The doctor adjusts the body of the patient left and right, up and down for correct posture in the device and then clicks the Preset Laser Position button to coincide the sensor with the body



At this time, the doctor tells the patients to confirm their positions on the monitor and keeps this position to the set angle and explains that the test will be done at that angle.

- (7) Start the device by clicking Test Start button on 8 of Figure A-1.
 In case of Method B, the graph screen on the mini screen disappears after movement to the set body angle and tilting and the time when hold time starts. The mini screen appears as graph screen when moving to the next step after test
- (8) If all steps are completed, the finish alarm goes off along with the pop-up window showing the finish of test
- (9) For Skip, when Auto Skip is released, click Skip to Next button in of Fig. A-1 or press Skip switch located on the left of the control box. It is possible to select manual mode for skip checking the condition of the patient and the distance between sensor and body
- (10) If the test is completed, the results are displayed as numerical values and graphs as shown Figure A-4 and A-5.. (of Fig.A-14)

Test Result

Muscular Strength Test Method **Method Type A** Aslope **27도** HoldTime **10 초** Clear Graph

	Step1	Step2	Step3	Step4	Step5	Step6	Step7	Step8
Angle	0	180	90	-90	135	-45	-135	45
Momentum	7	5	10	8	0	8	0	0
% / Max	70 %	50 %	100 %	80 %	0 %	80 %	0 %	0 %
Slope	27	27	27	27	27	27	22	24

View as Percent

Figura 10-1

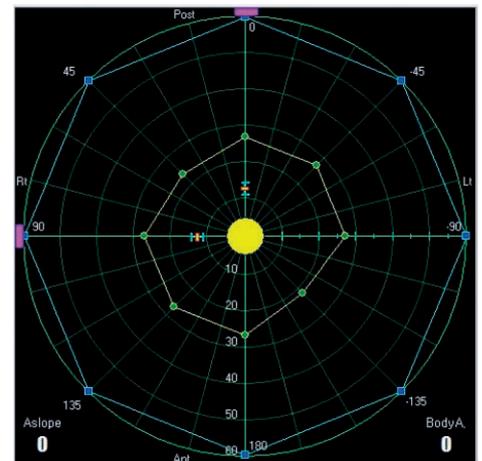


Figura 10-2

- (11) It is possible to print out the result graph using the Result Graph button on Personal Info.

5) Dynamic balancing measuring and training mode

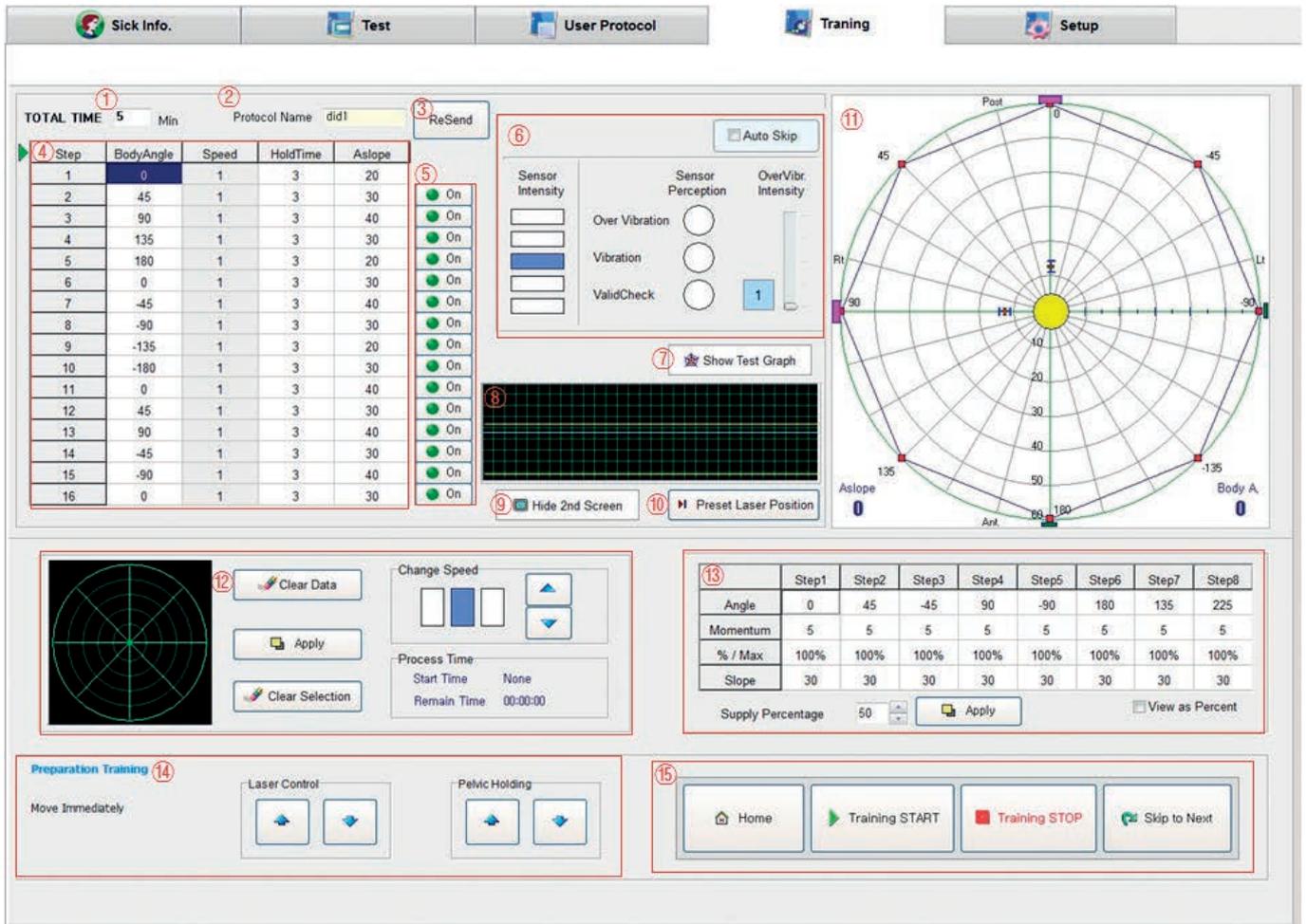
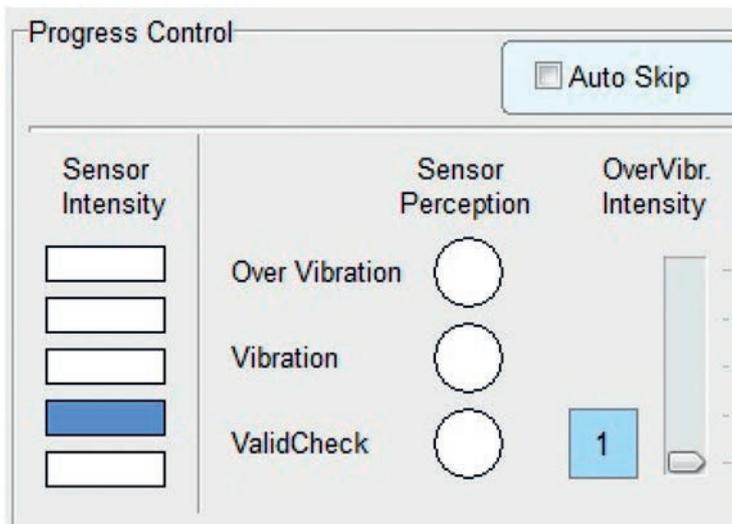


Figura 20

- 1 **Total Time:** This is the total time for training. It is possible to amend prior to the start of training.
- 2 **Protocol Name:** Name of protocol.
- 3 **Resend:** This is the button for transmitting the revised contents of the protocol when the contents are changed.
- 4 **Contents of Protocol:** This is the window showing the selected protocol. It is possible to revise prior to or during the training. (Click the part to be revised and enter the numbers using keyboard. Then click Resend button of).
- 5 **On/Off:** ON beside each step is clicked to OFF, the step marked with OFF shall not be executed and automatically skip to the next step. It is used for specified step training
- 6 **Sensor intensity control and sensor condition lamp**
- 7 **Show Test Graph:** This button is to show the test results on the screen of when moving to Training after completion of the test. If the button is clicked, it turns to hide test graph. It is also possible to recover the screen by clicking.
- 8 **Section showing the condition of the sensor as graph.**
- 9 **Hide 2nd Screen:** This is the button to turn off the coordinate window of displayed on the mini monitor.
- 10 **Preset Laser Position:** This is the button to adjust the distance between ultrasonic sensor and body. (see Figure A-16, and A-17)

- 11 **Screen of measuring graph:** This is the window to print out the tilting angle, rotation angle and change of actions during the training on real time basis.
- 12 **Protocol correction window:** It is possible to change the protocol using simple operation in this window.
- 13 **Testresult window:** The test results window in Fig. A-5 which appears after test is transmitted.
- 14 **Pelvis and sensor up/down adjusting button.**
- 15 **Start, stop,skip, and homebuttons of training.**

6) Sensor intensity control and condition screen



- **Auto Skip:** It is possible to move to the next step when the body is out of the range of the sensor during checking.
- **Sensor Intensity:** It is possible to control the sensibility of sensor into 5 steps.
It is possible to control the intensity by clicking the bar. The upper bar means the lower intensity and vice versa
- **Sensor Perception:**This shows the condition of the sensor.
Over vibration:If the body is out of the range of sensor, the red lamp is on.
Vibration:If the body is just on the sensor line, the blue lamp is on.
Valid Check:The green lamp is on when the body is within the range of the sensor.
- **Over Vibr. Intensity:**This controls the interval of alarm and skips when the body is out of the range of the sensor. It can be set in five steps.
Step 1: The alarm goes off in every 0.2 second and the Skip motion is performed at the same time.
Step 2: The alarm goes off in every 0.4 second and the Skip motion is performed 0.5 seconds after the first alarm.
Step 3: The alarm goes off in every 0.6 second and the Skip motion is performed 1.0 second after the first alarm.
Step 4: The alarm goes off in every 0.8 second and the Skip motion is performed 1.5 seconds after the first alarm.
Step 5: The alarm goes off in every 1.0 second and the Skip motion is performed 2.0 seconds after the first alarm.
(If there is no check on the Auto Skip, only alarm interval is adjusted. There is no skip action.)

6) Training graph screen

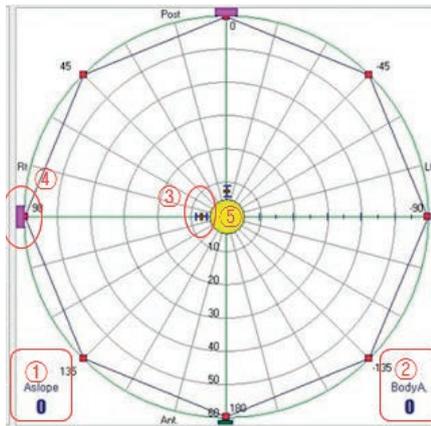


Figura 22-1

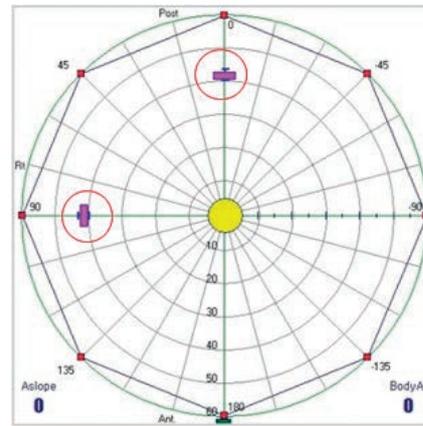


Figura 22-2

- 1 **Aslope:** This shows the change of tilting value on real time basis.
- 2 **Body A:** This shows the body angle (rotation angle of the body) on real time basis.
- 3 **Position of sensor:** During training, position the patient and make the position of sensor to coincide with the body of the patient using button in Figure A-14.
- 4 **Position of body:** Start training after making the body position to coincide with the sensor position using button of Fig. A-14. If and are not coincident, alarm goes off. The red spot is marked on the position of the yellow circles when the alarm goes off.

The patient shall keep the body and sensor to be coincident while watching on the screen looking like Figure A-23 which is displayed on the mini monitor. The patients shall continuously keep their initial posture during training

- 4 **This shows the position of the device:** This moves over the coordinates of the screen depending on Aslope and Body angle during test. (The coordinates marked with circle represent the slope while those marked with line represent the rotation angle.)

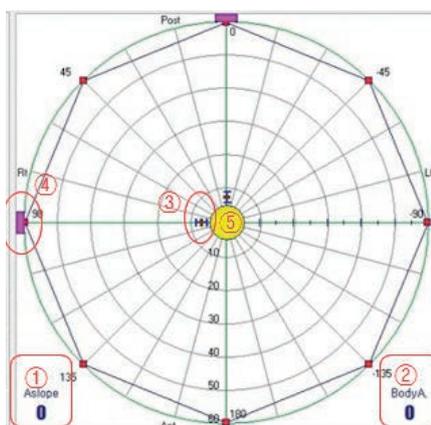


Figura 22-1

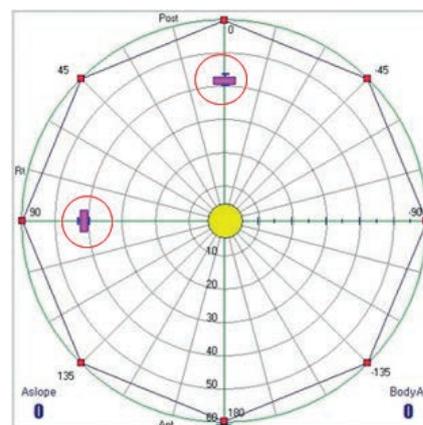


Figura 22-2

- Prior to start training, the screen is displayed like as of Figure A-18. When training starts, the red spots are displayed on the position where the sensor and the body are out of the range as shown in so that it is possible to check them as soon as the training starts. The red spots are marked on the yellow circles which show the current movement position.

7) Protocol amendment screen

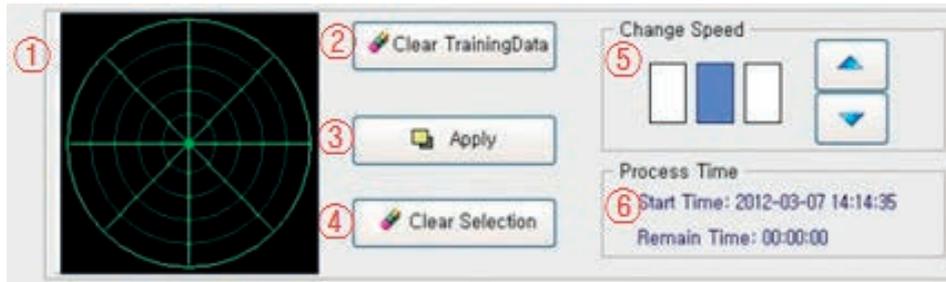


Figura 23

- 1 This is the window to select the desire directions among 8 directions which are not the selected protocol. Click the line to select a direction. It is possible to select more than one.
- 2 **Clear Training Data:** It is the button to delete the protocol prepared at of Figure A-14.
- 3 **Apply:** After selecting the direction through in Figure A-19, click this button to generate a new protocol like as in Fig. A-14. (Set the Aslope at 10 degree and hold time at 10 seconds. The protocol is generated with the sequence of steps determined according to the sequence of the selected direction.)
- 4 **Clear Selection:** It is the button to delete the scope which is selected at of Figure A-19
- 5 **Change Speed:** It is the part to amend the Speed of the total Step in the Protocol prepared at in Figure A-14. With clicking the arrow buttons, it is possible to amend No. 1 to No. 3 and change the rotation speed of the body
- 6 **Training Time:** The upper line shows the start time of training and the lower line shows the remaining time.

8) Test result window

- When moving to the training tab after completion of the test, the test result window (in Fig. A-1) is transmitted to window in Fig. 20. If the test results of test info of in Fig. 3 are double clicked, it is transmitted to window of Fig. A-14.

①	Step1	Step2	Step3	Step4	Step5	Step6	Step7	Step8
Angle	0	180	90	-90	135	-45	-135	45
Momentum	0	0	4	8				
% / Max	0 %	0 %	40 %	80 %				
Slope	14	18	27	27				

② Supply Percentage(%) 50 ③ Apply ④ View as Percent

Figura 24

- 1 This window shows the transmitted test results.
- 2 **Supply Percentage (%):** The slope of the result shown at table of Figure A-20 is converted to percentage and then set the percentage for training application. (If 50% is entered, the training protocol with the 50% of the slope value calculated from the test results is generated.)
- 3 **Apply:** If this is clicked, the calculated protocol by entering percentage in of Figure A-20 is transmitted to of Figure A-14 and new protocol is generated. (If there is no value at of Figure A-14, new protocol is not generated. Apply when the protocol is imported through User Protocol.)

- 4 **View as Percent:** This shows the percentage of the slope value when checking. ex) If is clicked by setting the data and Supply Percentage of Figure A-20 at 50%, the following is shown.

Angle (Body)	0	180	90	-90
Slope	7	9	14	14

Hold Time has the value as recorded at the loaded Protocol. (Change the Hold Time if it is needed.)

9) Training Preparation screen



Figura 25

- 1 **Laser Control:** This button is used to adjust the height of the arm where sensor and mini monitor are attached. Adjust the height taking into consideration the height of patient's eyes and shoulder..
- 2 **Pelvic Holding:** This is the button to move pelvic holding part up and down

10) Screen showing start, stop and skip of training



Figura 26

- 1 **Home:** This button moves the device to Home before the training starts. (It is possible to move the device to Home position by clicking even when the device stops during the training.)
- 2 **Training Start:** This starts the training.
- 3 **Training Stop:** This stops the training. (it stops during test)
- 4 **Skip to Next:** This button moves it to the next step during training by force.

11) Screen which patients can confirm during training (mini monitor screen)

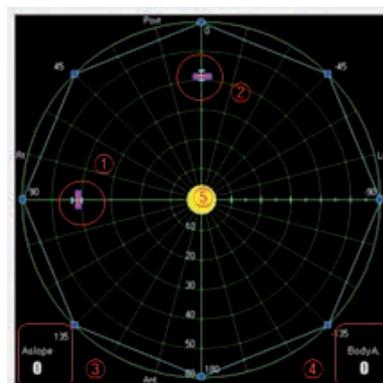
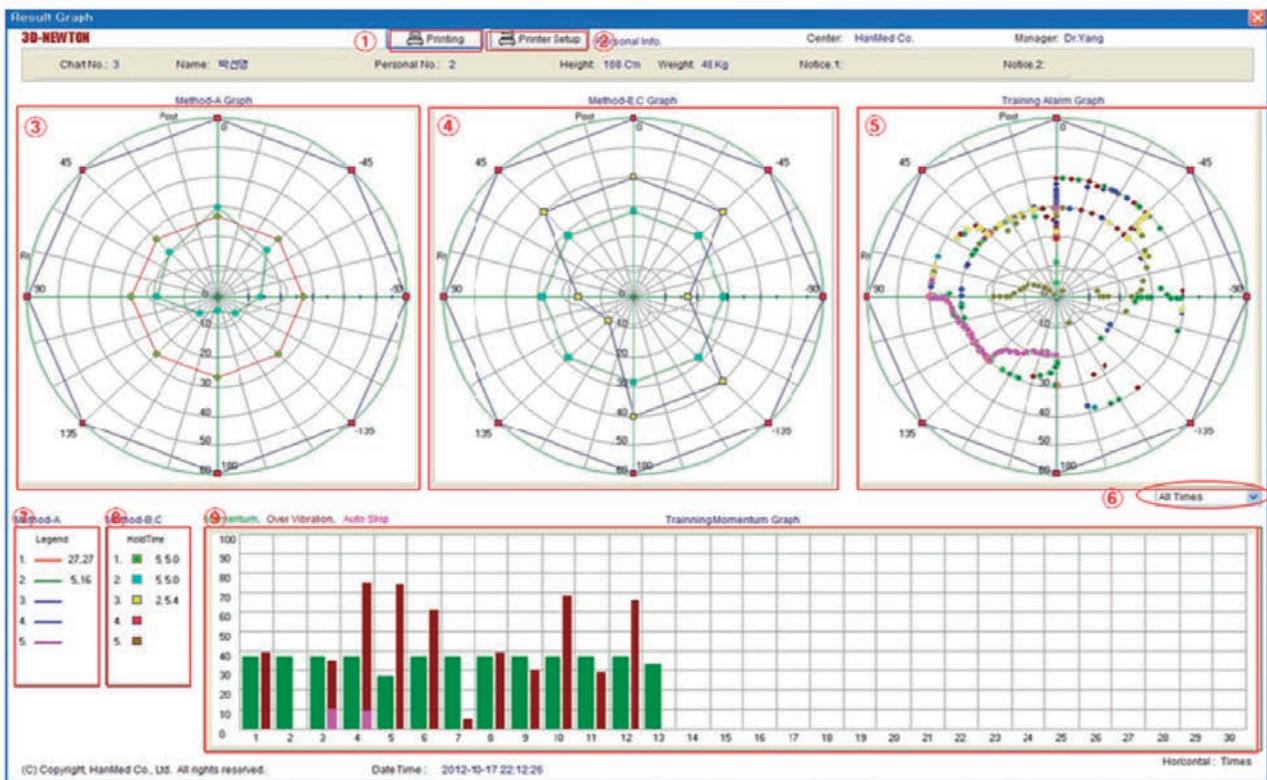


Figura 27

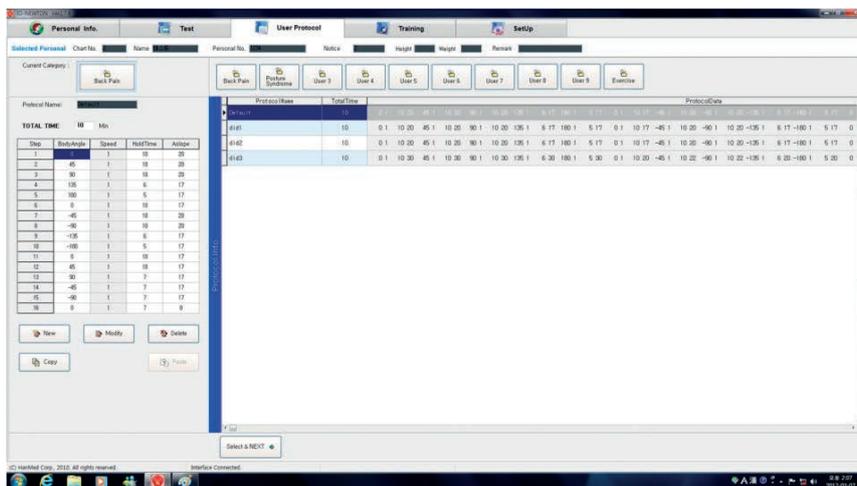
- 1 and 2 are the parts displaying the positions of the body and sensor. It is possible to check and correct posture on real time basis.
- 3 is the part displaying the tilting angle on real time basis while 4 is where the rotation angle of the body is displayed on real time basis.
- 5 is where the position of the device is displayed by moving over the circular coordinates.

How to prepare protocol

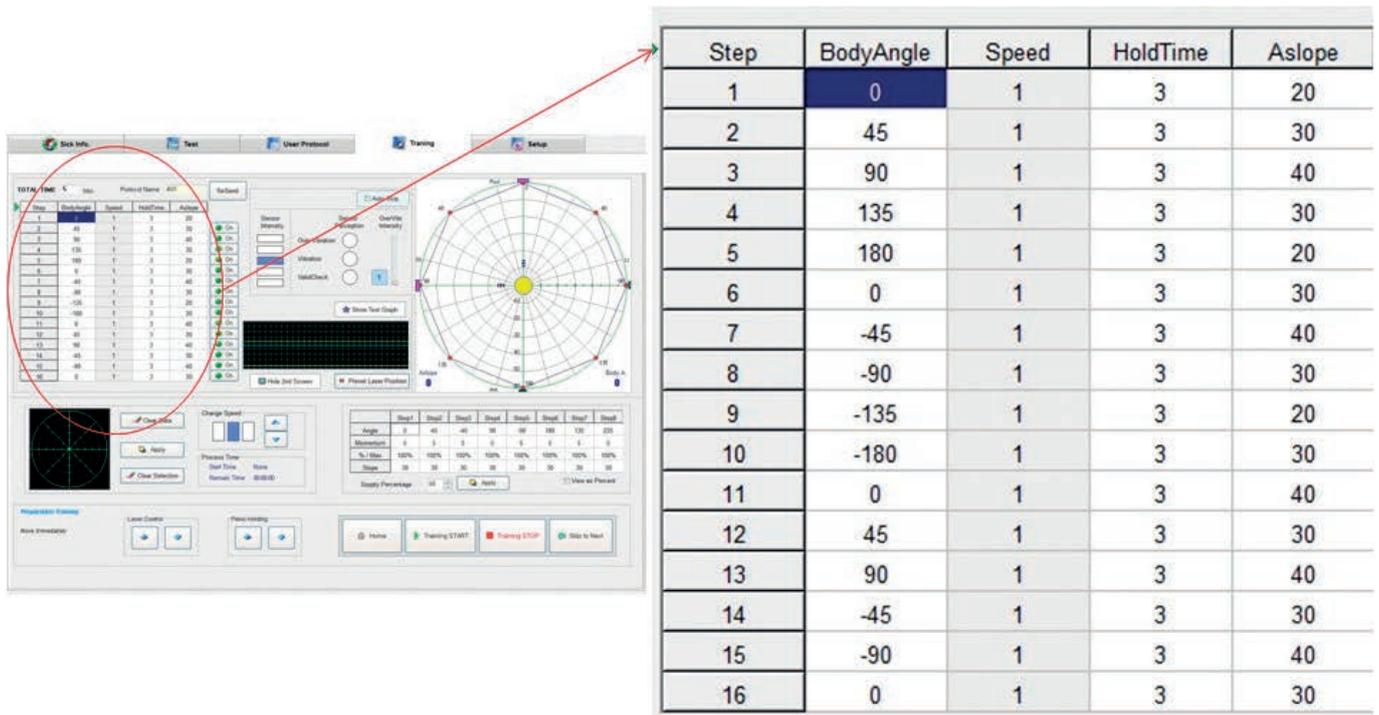
12) Dynamic balancing measuring and training mode



- If the tests of Method A and B are completed, click the Result Print button located at the bottom of the Personal Info Tab to get the following Result Graph screen.
- The graph of on the left side of the screen shows the test result of Method A and determines the Aslope of Protocol. At the legend, the screen shows the minimum and average of Aslope. The minimum value of Aslope is determined as the Aslope of training Protocol.
- The graph of in the middle of the screen shows the test results of Method B as graph and determines the Hold Time of Protocol. The average value appears on the Hold Time in window and fix the average value as the Hold Time of Protocol.
- Once Aslope and Hold Time are fixed, close the result graph window.
- Click the User Protocol Tab in the upper menu to move over to the User Protocol screen.



- Select one of the first step among categories in User Protocol screen.
- Double click the selected Protocol to automatically move over to the Training Tab



- The selected Protocol is generated at Training Tab display section.

Enter the values of Aslope and Hold Time generated from the above mentioned test to the generated Protocol.

-The training is operated with the Protocol from the above mentioned.

In case of the training alarm count less than 10 times, the Aslope of Protocol is increased to 20% up. (The minimum Aslope value of the test Method A is increased 20% up.-It is called 2 level)

Level	Aslope	Hold Time
1 Level	The Min. Value of Method A Test	The Ave.. Value of Method B Test
2 Level	20% up from 1 Level	The Ave.. Value of Method B Test
3 Level	40% up from 1 Level	The Ave.. Value of Method B Test
4 Level	60% up from 1 Level	The Ave.. Value of Method B Test
5 Level	80% up from 1 Level	The Ave.. Value of Method B Test
6 Level	100% up from 1 Level	The Ave.. Value of Method B Test

-The Method A, and B will be re-tested at the end of 6 Level or more than 10 times Training.

13) How to do Training

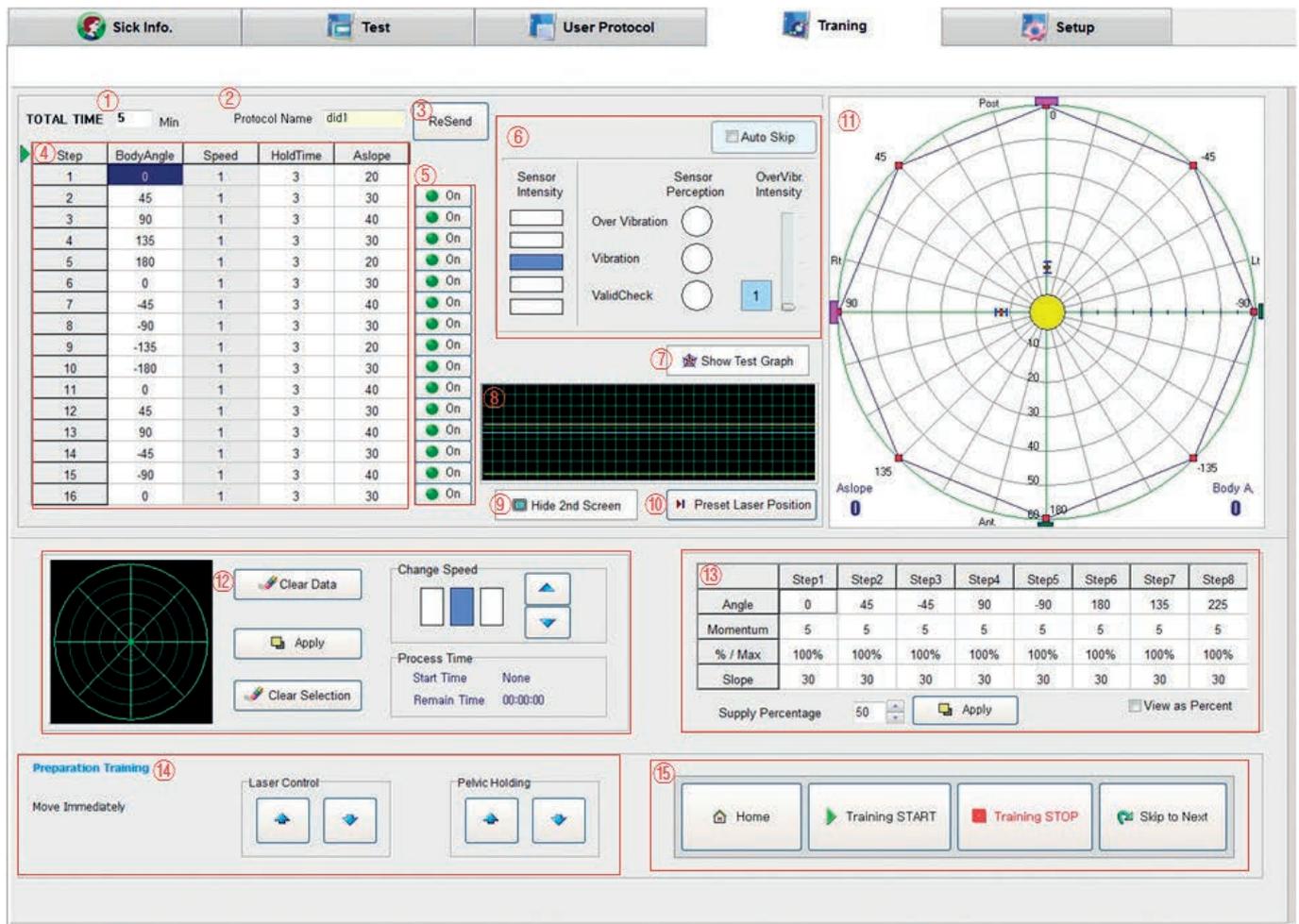


Figura 20

- 1 Make patients stand upright and correct their postures in the device.
- 2 Move the sensor and pelvic holding part of in Figure A-14 up and down to fit to the shape of the patient's body.
- 3 Adjust the pelvic holding part to fit the patient's pelvis to the device.
- 4 Protocol selection and setting (Refer to selection and amendment items.)
- 5 Adjust the sensor intensity and sensor perception in of Fig. A-14
- 6 Click the button in of Fig. A-14 to coincide the sensor with the body. (See Figure A-17.)
- 7 Start the device by clicking Training Start button in of Figure A-14.
- 8 If the training is completed, the equipment returns to Home position with the ending sound.
- 9 The patient's Training Data appear as red spots as shown in Figure A-8.
- 10 It is possible to print out the result graph by clicking the Result Graph of the Personal Info.

- See the Result graph

* Result graph

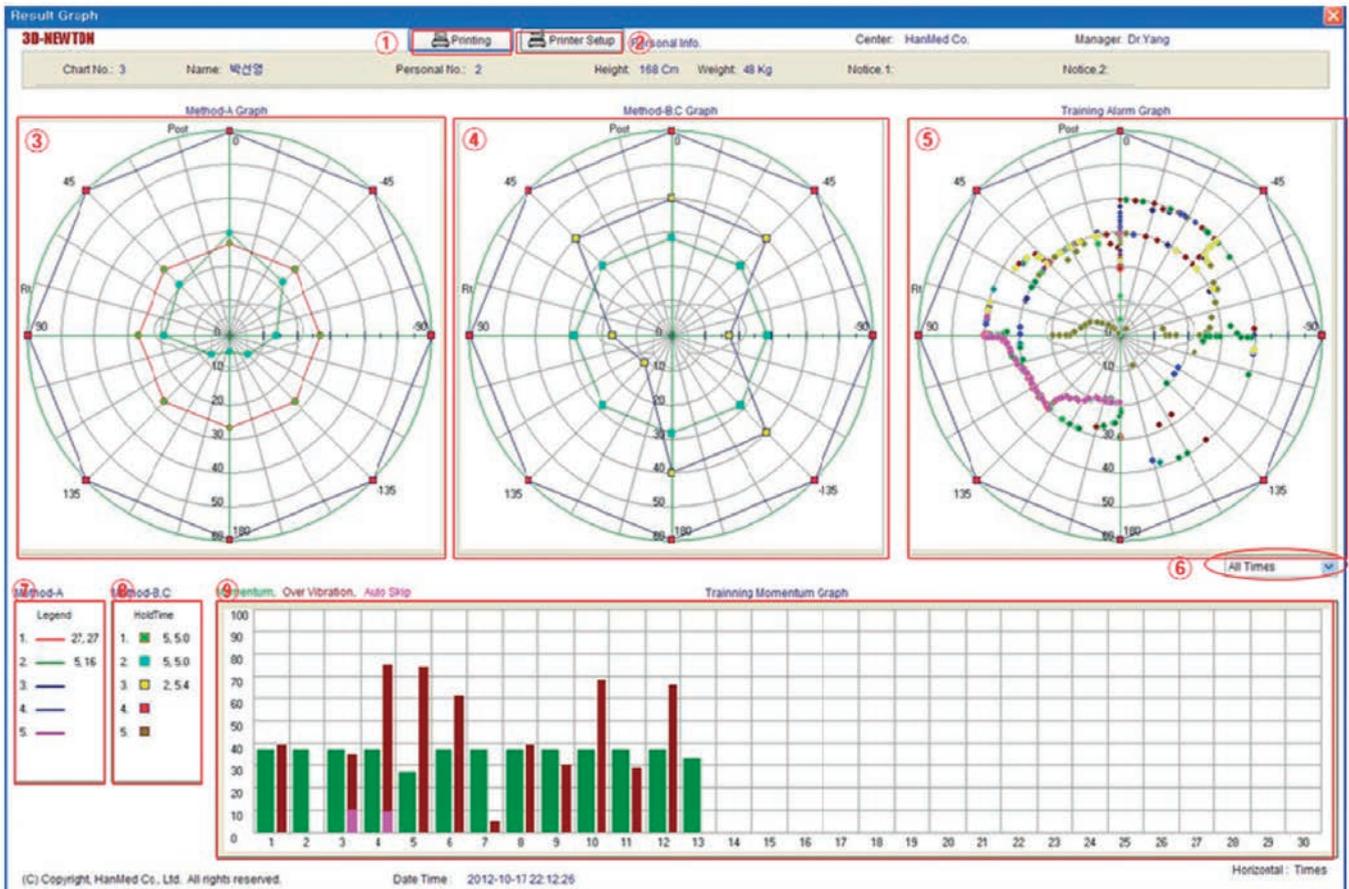


Figura 20

- 1 **Printing:** This is the button to print out the results on the screen.
- 2 **Printer Setup:** This is the button to amend the printer settings for printing.
- 3 **Method A Graph:** This window shows the test results obtained from Method A of Test Tab in a graph..
- 4 **This window shows the test results obtained from Method B and C of Test Tab in a graph.**
- 5 **Training Alarm Graph:** This window shows the position of the alarm when it goes off as the body is out of the range of the sensor during training.
- 6 **Contents in the Training:** It is the part to set the range displaying the training results obtained from window
- 7 **Legend:** This shows the colors of graph lines of and . The past test is displayed as No. 1 (red).
- 8 **Hold Time:** This shows the colors of graph spots of window and . The past test is displayed as No. 1 (green). It shows the Hold Time in Test and the average value is displayed in numerical value.
- 9 **Training Momentum Graph:** The momentum and frequency of alarms for the past training are displayed.

Method-A

Legend	
1.	27, 27
2.	5, 16
3.	
4.	
5.	

1 Legend:

This describes that the line of test graphs has different colors according to the History.

1. Red: First test
2. Green: Second test
3. Dark blue: Third test
4. Blue: Fourth test
5. Purple: Fifth test

Method-B,C

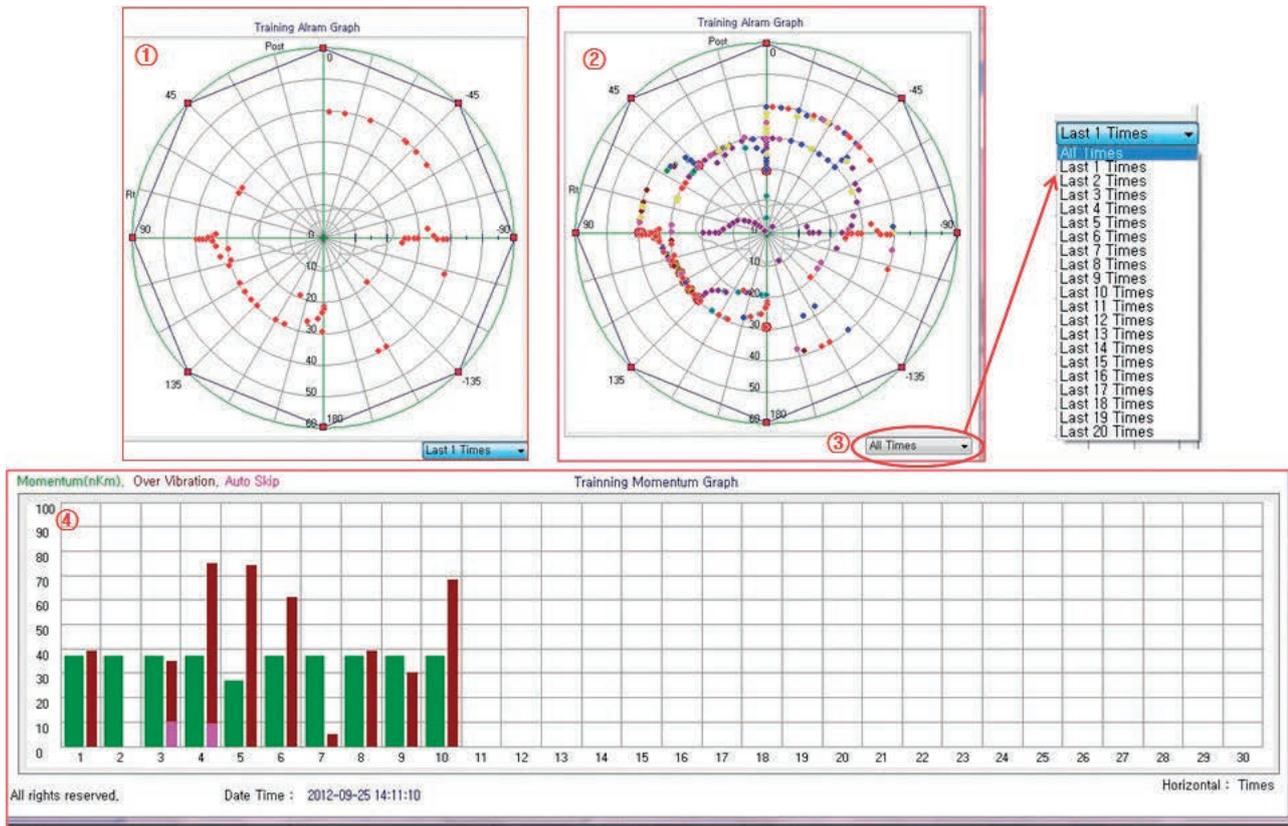
HoldTime	
1.	5, 5.0
2.	5, 5.0
3.	2, 5.4
4.	
5.	

2 Hold Time:

This describes that the spot of the test graphs has different color according to History. The number next to it shows the average Hold Time during Test

1. Green: first test
2. Sky blue: second test
3. Yellow: Third test
4. Red: Fourth test
5. Gold: Fifth test

*** Training Alarm Graph**



This graph shows the results of the training motion. It shows the frequency of alarms which go off whenever the body is out of the range of the sensor during training (when the posture is not correct.). As shown in graphs of , and , the positions of alarms are marked with spots. Using the distribution of spots, it is possible to check at what angle the posture is not correct.

Click the bar and confirm the latest one time training (last one time) or check all trainings (all times). It is possible to check the trainings with the last number of times. Fig. is the latest confirmed graph and Fig. shows all trainings. The graph of shows the training results in bar graph with the horizontal axis representing the frequency of trainings and the vertical axis representing the value of training momentum and the number of over vibration (alarm). The green bar represents the training momentum value. If it is assumed that H_t is obtained by multiplying tilting angle and Hold Time, the following equation is obtained. - Training Momentum = $X + H_t * 2$

This shows the average tilting angle of the training results and Hold Time as the momentum numerical value.

The brown bar shows the frequency of alarms during training in bar. It is possible to check its number up to 100 times. Over 100 times, the frequency is displayed as number over the bar. They are displayed as spots in graph of and . If two or more trainings are displayed as shown in , it is possible to distinguish them with spot color- self the brown bar in the graph of is clicked, the results of the corresponding trainings are marked with spots. Other spots disappear. The pink bar on the bottom of the brown bar shows the frequency of Auto Skip, which is displayed as circles in the graph of and .

(1) Device Check-up and performance test

- 1 Check if they can operate without any problem by operating the motors in , , , of Picture 29 manually. (For the motors in and , check if the angles are displayed in Location at the bottom.)
- 2 Check if the figures of Sensor1 and Sensor2 (marked in Green Circle) in of Picture 29 are normal.
- 3 If the sensor and motors operate normally, click Auto Start in Protocol in of Picture 29.
- 4 Test the performance to see if the device operates normally.

(2) DB Backup

- 1 You can perform data backup in of Picture 29 above; the backup data is saved to the backup folder in C:/3D Newton folder under the filename of backup date (ex. newton3d_20120305.rdb).
- 2 You can check the data in Personal Info. if you run the program after changing the name of the backup file to newto3d.rdb and moving to the 3D Newton folder after deleting newton3d.rdb of the 3D Newton folder or to other folders.

Chapter 3. Maintenance

1) Cleaning the Device

- (1) Use a friction-free towel to clean the screen.
- (2) Clean the surface of the base prop with nontoxic bactericide regularly.
- (3) Remove dust on the whole device with a vacuum cleaner about once a month.

2) Preventive Inspection

Warning: This device should be checked regularly.

Caution: Use extension wire to maintain electrical safety and use a surge protector if necessary.

- (1) Do not expose the device to rain or humidity.
- (2) Do not attempt to disassemble, change, or redesign the device without the consent of the researchers of Hanmed Co., Ltd.
- (3) Check the voltage first before plugging in 3D NEWTON.
 - **The factory setting for the device is 220V.**
 - **If the voltage of the place where it will be used is 110V, plug in only after changing the terminal of the voltage input part from 220V to 110V.**
- (4) Do not use damaged electric wire.
- (5) Do not pump any liquid or foreign substance into the console.
- (6) Do not remove the cover to prevent electric shock.
- (7) Do not have the device repaired by an engineer who is not authorized by Hanmed Co., Ltd.

3) Regular Care

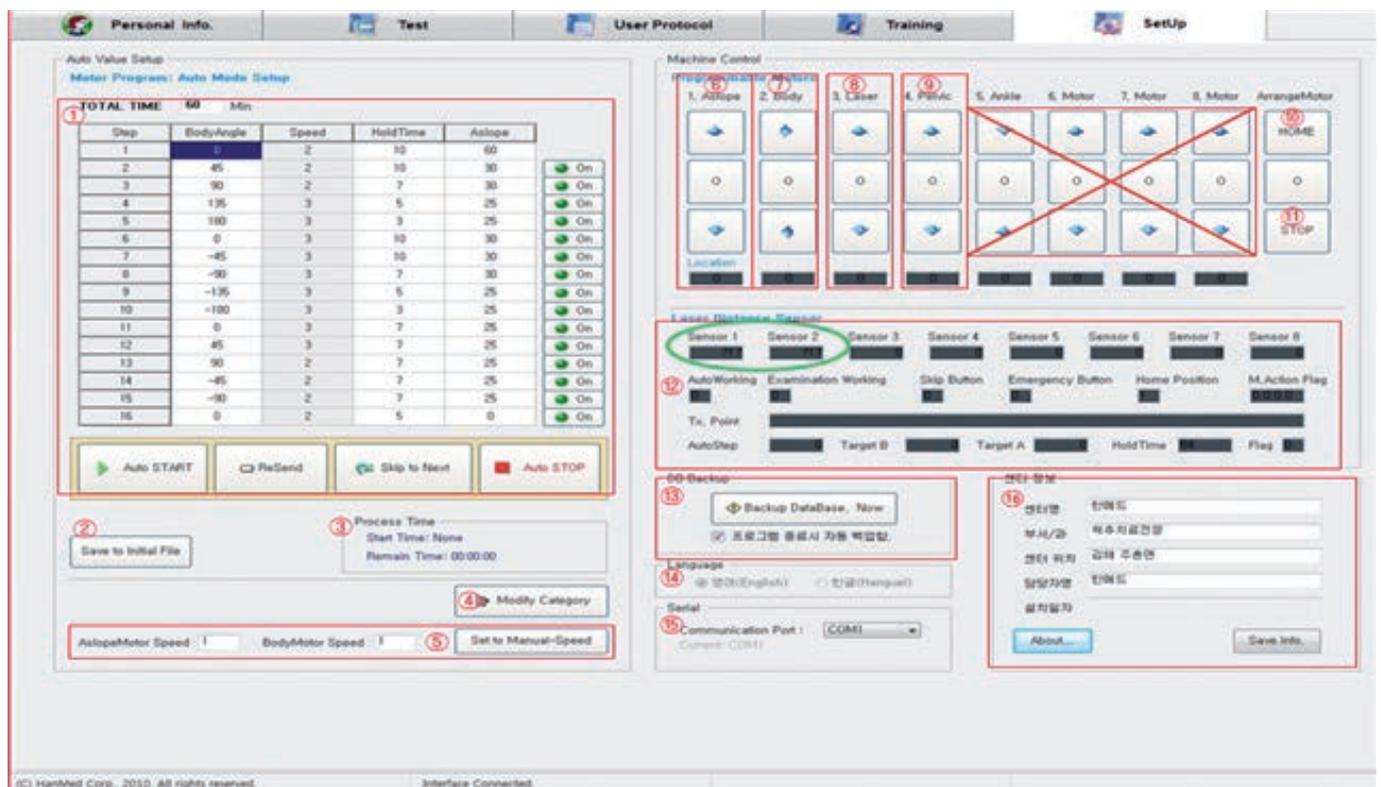
The following must be done at least once a week:

- (1) Inspect the status of error or malfunctioning of the operating parts on the setup window of the device.
- (2) Check for any bare wire or short circuit of the main body or around the control box.
- (3) Inspect the earthing status within the control box.
- (4) Inspect the status of all tightened parts.
- (5) Inspect the fixture status of the fixed parts of the pelvis.

If you have other queries, please contact a service provider authorized by Hanmed Co., Ltd

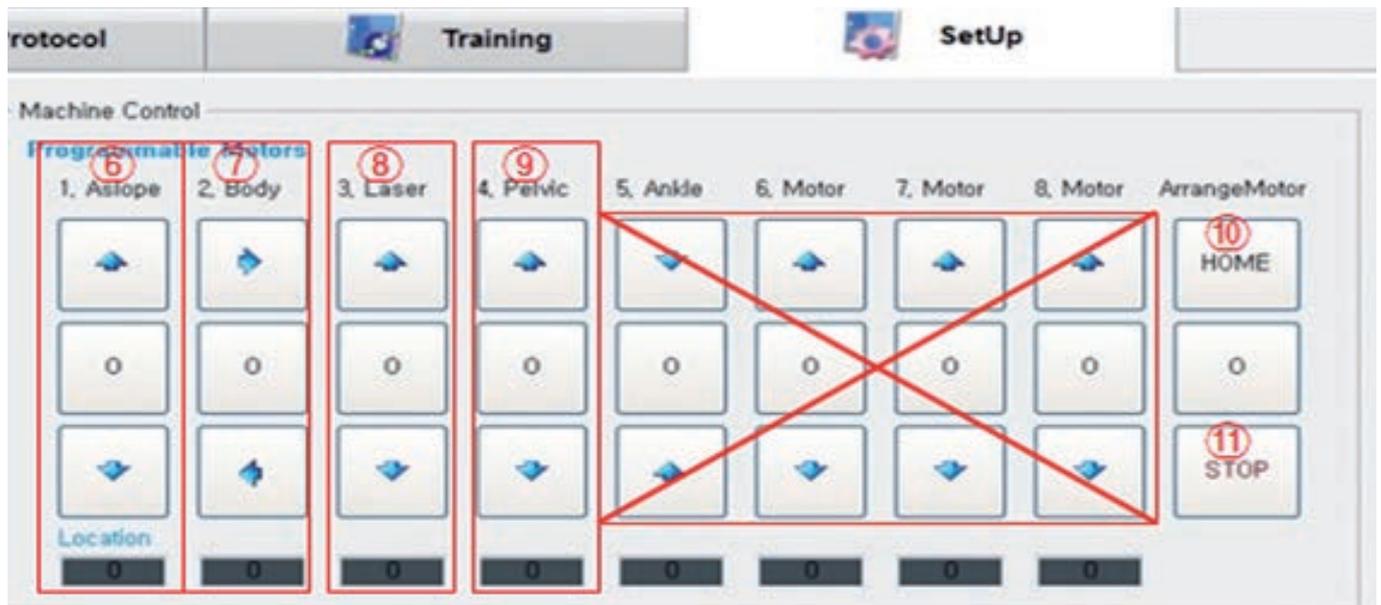
4) Malfunctioning Test and Manual Inspection

- When error or malfunction occurs, conduct an inspection by pressing the setup window button.



Picture - Button for starting the motor

- (1) After turning on power, test the movements of the motors for each function on the Manual Operation window of the computer monitor. Click all functional buttons of the motors from no.1 to no. 4 to check if they are all fully functional.



Picture -Window for checking the sensor pulse during the movement of motors

- 1 Inspect whether the number at the center increases and decreases without any problem when each functional motor is moving.
- 2 If you click the Home button after checking the normal movement of motors as well as for any pulse occurrence, all functions are aligned, and all arrangements are complete.
- 3 If no motor pulse is emitted, contact the supplier.

5) Device Disposal

At the end of the service life of 3D NEWTON, it shall be disposed of after being disassembled carefully by a licensed waste disposal company or sent back to Hanmed Co., Ltd. The device does not have toxic or explosive substances; it is mostly composed of aluminum, iron, or plastic

5) Service Maintenance/Cleaning Log

All daily management matters such as services, calls, and visits related to the device should be recorded accurately

Failure to keep records invalidates the warranty

Precautions

1) Cautions in Use

Warning: Only a physical therapist, a spine doctor, or a licensed specialist can use the device. Otherwise, the device can be used only under the instructions of a licensed specialist.

- (1) Check thoroughly for any abnormality across the device.
- (2) When you find any abnormality in the device, stop the operation immediately and ask the manufacturer to check after taking appropriate measures.
- (3) When you find any abnormality in the device or unusual symptoms in the subject, take appropriate measures such as putting the subject on a flat place and stopping the device.
- (4) When a sudden blackout causes the device to stop during operation, unlock the fastening device for pelvis fixing with more than one helper to extricate the subject from the machine safely.
- (5) Prohibit other people except the subject from going near the device.
- (6) Do not remodel the device arbitrarily.
- (7) When the device breaks down, contact an expert after marking appropriately.
- (8) If the subject feels uncomfortable during operation, stop the operation and have the subject see a doctor, and then try again.
- (9) During operation, do not touch or manipulate the power-supplying part or parts in operation.
- (10) Do not make the slope too steep at the beginning.
- (11) Do not apply external shock to the device during operation.
- (12) Install the main body of the device on a flat place.

2) Warning & Caution

Persons with the following health conditions should be careful when selecting the slope:

- 1 High blood pressure
- 2 Eye problems such as glaucoma, diabetes-related diseases
- 3 Esophageal hiatal hernia
- 4 Weak bones (osteoporosis), any fracture that has just occurred and which has not been cured yet, acupuncture of bone marrow
- 5 Encephalosclerosis
- 6 Heart failure or cardiovascular function failure that has not been cured yet
- 7 Severely swollen joint
- 8 Pregnant women and elders

Items Mentioned

- 1) Name of product (model name): **Mobility test and evaluation device** (Newton 3.0).
- 2) Manufacturer name and address: HANMED CO., LTD. Room #112, Gimhae Biomedical Collaboration Center, 155-1 Nongso-ri, Juchon-myun, Gimhae-si, Kyeongnam.
- 3) Product License Number: To be mentioned after receiving license.
- 4) Lot number and Month and Date of Manufacture: To be mentioned after manufacturing.
- 5) Weight and Packing Unit: About 400kg, Individual Packing.
- 6) Purpose of Use: Device for measuring muscular strength and endurance of body parts such as spine.
- 7) Performance and Instructions: Refer to the Manual.
- 8) Cautions in Use: Refer to the Manual.
- 9) Other items that should be mentioned:
 - (1) Form and Degree of Protection against Electric Shock: 2nd Class, Type B Class Device
 - (2) Power Rated Phase, Rated Voltage and Frequency: Single-phase, 220V/60 Hz
- 10) This product is a medical device.