Operator's Manual

HDC-7000

Huvitz
Pacing Progress toward People

IMPORTANT NOTICE

This product may malfunction due to electromagnetic waves caused by portable personal telephones, transceivers, radio-controlled toys, etc. Be sure to avoid having objects such as, which affect this product, brought near the product.

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9000C100002-A

CONTENTS

1. Introduction

1.1. Outline of product

HUVITZ HDC-7000 is an automatic digital chart which provides 41 different charts for the eye optometry. Users can select the desired charts instantaneously by cordless remote controller. Charts move quickly and quietly. The customized two programs will help you to perform more convenient and effective examination. You can also execute the binocular balance tests, stereo tests, fixation disparity tests and fusion tests with HDC-7000. This automatic digital chart is compatible with HUVITZ digital refractor.

1.2. Classifications

- Product Name
  Digital Eye Chart (Huvitz Digital Chart HDC-7000)
- Weight
  1.2Kg
- Objective: Device for optometry, which can display letters or symbols

2. Safety Information

2.1. Introduction

Safety is everyone's responsibility. The safe use of this equipment is largely dependent upon the installer, user, operator, and maintainer. It is imperative that personnel study and become familiar with this entire manual before attempting to install, use, clean, service or adjust this equipment and any associated accessories. It is paramount that the instructions contained in this manual are fully understood and followed to enhance safety to the patient and the user/operator. It is for this reason that the following safety notices have been placed appropriately within the text of this manual to highlight safety related information or information requiring special emphasis. All users, operators, and maintainers must be familiar with and pay particular attention to all Warnings and Cautions incorporated herein.

⚠ WARNING

"Warning " indicates the presence of a hazard that could result in severe personal injury, death or substantial property damage if ignored.

NOTE

"Note" describes information for the installation, operation, or maintenance of which is important but hazard related if ignored.

⚠ CAUTION

"Caution" indicates the presence of a hazard that could result in minor injury, or property damaged if ignored.

2.2. Safety Symbols

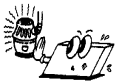
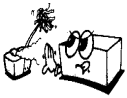
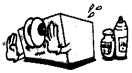
The International Electrotechnical Commission (IEC) has established a set of symbols for medical electronic equipment, which classify a connection or warn of any potential hazards. The classifications and symbols are shown below.

Save these instructions

	I and O on the power switch represent ON and OFF respectively.
	Signal Input/Output Connection.
	This symbol identifies a safety note. Ensure you understand the function of this control before using it. Control function is described in the appropriate User's or Service Manual.
	Identifies the point where the system safety ground is fastened to the chassis. Protective earth connected to conductive parts of Class I equipment for safety purposes.

2.3. Environmental factors

Avoid the following environments for operation or storage:

	Where the equipment is exposed to water vapor. Don't operate an equipment with a wet hand.
	Where the equipment is exposed to direct sunlight.
	Where the temperature changes extremely. Normal operating temperature range is from 10℃ to 40℃, Humidity is from 30% to 75%.
	Where it is near the heat equipment.
	Where the humidity is extremely high or there is a ventilation problem.
	Where the equipment is subject to excessive shocks or vibrations.
	Where equipment is exposed to chemical material or explosive gas.
	Be careful not to be inserted dust, especially, metal

Avoid places where the ambient temperature falls below 10℃ or exceeds 40℃ for normal operation, or below -10℃ or exceeds 40℃ (14°F-104°F) for transportation and storage. Humidity should be maintained between 30 and 75% for normal operation, transportation and storage. Avoid environments where the equipment is exposed to excessive shocks or vibrations.

2.4. Safety Precautions

This equipment has been developed and tested according to national as well as international safety standards. This guarantees a very high degree of safety for this device. The correct handling of this equipment is imperative for its safe operation. Therefore, please read carefully all instructions before switching on this device. For more detailed information, please contact our Customer Service Department or one of our authorized representatives.

1. This equipment must not be used (a) in an area that is in danger of explosions and (b) in the presence of flammable, explosive, or volatile solvents such as alcohol, benzene or similar chemicals.

2. Do not put or use this device in humid rooms. Humidity should be maintained between 30 and 75% for normal operation. Do not expose the device to water splashes, dripping water, or sprayed water. Do not place containers containing fluids, liquids, or gases on top of any electrical equipment or devices.

3. The equipment must be operated only by, or under direct supervision of a properly trained and qualified person.

4. Customer maintenance of this equipment may only be performed as stated in the User's Manual. Any additional maintenance may only be performed by HUVITZ service technicians or other authorized persons.

5. The manufacturer is only responsible for effects on safety, reliability, and performance of this equipment when the following requirements are fulfilled: (1) The electrical installation in the respective room corresponds to the specifications stated in this manual and (2) This equipment is used, operated, and maintained according to this manual.

6. The manufacturer is not liable for damage caused by unauthorized tampering with the device(s). Such tampering will forfeit any rights to claim under warranty.

7. Only persons who have undergone proper training and instructions are authorized to install, use, operate, and maintain this equipment.

8. Keep the User's Manual in a place easily accessible at all times for persons operating and maintaining the equipment.

9. Please do not pull on any cable. Always hold on to the plug when disconnecting cables.

10. Before every operation, visually check the equipment for exterior mechanical damage(s) and for proper function.

11. Do not cover any ventilation grids or slits.

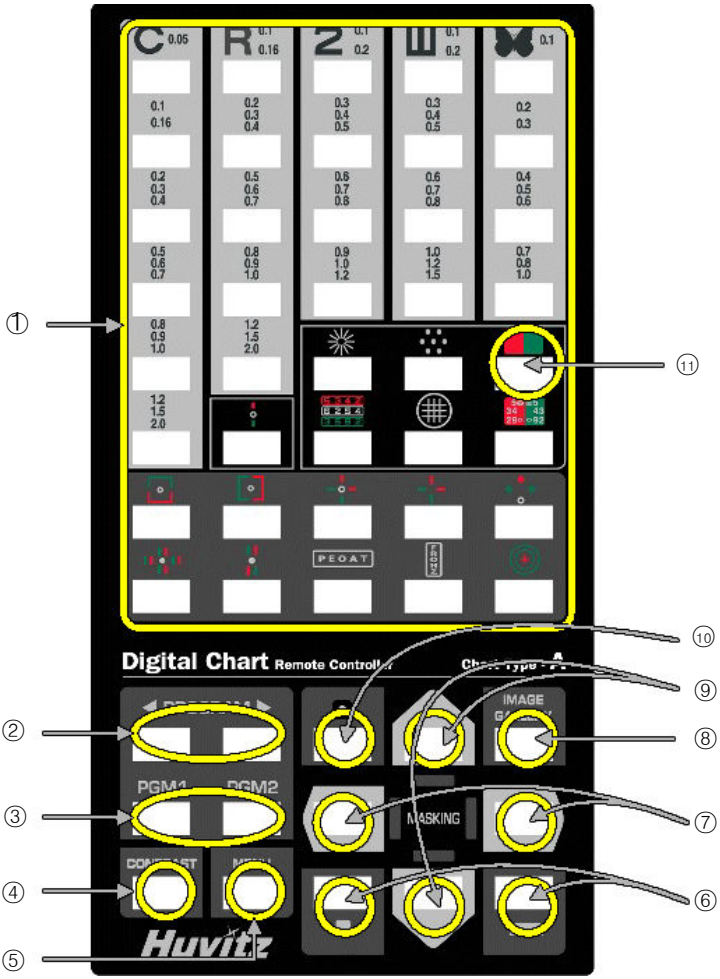
3. Features

HDC-7000 has features as follows.

- Applicable to various size of LCD monitor
  HDC-7000 can be used on 17 ~ 24-inch LCD monitor
- Adaptable test distance
  Using HDC-7000, you can test patient's vision within 8~20 feet (2.5~6m). The distance can be adjusted by 0.5 feet (when using meter, 0.1m). If you want to install HDC-7000 in smaller distance than 8 feet, you can use mirror.
- Red/Green color adjustment
  Red/Green color can be adjusted to your red/green filter.
- Contrast test
  HDC-7000 can change contrast of chart background and optotypes.
- Random optotypes
- Easily networked with HUVITZ's Digital Refractor

3.1. Organization

3.1.1. Remote Controller



① Chart selection buttons
Select a chart for optometry

② Program left, right buttons
Move previous (left) or next (right) chart on programmed chart display.

③ Program selection buttons
Select program1 or program2

④ Contrast button
Change the contrast level of chart. There are 4 steps.
(25%→12.5%→6%→100%→25%…)

⑤ Menu button
Display user menu.

⑥ Point masking button, Horizontal masking button
Display horizontal line optotypes (horizontal masking button) or single optotype (point masking button)

⑦ Masking left, right button
Display vertical line optotypes.

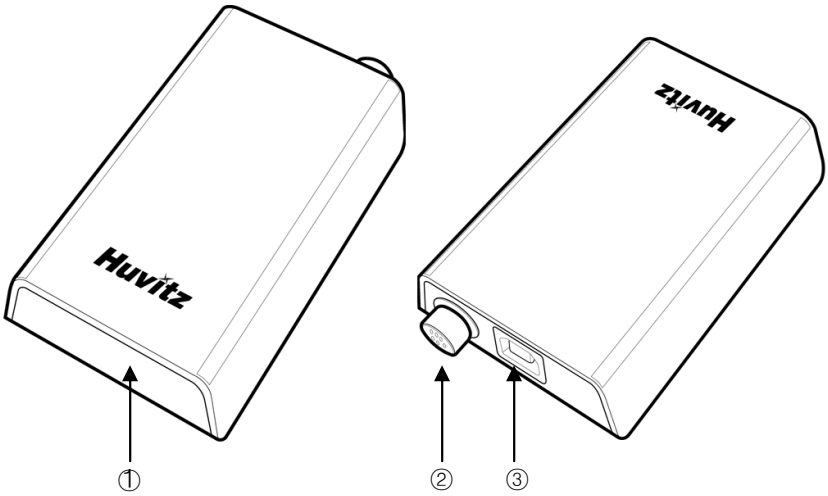
⑧ Image gallery button

⑨ Masking up, down button

⑩ Fixation point button

⑪ Red/green filter button
Apply red/green filter to VA chart. This button is available when VA chart is displayed. If non-VA chart is displayed and this button is pressed, there will be no changing.

3.1.2. IR, CAN Receiver



① IR receive area
There is IR receive sensor.

② CAN connector
This connector is connected with Junction Box on CAN communication.

③ USB port
Connect with PC

3.1.3. System Requirement

HDC-7000 must be installed the system, referred below.

- **Operating System**
  Windows 2000, Windows XP, Windows Vista

- **Recommended PC Specification**
  PC, recommended by Operation System, with USB port

- **Required HDD space**
  Above 100MB

- **Display Device**
  17~25-inch LCD Monitor

4. Preparation before using

4.1. Software Installation

Step 1. Running Setup Program

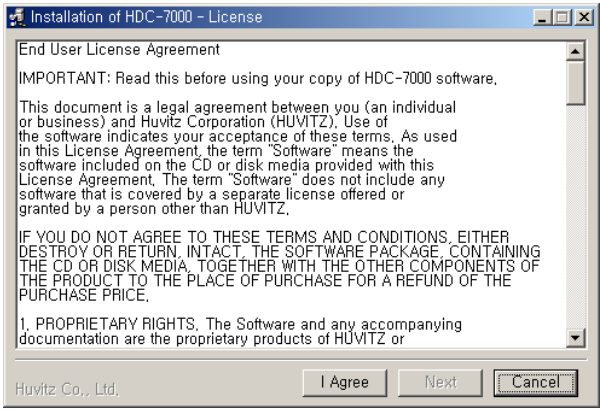
HDC-7000 setup program will automatically start by auto-run when you insert the installation CD into CD-ROM on PC. If it doesn't work or is installing from local network drive, open the installation folder and manually run *HDC-7000_intall.exe*.

Step 2. Start setup

Click 'Next' Button.

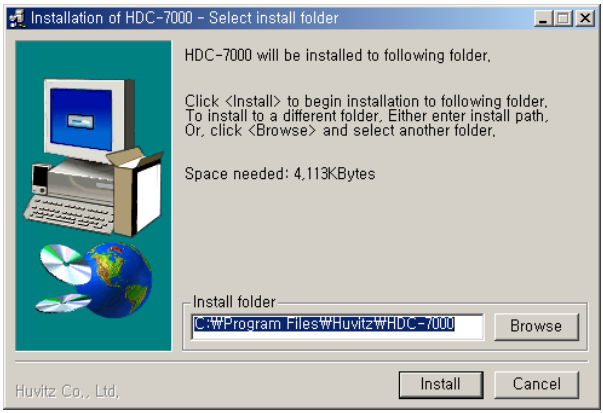
Step 3. End User License Agreement

After reading End User License Agreement, click 'I Agree', then click 'Next'.

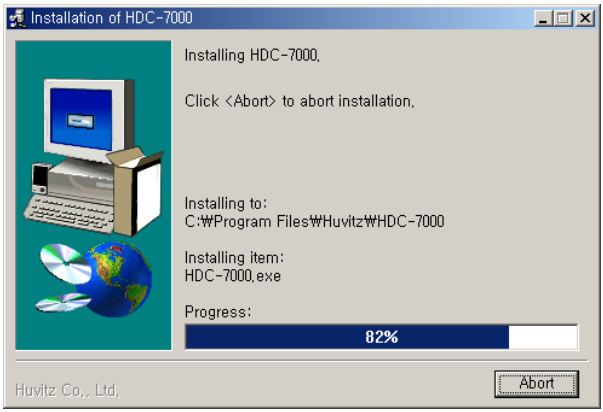


Step 4. Select Install folder and Install

If you want to install HDC-7000 SW to another folder, click 'Browse' button and select the folder where you want. If you want to install on default folder, skip this process.

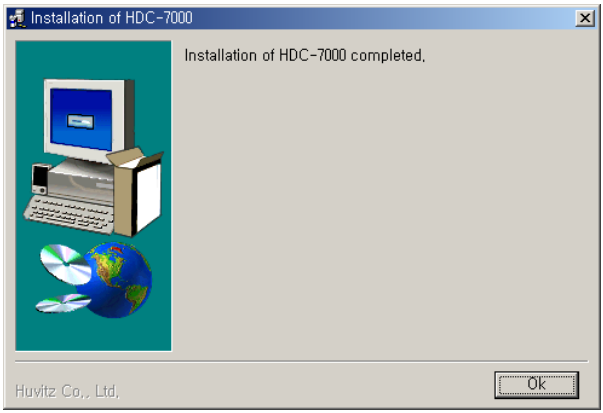


Click 'Install' button, to start HDC-7000 installation.



Step 5. Installation Complete.

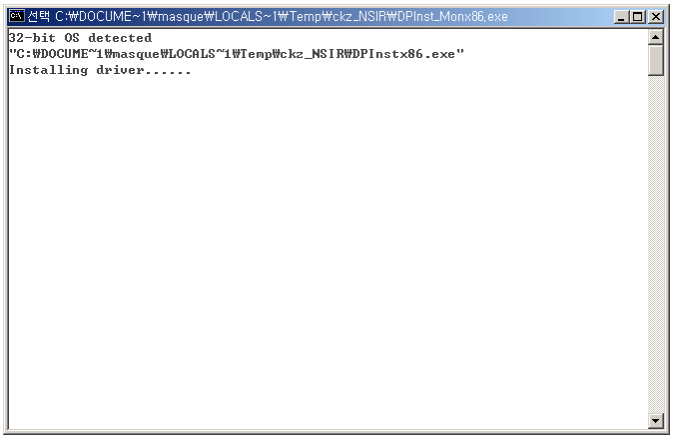
Click 'OK' button



4.2. IR/CAN Receiver Installation and Connection

Step 1. Install Driver

Run *CDM 2.04.06.exe* in served CD. Running screen is as follows.



Step 2. Connect IR/CAN Receiver

Connect IR/CAN Receiver to USB port.

4.3. Check Remote Controller

Put the batteries into remote controller.

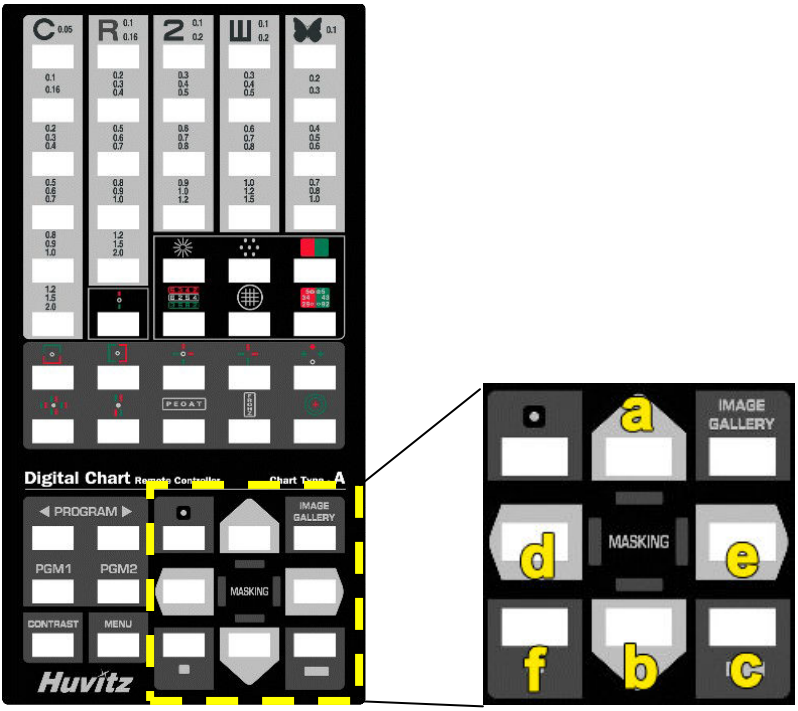
4.4. Configuration

Configure the options which are suitable to installation environment. Refer '5.3 User Menu Operation' for details.

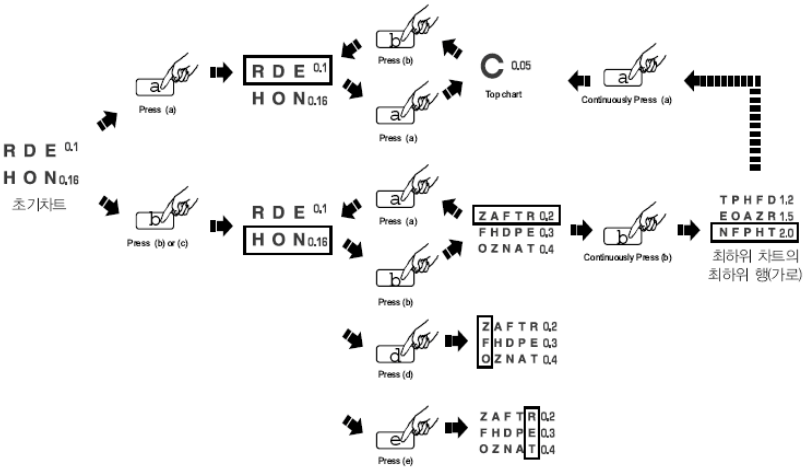
5. Operation

5.1. Mask operation

- **Buttons used on masking**



■ **Horizontal masking**



[Figure 1] Horizontal masking

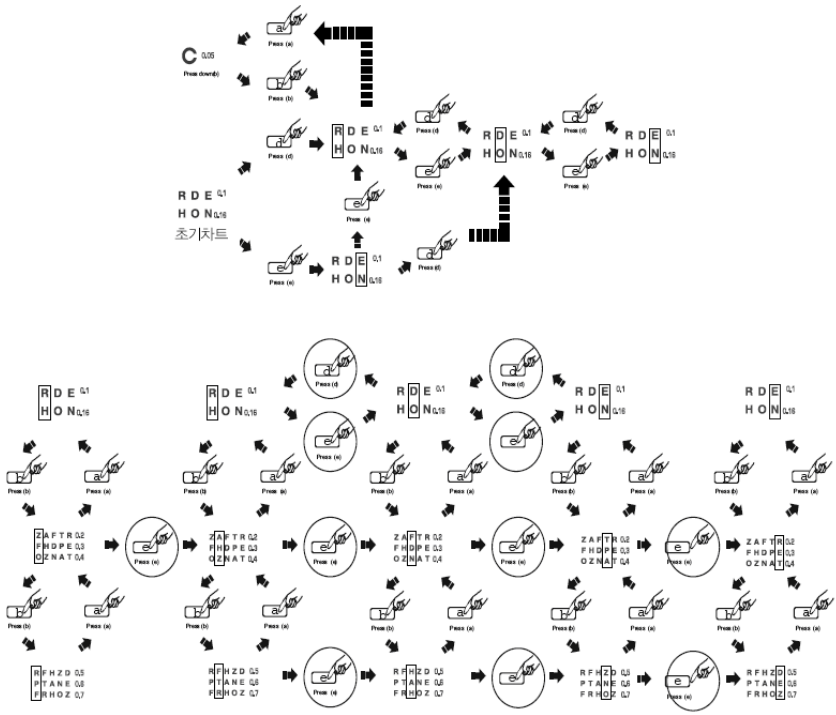
1) To enter the horizontal masking mode, press up, down, or horizontal masking button.

2) To move mask, press up or down button.

3) When the masking row is top row and you press up button or the masking row is bottom and you press down button, you can see next page with horizontal masking.

4) If you press left or right button, it will enter vertical masking mode.

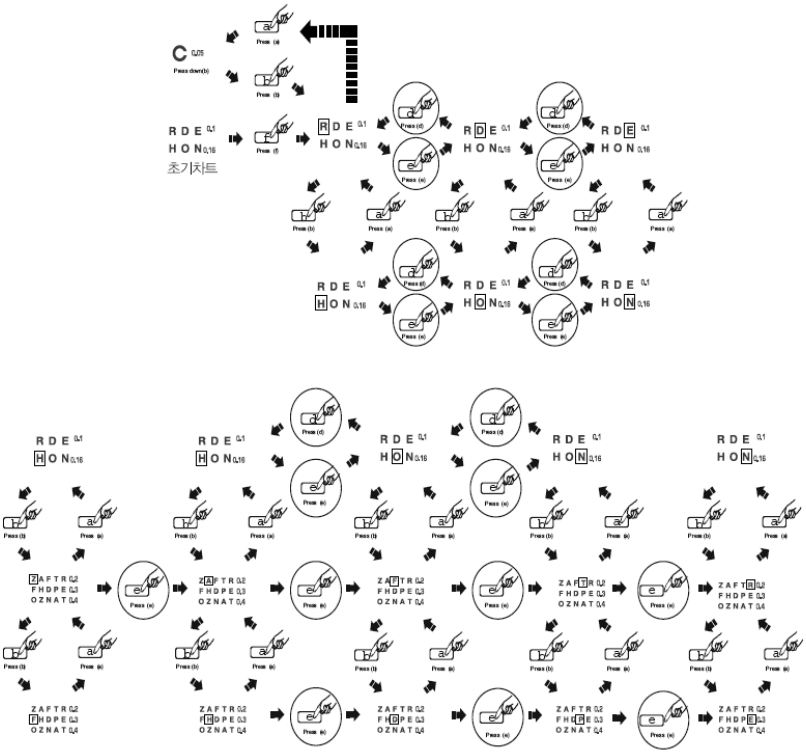
■ **Vertical maksing**



[Figure 2] Vertical masking

1) To enter the vertical masking mode, press left or right button.
2) If you press up or down button, you can see previous or next chart with vertical masking.
3) If you press left or right button, masking position will move circularly.

■ **point masking**



[Figure 3] point masking

1) To enter the point masking mode, press point masking button. (left top optotype will be displayed.)
2) If you press up or down button, next point masking optotype will be displayed.
3) If you press left or right button, masking position will move circularly.

5.2. Descriptions of Charts for the Measuring of Binocular Visual Functions

■ **Schober Chart**

-. Objective: To execute a phoria test during the subjective test.
-. Auxiliary Lens: Red Filter (right), Green Filter (left), Binocular Rotary Prism
-. Expectation: To make the cross mark (for the right eye) placed the center of the circle

Vision of patient	Heterophoria	Correction Method
 The cross mark is to the right of the circle.	Esophoria	Add the BD prism till the cross mark comes to the center of the circle.
 The cross mark is to the left of the circle.	Exophoria	Add the BI prism till the cross mark comes to the center of the circle.
 The cross mark is under the circle.	Left Eye with hyperphoria	Add BU prism in the right eye and/or BD prism in the left eye till the cross mark comes to the center of the circle.
 The cross mark is under the circle.	Right Eye with hyperphoria	Add BU prism in the left eye and/or BD prism in the right eye till the cross mark comes to the center of the circle.

[Table 1] **Analysis of Schober Test**

■ **Worth 4 Dots Chart**

-. Objective: To find suppression during the subjective test. It is possible to check the internal or external phoria.
-. Auxiliary Lens: Red Filter (right), Green Filter (left)
-. Expectation: To check how many dots can be seen. Normally, 4 points are seen.

Vision of patient	Heterophoria	Reference
4 spots	Fusion	red, green, pink or red/green alternately Red: When the right eyes is dominant Green: When the right eyes is dominant
3 spots	Right eye is suppressed	Two green and one are seen
2 spots	Left eye is suppressed	One red and one are seen
5 spots	Phoria	Red and green are seen at the same time
5 spots (Flickering)	Alternately suppressed	Red and green flickers alternately

[Table 2] **Analysis of Worth 4 Dots Test**

■ **Binocular Balance Chart**

−. Objective: To adjust binocular balance during the subjective test
−. Auxiliary Lens: Red Filter (right), Green Filter (left)
−. Expectation: The upper row for the right eye and the lower row for the left eye appear to be similarly clear.

■ **Cross Chart without the Fixation Point**

−. Objective: To execute a phoria test during the subjective test.
−. Auxiliary Lens: Red Filter (right), Green Filter (left)
−. Expectation: The upper-right cross mark for the right eye and the lower-left cross mark for the left eye are overlapped into one ideal cross.

■ **Cross Chart with the Fixation Point**

-. Objective: To execute the phoria test during the subjective test.
-. Auxiliary Lens: Red Filter (right), Green Filter (left)
-. Expectation: The upper-right cross mark for the right eye and the lower-left cross mark for the left eye are overlapped into one ideal cross.

Vision of patient	Heterophoria	Correction Method
1) 	Esophoria	Add the BO prism till the vertical bar comes to the center of the horizontal bar.
2) 	Exophoria	Add the BI prism till the vertical bar comes to the center of the horizontal bar.
3) 	Left eye with hyperphoria	Add BU prism in the right eye and/or BD prism in the left eye till the horizontal bar comes to the center of the vertical bar.
4) 	Right eye with hyperphoria	Add BU prism in the left eye and/or BD prism in the right eye till the horizontal bar comes to the center of the vertical bar.
5) 	Esophoria + Right eye with hyperphoria	Correct the horizontal phoria like 1) and correct the vertical phoria like 4)
6) 	Esophoria + Left eye with hyperphoria	Correct the horizontal phoria like 1) and correct the vertical phoria like 3)
7) 	Exophoria + Right eye with hyperphoria	Correct the horizontal phoria like 2) and correct the vertical phoria like 4)
8) 	Exophoria + Left eye with hyperphoria	Correct the horizontal phoria like 2) and correct the vertical phoria like 3)

[Table 3] Analysis of polarized cross chart with the Fixation point Test

■ **Horizontal Coincidence Chart**

-. Objective: To execute the Coincidence and the horizontal phoria test during the subjective test.
-. Auxiliary Lens: Red Filter (right), Green Filter (left)
-. Expectation: The upper frame for the right eye and the lower frame for the left eye form a ideal square.

■ **Vertical Coincidence Chart**

-. Objective: To execute the vertical phoria test during the subjective test.
-. Auxiliary Lens: Red Filter (right), Green Filter (left)
-. Expectation: The right frame for the right eye and the left frame for the left eye make ideal square.

■ **Stereo Chart**

−. Objective: To execute the Stereo test during the subjective test.
−. Auxiliary Lens: Red Filter (right), Green Filter (left)
−. Expectation: The upper rod for the right eye appears to be closer to the patient than the lower rod for the left eye.

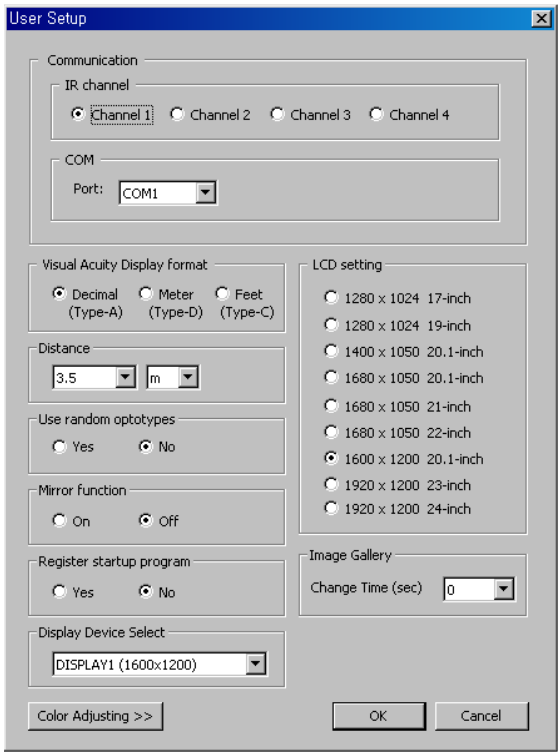
■ **Minute Stereo Chart**

−. Objective: To execute the Minute Stereo Test during the subjective test.
−. Auxiliary Lens: Red Filter (right), Green Filter (left)
−. Expectation: Starting from the central fixation point, clockwise, the next rods pair appears to be more and more close and clear to the patient than the previous one.

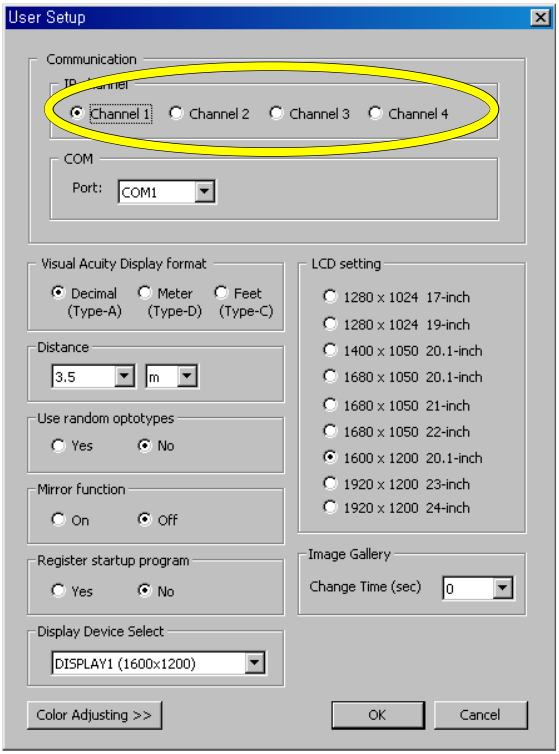
> If the rods in 12 and 3 o'clock directions appear stereoscopically: the patient can recognize up to 1 arc minute.
> If the rods in 3 and 6 o'clock directions appear stereoscopically: the patient can recognize up to 2 arc minutes.
> If the rods in 6 and 9 o'clock directions appear stereo: the patient can recognize up to 4 arc minutes.
> If the rods in 12 o'clock direction and the central fixation point appear stereoscopically: the patient can recognize up to 10 arc minutes.

5.3. User Menu Operation

HDC-7000 provides user menu to convert settings according to installation environment. In user menu, you can adjust communication channel of cordless remote controller, testing distance, LCD type, notation of Visual Acuity and red/green color. You can see the user menu using 'MENU' button on cordless remote controller. You can use mouse or cordless remote controller to convert settings.



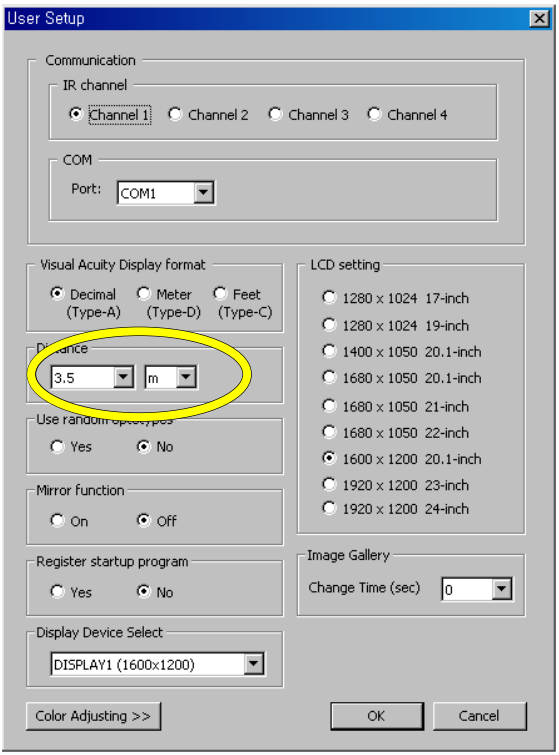
■ **Communication Channel**



HDC-7000 has 4-communication channel. HDC-7000 is operated by only the remote controller which has same communication channel. So, Four HDC-7000's can be installed in one refraction room without mutual interference. You can convert communication as follows.

1) Press the 'MENU' button to display user menu.
2) Select communication channel what you want, then click 'OK' button. If you use remote controller, you can convert selected channel by pressing mask up, down button. Press point mask button to apply converted setting.
3) If you don't want apply converted settings, Click 'Cancel'. If you use remote controller, press 'MENU' button.

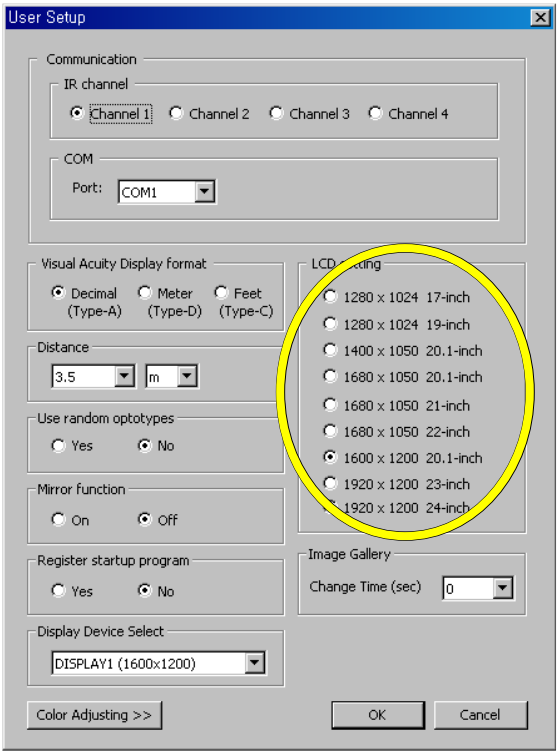
■ **Testing Distance**



HDC-7000 display optotypes with different size according to the testing distance. So testing distance must be selected correctly. You can convert testing distance as follows.

1) Press the 'MENU' button to display user menu.
2) Select testing distance which correspond to HDC-7000 installation environment, then click 'OK' button. If you use remote controller, you can convert testing distance by pressing mask up, down button. Press point mask button to apply converted setting.
3) If you don't want apply converted settings, Click 'Cancel'. If you use remote controller, press 'MENU' button.

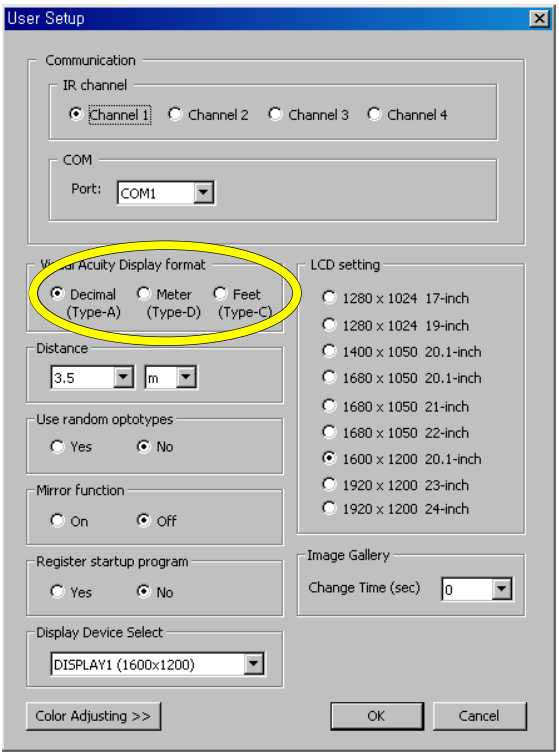
■ **LCD type and resolution**



HDC-7000 support various LCD monitors: 17", 19", 20.1", 23" and 24". Because different LCD has different size of displayed image that has same pixel size, it is very important to select LCD type. You can convert LCD type as follows.

1) Press the 'MENU' button to display user menu.
2) Select LCD type which correspond to HDC-7000 installation environment, then click 'OK' button. If you use remote controller, you can convert LCD setting by pressing mask up, down button. Press point mask button to apply converted setting.
3) If you don't want apply converted settings, Click 'Cancel'. If you use remote controller, press 'MENU' button.

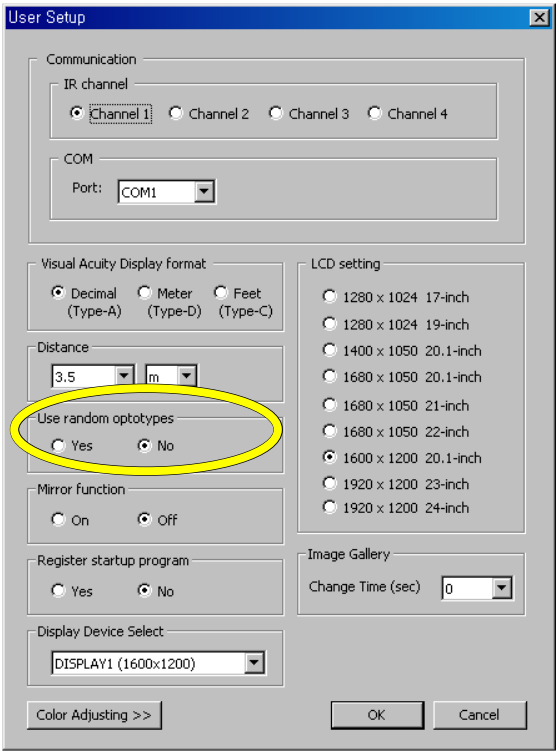
■ **Notation of Visual Acuity**



In HDC-7000, you can convert notation of visual acuity. Decimal format like 1.0, 2.0 is default setting. You can change this to Snellen fraction using feet like 20/20, 20/10 or using meter like 6/6 or 6/3. You can convert notation as follows.

1) Press the 'MENU' button to display user menu.
2) Select notation which you want, then click 'OK' button. If you use remote controller, you can convert notation of VA by pressing mask up, down button. Press point mask button to apply converted setting.
3) If you don't want apply converted settings, Click 'Cancel'. If you use remote controller, press 'MENU' button.

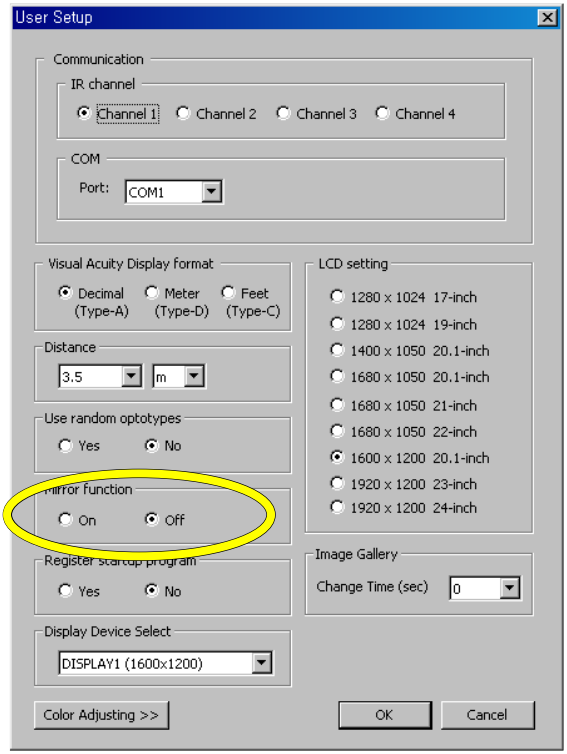
■ Random Optotype Display



HDC-7000 provides random prototype display. This gives better reliability to the optometry. (Generally, chart displays same optotypes at the same position. So patient can remember some optotypes. This makes optometry to have less reliability). You can convert this configuration as follows.

1) Press the 'MENU' button to display user menu.
2) Select 'Yes' or 'No' which you want, then click 'OK' button. If you use remote controller, you can select 'Yes' or 'No' by pressing mask up, down button. Press point mask button to apply converted setting.
3) If you don't want apply converted settings, Click 'Cancel'. If you use remote controller, press 'MENU' button.

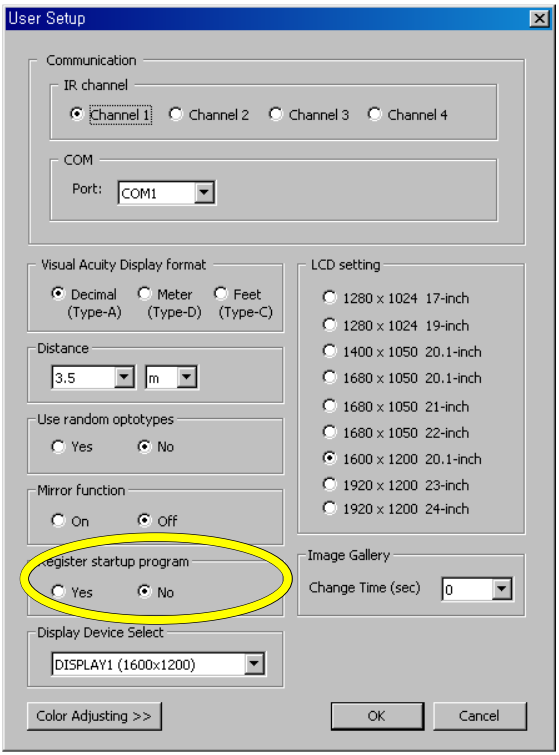
■ Mirror function



HDC-7000 provides revert-optotype display. When HDC-7000 is installed with distance below 2.5m (or 8ft.), you can use mirror with this option to obtain adequate test distance. You can convert this configuration as follows

1) Press the 'MENU' button to display user menu.
2) Select 'On' or 'Off' which you want, then click 'OK' button. If you use remote controller, you can select 'On' or 'Off' by pressing mask up, down button. Press point mask button to apply converted setting.
3) If you don't want apply converted settings, Click 'Cancel'. If you use remote controller, press 'MENU' button.

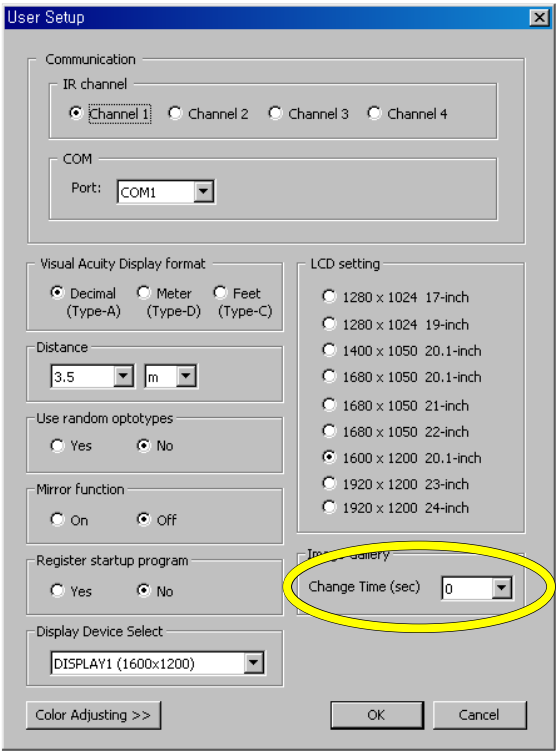
■ Register to Start program



HDC-7000 can be registered as startup program. This makes HDC-7000 starts automatically when windows start. You can convert this configuration as follows.

1) Press the 'MENU' button to display user menu.
2) Select 'Yes' or 'No' which you want, then click 'OK' button. If you use remote controller, you can select 'Yes' or 'No' by pressing mask up, down button. Press point mask button to apply converted setting.
3) If you don't want apply converted settings, Click 'Cancel'. If you use remote controller, press 'MENU' button.

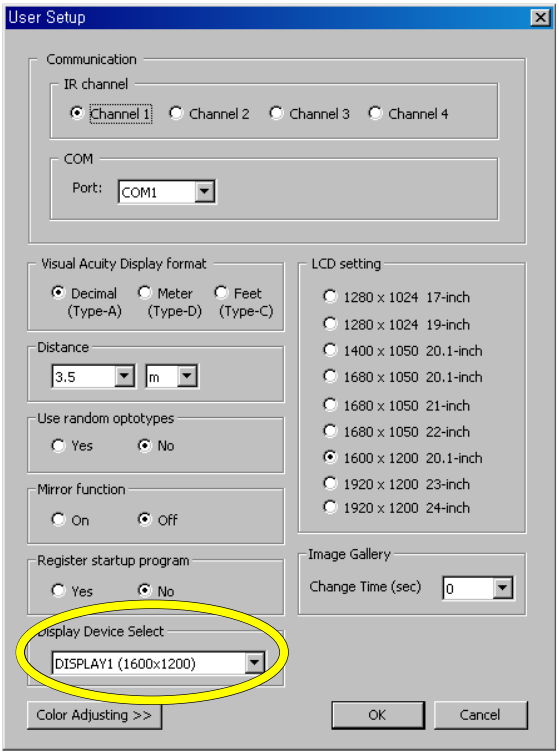
■ Image change time in Image Gallery



You can convert image auto change time in Image Gallery mode. If you set 'Change Time' to 0, auto change is not worked. You can convert this configuration as follows.

1) Press the 'MENU' button to display user menu.
2) Select the time which you want, then click 'OK' button. If you use remote controller, you can convert image change time by pressing mask up, down button. Press point mask button to apply converted setting.
3) If you don't want apply converted settings, Click 'Cancel'. If you use remote controller, press 'MENU' button.

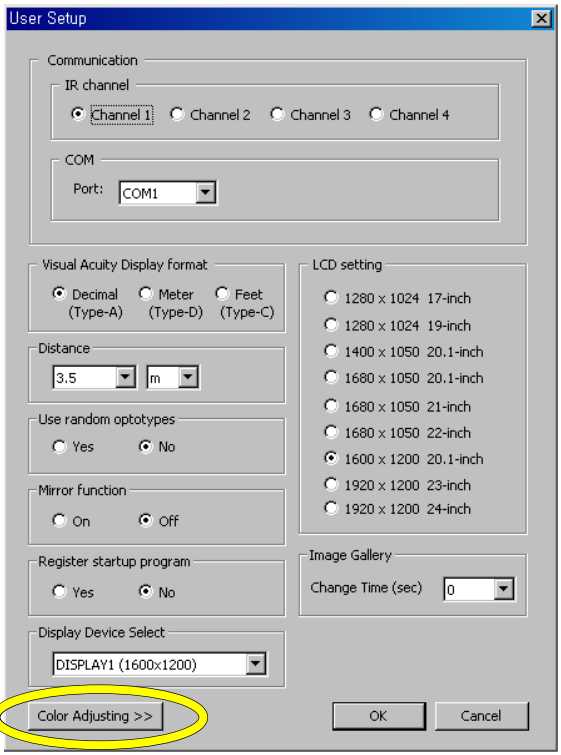
■ Monitor select in mutil-monitor environment



In multi-monitor environment, HDC-7000 can select default output device. When you use only one monitor, this setting will be disabled. You can adjust red/green color as follows.

1) Press the 'MENU' button to display user menu.
2) Select the time which you want, then click 'OK' button. If you use remote controller, you can select display device what you want by pressing mask up, down button. Press point mask button to apply converted setting.
3) If you don't want apply converted settings, Click 'Cancel'. If you use remote controller, press 'MENU' button.

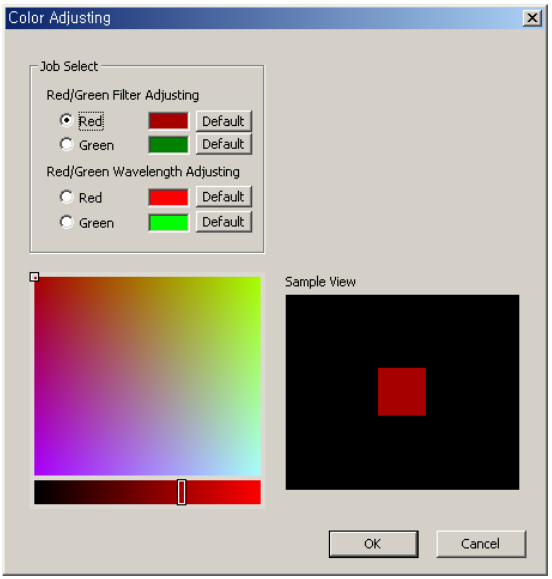
■ Red/Green Color



Because HDC-7000 support various LCD monitors, there color of green, red might be different even if RGB value is same. To solve this problem, HDC-7000 provides color adjusting function. You can adjust red/green color as follows.

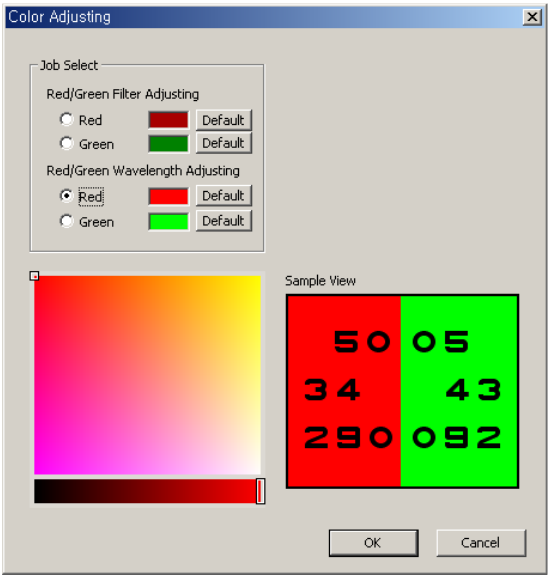
1) Press the 'MENU' button to display user menu.
2) Connect mouse to the PC

3) Click 'Color Adjusting >>'. If you use remote controller, you can select 'Color Adjusting >>' by pressing mask left, right button. Press point mask button to enter Color adjusting menu.



4) Using mouse on left-bottom color box, adjust red or green color. You can preview on right-bottom box. Click 'OK' to apply converted color. (Remote controller is available on red/green adjusting menu, too. But you can't change the color of red/green by remote controller. Only mouse is available on changing color of red/green.)

A. 'Filter adjusting' is used to adjust red & green color which is included in the chart using red/green filter. You must adjust color to be invisible when see with opposite color filter. In example, if you want adjust red color, you see sample view region with green filter and then adjust color to be invisible. If you don't want apply converted settings, Click 'Cancel'. You can get default value of the color using 'Default' button.

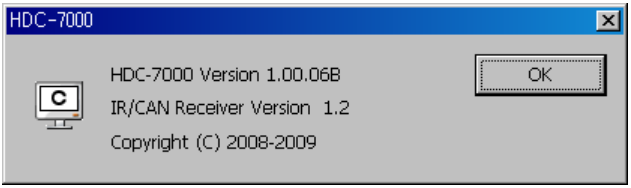


B. 'Wavelength adjusting' is used to adjust red & green background color.

5) If you don't want apply converted settings, Click 'Cancel'. If you use remote controller, press 'MENU' button.

5.4. Check Version Info

You can check version info of HDC-7000 with the following procedure. 1) Connect the mouse. 2) Click right mouse button to display menu. 3) Select 'About'. After you select 'About', you can see following figure.



At 1st line, you can see HDC-7000's version. And at 2nd line, you can IR/CAN receiver's version.

6. Keeping and Maintenance

6.1. Keeping

Keep product to the place which is suitable to '2.3 Environmental factors' and '2.4 Safety precautions'.

6.2. Maintenance

6.2.1. Replacing the Battery of Chart Remote

1) Remove the battery cover from the rear panel by sliding it.
2) Unload all the batteries.
3) Insert four new AAA size rechargeable batteries in the direction specified inside the battery box. Then, reinstall the battery cover.

⚠ WARNING

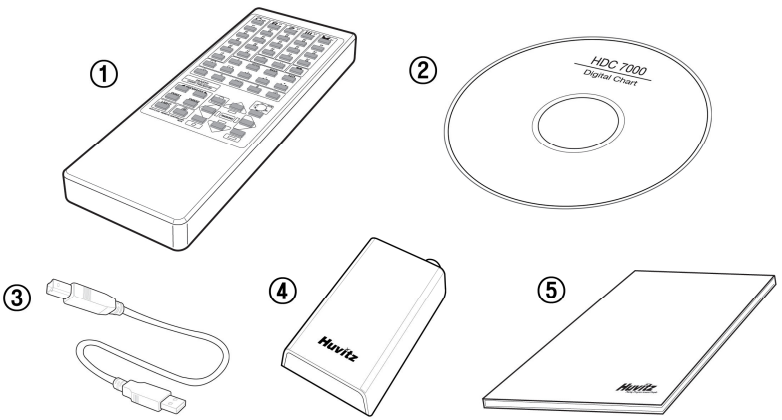
The direction of batteries should be the same as plus + and minus - marks printed in the battery case of the chart remote control. Leakage of battery acid may cause a malfunction of the chart remote control or damage the periphery.

7. Specifications

Chart	41charts -34 mask, Red/green Filters
Mask	Horizontal, Vertical, Single optotype display
Red/Green chart	Color adjustable
Test distance	8~20 feet (2.5~6m), adjustable by 0.5 feet (0.1m)
Applicable monitor	17, 19, 20, 23, 24-inch LCD monitor
Data Communication	USB (PC), CAN/IR (HDR/CDR), IR(Remote controller)
Receiver size	51mm(W) x 80mm(L) x 21mm(H) / 43.5g
Receiver power	5V, 100mA, 0.5W via USB cable

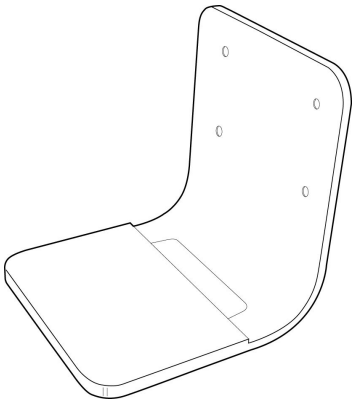
8. Components List

8.1. Standard accessories



① Cordless remote controller
② HDC-7000 installation CD
③ USB cable
④ IR/CAN receiver
⑤ User manual

8.2. Optional accessories



- Wall mount (only for iMac)

9. Service Information

How to contact service: If there are any problems with the equipment, please follow the steps below:

- First of all, refer to the 6. Maintenance and Repair sections according to the problem that you are encountered. And then follow the suggested sequences.
- If the problem persists, please contact the local distributor in your province or country at first.

If you can't contact with your local distributor, you can directly get in touch with the service department of the HUVITZ using the phone number and the address written in the below table.