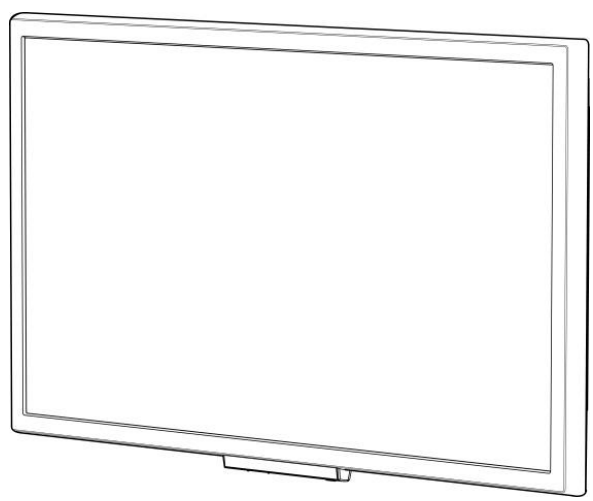
ENG

USER MANUAL

Digital Chart

HDC-9100N / HDC-9100PF



Huvitz Re:define, Re+create

IMPORTANT NOTICE

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

The information in this publication has been carefully checked and is believed to be entirely accurate at the time of publication. However, HUVITZ assumes no responsibility for possible errors or omissions, or for any consequences resulting from the use of the information contained herein.

HUVITZ reserves the right to make changes in its products or product specifications at any time and without prior notice, and is not required to update this document to reflect such changes.

9000ENG0094-D

(2022.05)

ANVISA : 81325990374

Huvitz Co., Ltd.

38, Burim-ro 170beon-gil, Dongan-gu, Anyang-si, Gyeonggi-do, 14055

Republic of Korea

All rights are reserved.

Under copyright laws, this manual may not be copied, in whole or in part, without the prior written consent of Huvitz Co., Ltd.

Contents

1. INTRODUCTION 6

1.1. SYSTEM OUTLINE 6
1.2. INTENDED USE 6
1.3. CLASSIFICATION 6
1.4. CONTRAINDICATION 7
1.5. PATIENT REQUIREMENT 7
1.6. APPLIED STANDARDS 7

2. SAFETY INFORMATION 8

2.1 INTRODUCTION 8
2.2 SAFETY SYMBOLS 9
2.3 ENVIRONMENTAL FACTORS 12
2.4 SAFETY PRECAUTION 14

3. FEATURES 17

4. USING THE INSTRUMENT 18

4.1 PREPARATION 18
4.2 OPERATION PROCEDURE 19
4.3 AFTER USING THE INSTRUMENT 20

5. NOTE FOR USE 21

5.1 NOTES ON THE USAGE 21
5.2 NOTES ON THE INSTALLATION 22
5.3 NOTES ON THE STORAGE 24

6. CONFIGURATION 25

6.1 MAIN BODY 25
6.2 REMOTE CONTROL 27

7. INSTALLATION 32

7.1 PREPARATION 32
7.2 INSTALLING THE MAIN BODY 32
7.2.1 Standard Installation 32

7.2.2 Installation with a Mirror 34
7.3 CONFIGURING THE SETTINGS 36
7.4 INTERFACING WITH THE DIGITAL REFRACTOR 36

8. USING THE MENU MODE AND FUNCTIONS 37

8.1 EXECUTING AND OPERATING THE MENU MODE 37
8.2 USING THE MENU MODE 39
8.2.1 Vision Test 40
8.2.2 Vision Therapy 52
8.2.3 Mode for Movie / Photo 55
8.2.4 Setting 57
8.3 OTHER FUNCTIONS 66
8.3.1 Adjusting the Contrast Sensitivity 66
8.3.2 Input Custom Program 67
8.3.3 Changing the Channel of the Remote Control 67

9. OPTOMETRIC TEST USING THE DIGITAL CHART 68

9.1 CYLINDER AXIS TEST 68
9.2 CYLINDER POWER TEST 68
9.3 BINOCULAR CYLINDER AXIS TEST 69
9.4 BINOCULAR CYLINDER POWER TEST 69
9.5 RED/GREEN TEST 70
9.6 CROSS CYLINDER TEST FOR AXIS 71
9.7 CROSS CYLINDER TEST FOR POWER 71
9.8 BINOCULAR BALANCE TEST 72
9.9 DOMINANT EYE TEST FOR PATIENTS WITH PHORIA 72
9.10 WORTH 4 DOT TEST 73
9.11 POLARIZED CROSS TEST 73
9.12 FIXATION DISPARITY TEST 73
9.13 COINCIDENCE TEST 74
9.14 SCHOBER TEST 74
9.15 VON GRAEFE TEST 74
9.16 MADDOX ROD TEST & THORINGTON TEST 75
9.17 ZEIGER TEST 76

9.18 STEREO TEST 76
9.19 MINUTE STEREO TEST 77

10. MAINTENANCE 77

10.1 REPLACEMENT OF BATTERY OF REMOTE CONTROLLER 77
10.2 CLEANING 78
10.3 DISPOSAL 79

11. TROUBLESHOOTING 79

11.1 LCD SCREEN IS NOT TURNED ON 79
11.2 CHART DISPLAYS BROKEN IMAGE 79
11.3 THE MAIN BODY IS NOT RESPONSIBLE TO THE REMOTE 80
11.4 THE SCREEN IS TOO BRIGHT OR TOO DARK 80
11.5 VISUAL ACUITY TEST RESULTS IN OVERCORRECTION OR UNDERCORRECTION 80
11.6 VISUAL ACUITY TEST RESULTS IN OVERCORRECTION OR UNDERCORRECTION 81
11.7 RED/GREEN FILTER IS NOT FILTERING COMPLETELY 81
11.8 POLARIZER TEST IS NOT WORKING 81

12. COMPONENTS LIST 82

13. PRODUCT SPECIFICATION 83

14. EMC INFORMATION 85

15. SERVICE INFORMATION 90

1. Introduction

1.1. System Outline

The Huvitz Digital Chart (HDC-9100) is a computerized chart presenting device that provides charts for refractive correction test and various functional tests such as cross cylinder, red/green, binocular balance, fusion and suppression, heterophoria, associated phoria, aniseikonia, stereopsis, and dominant eye test for heterophoria. Since the Digital Chart implements charts on the LCD panel by exploiting the cutting edge digital technology, it's not only faster and quieter but also equipped with multifarious convenience functions. The contrast sensitivity and the background luminance of the chart are adjustable for environmental needs. The chart can be installed in a wide range from 1.5 to 6 meter. The distance between optotypes can be set to variable distance and even the selection of optotype can be randomized. Also the image gallery contains a dozen of image clips that the examiner could utilize during the examination. Various masking and random functions would be helpful for a punctual vision test.

The examiner may execute all the charts and functions by using the remote and the buttons on the main body of the digital chart. If the chart is connected to the Huvitz Digital Refractor, the examiner would just use the Operation Panel of the Digital Refractor for chart operation as it allows to control the lens unit and the chart device at the same time by a touch of buttons on it.

1.2. Intended Use

The Huvitz Digital Chart (HDC-9100) is a computerized chart presenting device that provides charts for refractive correction test and various functional tests.

1.3. Classification

- **Classification of product (according to EU MDR 2017/745) : Class I**
- **Resistance against electric shock: Class II. (This includes the AC/DC adapter)**
- **Protection class against electric: N/A**
- **Equipment is NOT suitable for use in the presence of flammable anesthetics mixture with oxygen or with nitrous oxide**
- **Mode of Operation: Continuous**

1.4. Contraindication

This device should not be used for:

• Patients who cannot maintain a relaxed position.

1.5. Patient Requirement

The patient who undergoes and examination by this instrument must maintain concentration for a few minutes and adhere to the following instructions.

- Keep the eye open
- Understand and follow instructions when undergoing an examination.

1.6. Applied Standards

- IEC/EN 60601-1: MEDICAL ELECTRICAL EQUIPMENT
  – Part 1: General requirements for safety

- IEC/EN 60601-1-2: Medical electrical equipment Part1: General requirements for safety
  - Collateral Standard: Electromagnetic Compatibility-Requirements and tests

- ISO15004-1: Ophthalmic instruments
  – Fundamental requirements and test methods
  General Requirements applicable to all Ophthalmic instrument

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 here in.

⚠ WARNING

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

"Warning" indique la présence d'un danger pouvant entraîner des blessures graves, la mort ou des dommages matériels importants s'il est ignoré.

NOTE

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

"Remarque" décrit les informations pour l'installation, le fonctionnement ou la maintenance, qui sont importantes mais qui présentent un danger si elles sont ignorées

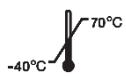
⚠ CAUTION

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

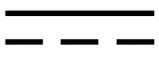
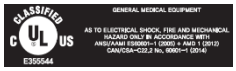
"Caution" indique la présence d'un danger pouvant entraîner des blessures mineures ou des dommages matériels si ignoré.

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.

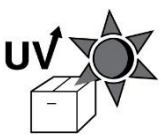
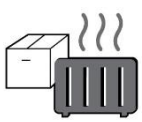
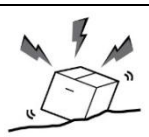
Symbol	Indication
	This symbol identifies a safety note. Ensure you understand the function of this control before using it. Control function is described in the appropriate User's or Service Manual. (Ce symbole identifie une note de sécurité. Assurez-vous de comprendre la fonction de ce contrôle avant de l'utiliser. La fonction de contrôle est décrite dans le manuel d'utilisation ou d'entretien approprié.)
	This symbol identifies the standby;power switch and indicates its operational status (Ce symbole identifie le commutateur de secours et indique son état de fonctionnement)
	Temperature Limitation (Limitation de température)
	Atmospheric pressure limitation (Limitation de pression atmosphérique)
	Humidity limitation (Limite d'humidité)
	Stack direction (Direction de la pile)
	Keep DRY (Garder au sec)
	Fragile , handle with care (Fragile, manipuler avec soin)
	Handle with care (Manipuler avec soin)
	Keep away from sunlight (Tenir à l'écart de la lumière du soleil)
	Stack layer limit (Limiter la couche de pile)

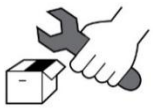
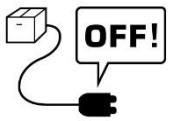
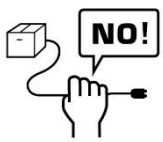
CE	CE Mark (Marque CE)
	Use no hook (N'utilisez aucun crochet)
	WEEE Symbol – EU only <u>Disposal of your old appliance</u> When this crossed-out wheeled bin symbol is attached to a product it means the product is covered by the European Directive 2002/96/EC. All electrical and electronic products should be disposed of separately from the municipal waste stream via designated collection facilities appointed by the government or the local authorities. The correct disposal of your old appliance will help prevent potential negative consequences for the environment and human health. For more detailed information about disposal of your old appliance, please contact your city office, waste disposal service or the shop where you purchased the product. (Symbole WEEE- EU seulement <u>Mise au rebut de votre ancien appareil</u> Lorsque ce symbole de poubelle barrée est joint à un produit, cela signifie que le produit est couvert par la directive européenne 2002/96 / CE. Tous les produits électriques et électroniques doivent être éliminés séparément du flux des déchets municipaux via des installations de collecte désignées par le gouvernement oules autorités locales. L'élimination correcte de votre ancient appareil aidera à prévenir les conséquences negatives potentielles sur l'environnement et la santé humaine. Pour plus d'informations sur l'élimination de votre ancient appareil, veuillez contacter votre mairie, le service d'élimination des déchets ou le magasin où vous avez acheté le produit.)
EC REP	Authorized representative in the European Community – EU ONLY (Représentant autorisé dans la Communauté européenne- EU seulement)
	Manufacturer (Fabricant)
	Date of manufacture (Il indique l'année de fabrication et le fabricant.)

	Refer to instruction manual/booklet (Se reporter au manuel d'instructions / brochure)
	QR code (QR code)
	Direct Current (Courant direct)
	The United States and Canada have mutual-recognition agreements. Therefore, if certified using a Canadian specification (CSA) for UL, the certification mark for the product will be a C-UL certification mark which means CSA specification compliance as follows. (Les États-Unis et le Canada ont conclu des accords de libre-échange. Par conséquent, si l'on obtient une certification au moyen d'une spécification canadienne (CSA) pour l'AMT, la marque de certification pour le produit sera une marque de certification C-UL, ce qui signifie la conformité de la spécification CSA comme suit.)
	Medical Device (dispositif medical)
	Wi-Fi sticker (Wi-Fi autocollant)

2.3 Environmental Factors

Avoid the following environments for operation or storage:

	Where the instrument is exposed to water vapor. Don't operate the instrument with wet hands Indoor use only.
	Where the instrument is exposed to direct sunlight.
	A place where the equipment can be exposed to direct ultraviolet.
	Where there are big changes in temperature. Optimal temperature range for normal operation is from 10°C to 40°C (Humidity : 30 ~ 90%).
	Where there is hot equipment nearby.
	Where the humidity is extremely high or there is a ventilation problem.
	Where the instrument is exposed to excessive shocks or vibrations.
	Where the instrument is exposed to chemical material or explosive gas.
	Be cautious so that things like dust and metal do not fall inside the instrument.

	Don't disassemble or open the product. HUVITZ does not take responsibility for the possible problems
	Be careful not to block the fan of the instrument.
	Don't plug the AC power cable into the outlet unless all parts of the instrument are completely connected. Otherwise, it will cause severe damage on the instrument.
	Pull out the power cable with holding the plug, not the cord. To avoid risk of electric shock, this equipment must only be connected to a supply mains with protective earth.

This instrument can withstand the following conditions:

1. Operation

- An ambient temperature range of 10℃ ~ 40℃ (50°F ~ 104°F)
- A relative humidity range of 30% ~ 90% (with non-condensing)
- An atmospheric pressure range of 800 ~ 1060hpa

2. Transportation

- An ambient temperature range of -40℃ ~ 70℃ (-40F ~ 158°F)
- A relative humidity range of 10% ~ 95%
- An atmosphere pressure range of 500 ~ 1060hpa

3. Storage

- An ambient temperature range of -10℃ ~ 55℃ (14°F ~ 131°F)
- A relative humidity range of 10% ~ 95% (with non-condensing)
- An atmosphere pressure range of 700 ~ 1060hpa

Avoid environments where the equipment is exposed to excessive shocks or vibrations.

2.4 Safety Precaution

This equipment has been developed and tested in conformity with domestic & international safety standards and regulations, which guarantees the high stability of this product. This guarantees a very high degree of safety for this device. The legislator expects us to inform the user expressively about the safety aspects in dealing with the 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 device must be used with accessory kits which were offered by HUVITZ. If customer want to use accessory kit from other manufacturer, that accessory kit's safety must be guaranteed by HUVITZ or manufacturer of accessory kit.

2. The equipment must be operated only by, or under direct supervision of properly trained and qualified person/s.

3. Modifications of this equipment may only be carried out by Huvitz's service technicians or other authorized persons.

4. Customer maintenance of this equipment may only be performed as stated in the User Manual. Any additional maintenance may only be performed by Huvitz's 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. Only persons who have undergone proper training and instructions are authorized to install, use, operate, and maintain this equipment.

7. User Manual should be kept in the place where the persons in charge of operation and maintenance can access easily any time.

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

9. Before every operation, proceed with visual inspection on the equipment exterior to seek any mechanical damage(s) to ensure the proper functioning.

10. Do not obstruct any ventilation outlet for proper heat dissipation.

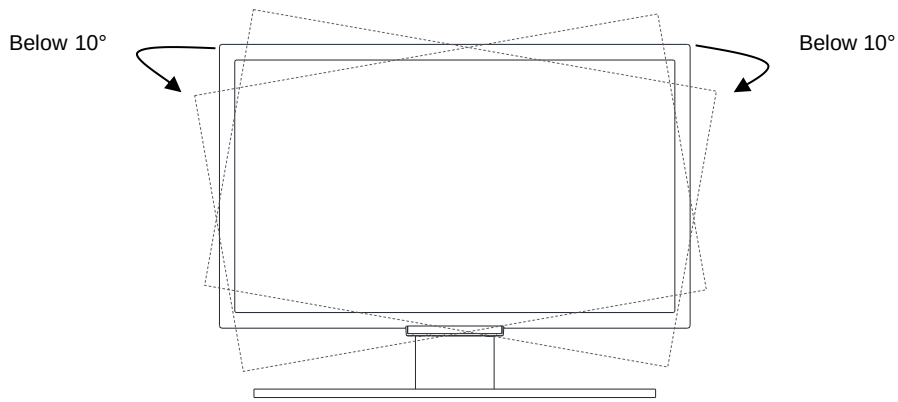
11. In case of any presence of smoke, spark or abnormal noise/smell from the machine, please power off immediately and pull out the plug.

12. The device should neither be kept nor installed in the place with the risk of explosion or near the alcohol, benzene and other inflammable substance.

13. The device should neither be kept nor installed in the place with high humidity. For the optimal operation, the humidity should be at the range of 30%~90%.

14. 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.

15. To avoid injury by tipping over, set the monitor to the following tilted position before moving.



16. Before connecting the AC power cord to the DC adapter outlet makes sure the voltage designation of the DC adapter corresponds to the local electrical supply.

17. Equipment grounding is vital for safe operation. Plug power cord into a properly earthed mains supply outlet whose voltage and frequency characteristics are compatible with those listed on the monitor or in this manual. Do not uses plug adapters or extension cords; such devices defeat the safety ground and could cause injury.

18. Grounding reliability is achieved only when the monitor is connected to a “hospital only” or “hospital grade” receptacle. Inspect routinely and do not use if damage is discovered.

19. Do not touch signal input, signal output or other connectors, and the patient simultaneously.

20. Plug the female and of the AC Power Cord into the AC inlet of the DC Adapter.

    Caution: Make sure the power cord is the correct type that is required in your area.
    This LCD monitor has a universal power supply that allows operation in either 100-120V AC or 200-240V AC voltage areas (no user adjustment is required).
    Use the proper power cord with correct attachment plug type. If the power source is 120 V AC, use a power cord which is a Hospital Grade Power Cord with NEMA 5-15 style plug, labeled for 125 volts AC with UL and C-UL approvals. If the power source is a 240 V AC supply, use the tandem (T blade) type attachment plug with ground conductor power cord that meets the respective European country’s safety regulation.
    The hospital-grade plug for medical products intended for use in Denmark has DEMKO approval and is rated 13 amps at 250 Vac. Plug is recommended for use in medical applications and specification are being added to the standard SB 107-2-D1. Plug mates with maker’s Danish hospital-grade socket. Hospital sockets have slightly

different shaped openings allowing only the hospital plug, not the standard Danish plug, to be inserted, to protect the ac circuit in specific medical settings.

21. External equipment intended for connection to signal input, signal output or other connectors, shall comply with relevant IEC Standard (e.g., IEC60950 for IT equipment and IEC60601-1 series for medical electrical equipment). In addition, all such combination-system-shall comply with the standard IEC60601-1 and/or IEC60601-1-1 harmonized national standard or the combination. If, in doubt, contact qualified technician or your local representative the operator should not touch the patient and accessible male parts of the SIP/SOP connectors simultaneously.

3. Features

The following features are main features of this device. You can get more precise information in the index of 8.

- **HDC-9100PF consists of LCD panel that can express polarization.**
- **HDC-9100N consists of LCD panel that cannot express polarization. This device support binocular test through the Red/Green filter**
- **By the vision test function, you can check the color blindness and color weakness.**
- **By the two kind of Hue Test, you can check the color ability.**
- **You can adjust easily with button of remote controller. And also this device supports the function of adjusting of level of contrast.**
- **We can change test distance freely, from 1.5m to 6m in the unit of 10cm.**

If you set the distance under the 2.5m, This could result not clear expression of chart.
If you want to see clear chart in the distance under the 2.5m, You must install mirror.

Si vous définissez une distance inférieure à 2,5 m, l'expression du graphique risque de ne pas être claire. Si vous voulez voir un graphique clair au loin sous les 2,5 m, vous devez installer un miroir

- **Through the mirroring function, we can test examinee in the small room.**
- **The chart space can be changed by user.**
- **With the random chart, you can prevent examinee to remember order of chart.**
- **With various image, you can explain or use in the test.**
- **This device provides background contrast function. You can set background to display white or black.**
- **This device support communication with HUVITZ digital reflector in wired or wireless.**

4. Using the Instrument

4.1 Preparation

Before using this product, please perform the required action refer to the following information and documentation.

- You can install the device in the wall mount, desk stand, moving stand. You should use stands and wall mount that provided by Huvitz.
- The device should be installed by qualified person or be installed under the supervision of qualified person.
- Check that the front side of the LCD panel is clean. Clean the dust on it.
- You must use cable and adapter which was provided by Huvitz.
- Simply check the device, after the connection of cable and adapter.
- Fix cable and adapter not to move.
- Check the remote controller battery right place and power remains.
- If the environment like test distance has been changed, Changed settings in the menu.
- In the case of HDC-9100PF, set the LCD panel right angle for using polarized filter.
- In the case of HDC-9100PF, check if protective film on the LCD panel has been removed. The film or any other similar materials could obstruct the polarizer test

⚠ WARNING

Standard of adapter is DC12V 5A.
You must use adapter and cable that provided by Huvitz.
The adapter that provided by Huvitz have medical certification.
Huvitz have no responsibility about problem that caused by using adapter and cable which are not provided by Huvitz.

Le standard de l'adaptateur est DC12V 5A. Vous devez utiliser l'adaptateur et le câble fournis par Huvitz.

L'adaptateur fourni par Huvitz est certifié médicalement. Huvitz décline toute responsabilité en cas de problème lié à l'utilisation d'un adaptateur et d'un câble non fournis par Huvitz.

4.2 Operation procedure

Operation procedures may differ from the users. Followings are the most basic operational sequence.

- Connect power adapter to main body correctly. Fix adapter with cable tie.
- Press ⏻ power switch, the power LED turns on with one beep.
- Confirm the HDC Logo on the LCD panel
- Wait for the boot up and display of the C chart. The power LED turns off.
- Guide the patient to the right distance, make the patient see the chart.
- Adjust the LCD panel angle if necessary.
- Start and proceed the tests with the necessary chart using remote control.
- Program function allows you to set the most commonly used chart order for optometry and it helps to test quickly. For more detailed operation of program function, see the Register to Start program.
- After a period of idle time, screen off or screen saver will be activated. To revert to the chart, press any button on the remote controller. To setup or change the screen saver operation, check the Setup Menu section.
- When turn off the device, Press ⏻ power switch until beep 2 times. After some second, when beep 2 times again, the power is completely off. Improper shutdown can cause data loss.

In the black background color, the color on LCD can be spread. It's normal condition.

Dans la couleur de fond noire, la couleur sur l'écran LCD peut être étendue. C'est la condition normale.

In HDC-9100PF, existence of oil film phenomenon on LCD panel is normal condition. It is interference fringes.

Dans HDC-9100PF, l'existence d'un phénomène de film d'huile sur l'écran LCD est une condition normale. Ce sont des franges d'interférence.

4.3 After using the Instrument

- Turn off the ⏻ power switch of the main body and disconnect the power plug.
- Please do not pull on cable or do not use an impractical force.
- Remove the power if you are not using for a long time.
- Refer to the section “5.3 Notes on the Storage” and follow the steps for storage.
- Maintain all parts and cables clean and arranged for next use.
- Do not tamper or open the product. The manufacturer is not liable for the damages caused by such tampering.
- Do not plug the AC power cord into the outlet before the instrument is connected completely. This could provide reason for defects.
- Do not use organic solution such as thinner, benzene, etc. to clean the surface of this product. It may damage the product
- In case of no use of the machine for a long time, please put the dust cover on the device after powering and plugging off.
- For moving the instrument, disconnect the power first and hold firmly with both hands always.

5. Note for Use

5.1 Notes on the Usage

When using this product, please be aware of the followings

- Avoid places where ambient temperature is too low or too high for normal operation.
- Check the overall status of the instrument and any abnormally in the examinee persistently.
- If any abnormality is observed, the operator is required to take appropriate measures, stop the operation of the instrument and let the examinee in safe and stable condition.
- Avoid the examinee being touched by the instrument.
- During the examination using this instrument, maintain the examinee in upright and correct position.
- Carefully handle the instrument so as not to give impact on it or let fall it.
- Use the instrument under properly controlled ambient illumination. It could affect the test result.
- To interface this instrument with other instrument, contact the dealer you purchased the instrument.
- During the operation, if the instrument gives off smokes, sparks, strange noises or odors, immediately turn off and unplug the power. The contact the dealer you purchased the instrument.

5.2 Notes on the Installation

When installing this product, the installer should be aware of the following.

- Avoid places where the instrument is exposed to water vapor or moisture directly.
- Avoid places where the instrument is exposed to the condition under harmful influence by atmospheric pressure, humidity, temperature, ventilation, sunlight or by the air containing dust, salinity, sulfur and etc..
- Install the instrument on a place stable and leveled.
- Avoid places where the instrument is subject to excessive shocks or vibrations.
- Avoid places where the instrument is exposed to chemical material or explosive gas.
- Avoid places where it is near the heating equipment.
- Avoid places where the humidity us extremely high or there is a ventilation problem.
- Install the instrument within the capacity of the power supply and the power consumption.
- Install the instrument within the proper earth ground of the power.
- Check the contact of the switches and the polarity by using a device such as multi-meter to confirm safe and correct operation of the instrument.
- Check if the overall cable and power connection are correct and complete.
- Using the devices jointly could result a risk.
- Wall mount and stands must be installed by the order written in manual.

Fix the power input and adapter not to move.

Fixer l'entrée d'alimentation et l'adaptateur pour ne pas bouger.

⚠ WARNING

Wall mount and stands are must be installed after You are well informed of caution in manual. The device should be installed by qualified person or be installed under the supervision of qualified person.

Le support mural et les supports doivent être installés après avoir été informés de toutes les précautions du manuel. L'appareil doit être installé par une personne qualifiée ou sous la surveillance d'une personne qualifiée.

⚠ WARNING

In the place of inclined 10degree, the device might be collapsed. So please install device in the flat place.

À la place d'incliné de 10 degrés, l'appareil peut être effondré. Alors installez s'il vous plaît l'appareil à la place.

⚠ WARNING

To prevent collapse, do not install moving stand around examinee and examiner. When you move moving stand check the condition of floor.

Pour éviter l’effondrement, n’installez pas de support mobile autour du candidat et de l’examinateur. Lorsque vous vous déplacez, vérifiez l'état du sol.

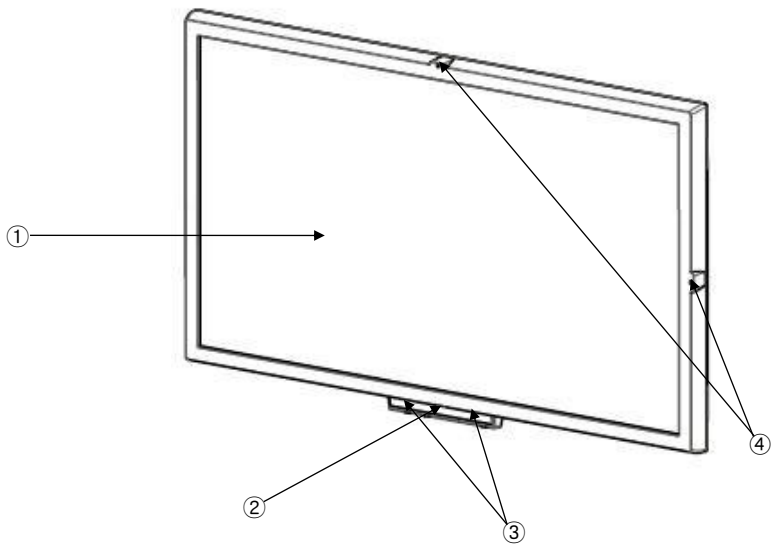
5.3 Notes on the Storage

When storing this instrument, the user should be aware of the followings.

- Avoid places where the instrument is exposed to water vapor or moisture directly.
- Avoid places where the instrument is exposed to direct sunlight.
- Avoid places where the temperature changes extremely. Recommended storage temperatures is from -10℃ to 55℃, with the humidity between 10 and 95%.
- Avoid places where it is near the heating equipment.
- Avoid places where the humidity is extremely high or there is a ventilation problem.
- Avoid places where the instrument is subject to excessive shocks or vibrations.
- Avoid places where the instrument is exposed to chemical material or explosive gas.
- Be careful not to be inserted dust, especially metal.

6. Configuration

6.1 Main Body



① **LCD Panel**

The LCD Panel displays chart, menu and other information on it.

② **IR Receiver Window**

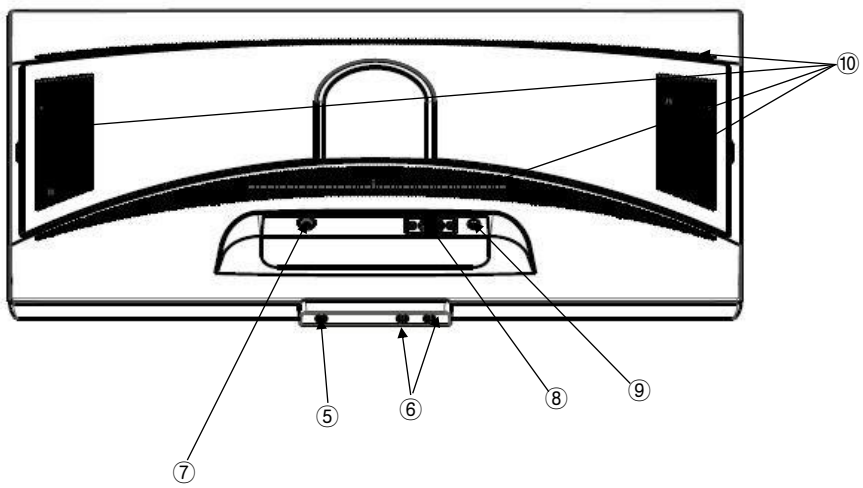
A window for receiving the remote signal. (Please keep unobstructed or cannot receive the IR signal normally)

③ **LED**

The LED indicates the operating status of the main body.

④ **Maddox LED**

The LED for Maddox Rod Test.



⑤ **Power switch**

It turns on and off the power of the main body.

⑥ **LCD screen brightness control switch**

Use to adjust the brightness of the LCD screen.

⑦ **CAN Port**

Connector for the communication with other product or computer

⑧ **USB port**

When you execute the FM-100 Test, You can use the mouse.(refer User Manual 8.2.1. vision test)
You can show movie and photo connecting the external storage(USB)
(refer User Manual 8.2.3. mode for movie/photo)

The file system format of the external storage device (USB) must be FAT format. (NTFS format is not supported.)

Le format du système de fichiers du périphérique de stockage externe (USB) doit être au format FAT. (Le format NTFS n'est pas pris en charge.)

⑨ **Power input**

Power supply unit for connecting the power adapter.

⑩ **Ventilation Slits**

These slits ventilate the main body so that it keeps the appropriate temperature while the chart is running.

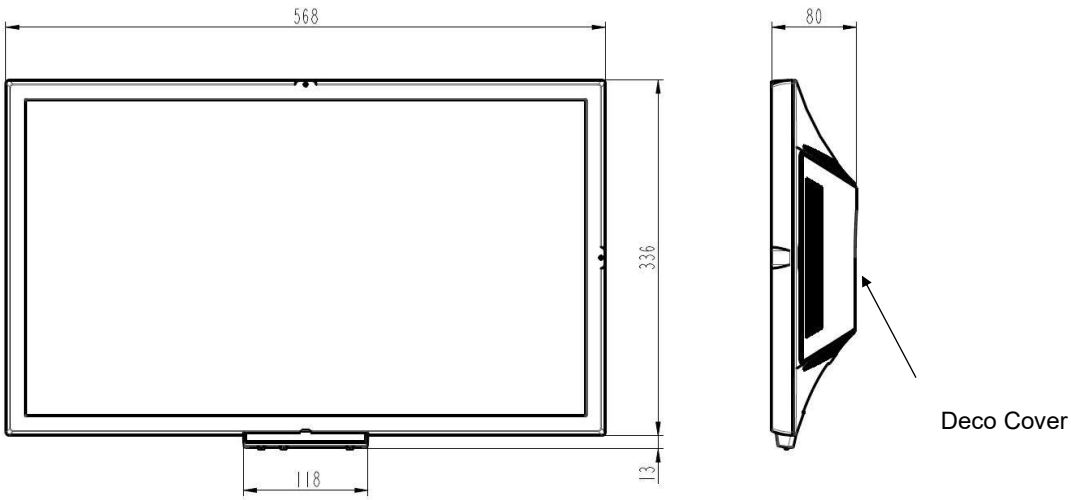
WARNING

Do not cover or place anything on the ventilation slits. Overheat can cause a product malfunction
When you install this product as wall-hanging form, separate the Deco cover. It will help the product to

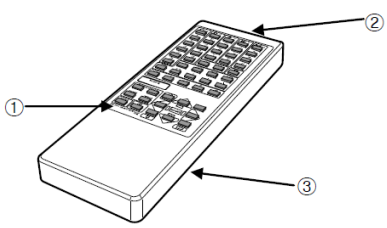
cool.

Ne couvrez et ne placez rien sur les fentes de ventilation. Une surchauffe peut provoquer un dysfonctionnement du produit Lorsque vous installez ce produit en tant que forme suspendue au mur, séparez le couvercle Deco.

Cela aidera le produit à refroidir.



6.2 Remote Control



① Button Panel

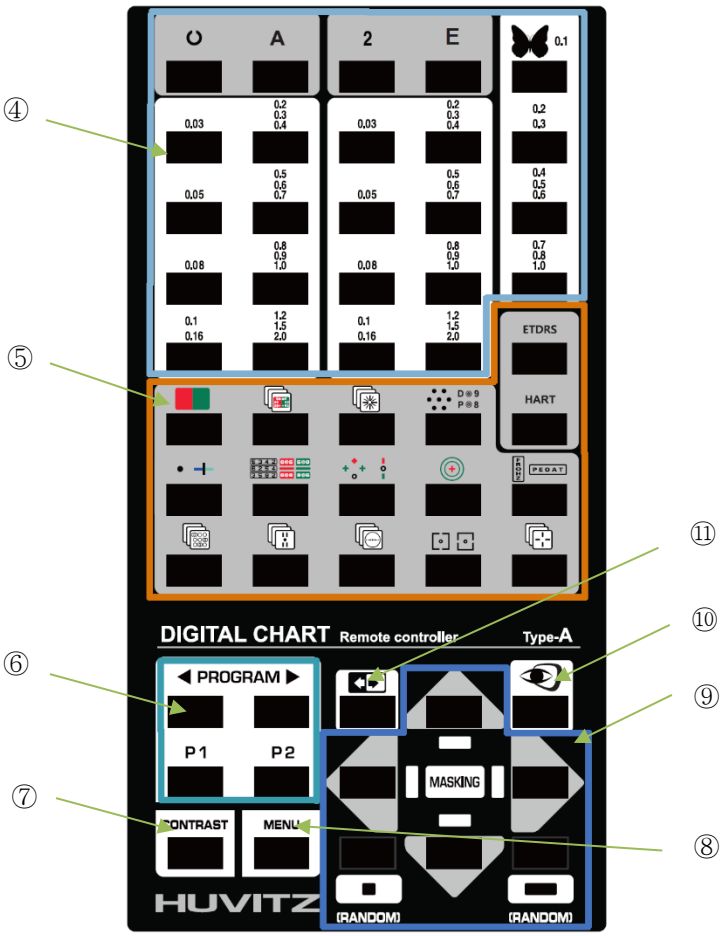
Buttons provided on the remote executes charts, mask operation, menu, image gallery, contrast and etc.

② IR Transmitter Window

The transmitter inside the window emits infrared signals for the buttons.

③ Battery compartment

On the back of the remote provides a room for batteries. Open the cover to install or replace batteries. The size and type information about the battery is printed on the label attached on the back of the remote.



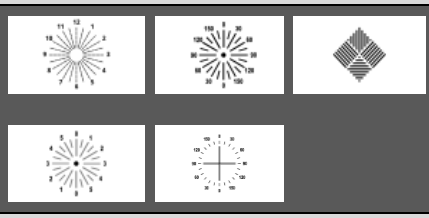
④ **Buttons for Visual Acuity Test**

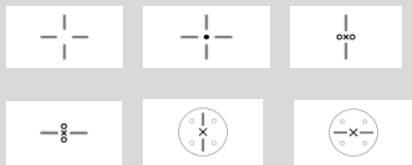
These buttons executes visual acuity test.

Button	function
O	Landolt Ring charts (0.03~2.0)
A	Alphabet Letter charts (0.03~2.0)
2	Number charts (0.03~2.0)
E	Snellen E charts (0.03~2.0)
0.1	Figures for children (0.1~1.0)

⑤ Buttons for Functional Chart

Charts for polarizing test are displayed differently on the display panel depending on the chart model.

Button	Function	Lens	Chart
	Red/Green Filter		
	Red/Green Test, Cross grid Test for distance	Polar, Cross Cylinder	
	Astigmatism Test	Polar	
	Cross cylinder Test	Cross Cylinder	
	Maddox rod Test	Maddox rod	
	Binocular balance Test	Polar	
	Worth 4 dot Test, Dominant eye Test	Red/Green	
	Phoria Test	Red/Green	
	Horizontal/Vertical phoria Test	6BU prism, 10BI prism	
	Minutes Stereo Test	Polar	
	Stereo Test	Polar	

	Stereo Test	Polar	
	Phoria and aniseikonia test	Polar	
	Phoria Test	Polar	

⑥ **Buttons for Program**

Button	Function
◀	Executes the previous step of executing program
▶	Executes the next step of executing program
P1	▪ Executes the first step of the program PGM 1 ▪ Pressing the button 3 times in a row executes programming PGM1
P2	▪ Executes the first step of the program PGM 2 ▪ Pressing the button 3 times in a row executes programming PGM2

⑦ **Button for Adjusting the Contrast Sensitivity**

This button adjusts the contrast sensitivity of visual acuity charts. By the button press, the contrast is leveled down step by step. The total number of adjustable contrast and the default level are set in the menu.

⑧ **Button for Menu Mode**

This button executes the menu mode. Refer to the section 8.2 for detailed information.

⑨ **Buttons for Chart Mask Operation**

Button	Function
	▪ Isolates the letter in the 1st column of the 1st row. ▪ In the menu mode, selects menu item or execute it.
	▪ Isolate the mid row. ▪ In the menu mode, cancels executed menu item or exits the menu mode.

	▪ Moves the isolating position up 1 row or isolates the 1st row if there is no mask set previously. ▪ In the menu mode, changes the option value (+ key).
	▪ Moves the isolating position down 1 row or isolates the last row if there is no mask set previously. ▪ In the menu mode, changes the option value (- key).
	▪ Moves the isolating position leftward 1 column or isolates the 1st column if there is no mask set or horizontal line is isolated previously. ▪ In the menu mode, changes the selection of option item (left tab key)
	▪ Moves the isolating position rightward 1 column or isolates the last column if there is no mask set or horizontal line is isolated previously. ▪ In the menu mode, changes the selection of option item (left tab key)

⑩ **Button for Image Gallery**

Button	Function
	▪ Executes Image Gallery

⑪ **Button for Reverse Background**

Button	Function
	▪ Reverses background color black/white for Visual Acuity charts.

When you change background to black color, the color could be spread to LCD panel or the White pixel could be appeared.

Lorsque vous modifiez l'arrière-plan en couleur noire, la couleur peut être étendue à l'écran LCD ou le pixel blanc peut apparaître.

7. Installation

7.1 Preparation

Before installing this instrument, carefully check the following in advance.

- Model name HDC-9100PF, HDC-9100N (HDC-9100PF is polarization type, HDC-9100N is Red/Green type)
- Package contents listed in chapter 12.
- Exterior appearance of the LCD panel (any external material on the display should be removed and cleared including the protective film).

After checking the package contents and their status, proceed installing the instrument by following the procedure in the next sections. Anyone who performs installation should understand a fully aware of the notes and procedure related with the installation in this manual.

7.2 Installing the Main Body

The installation of this instrument is available in two ways, standard installation and mirroring installation. In case of installing the instrument in a small and limited space, mirroring installation could be chosen. Otherwise choose the standard installation.

7.2.1 Standard Installation

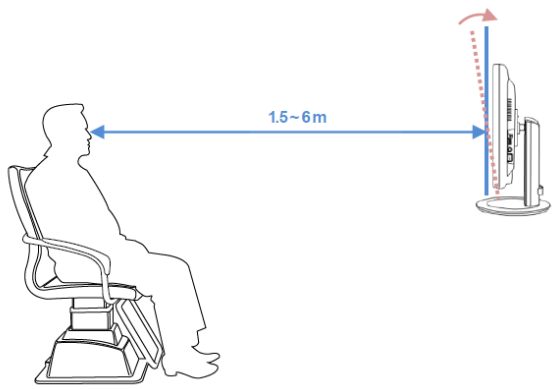
① Fix the main body either to the chart stand or on the wall by using the wall mount. Before putting the main body, it is required to check the test distance first to confirm if it's proper for the standard installation.

② Put the main body at the position to be used. The distance from the examinee to the main body should be set by the step of 10cm or 0.5 feet as the software allows inputting the test distance in that step.

③ Put the power adaptor to the main body and connect the power cord to the wall outlet.

Make the horizontal line between the eye of examinee and the center of HDC-9100 LCD panel. Especially, HDC-9100PF polarization type must be installed in the angle which polarization's afterimage is minimized.

Tracez la ligne horizontale entre l'œil du candidat et le centre de l'écran LCD HDC-9100. En particulier, le type de polarisation HDC-9100PF doit être installé dans l'angle où l'image rémanente de la polarisation est minimisée.

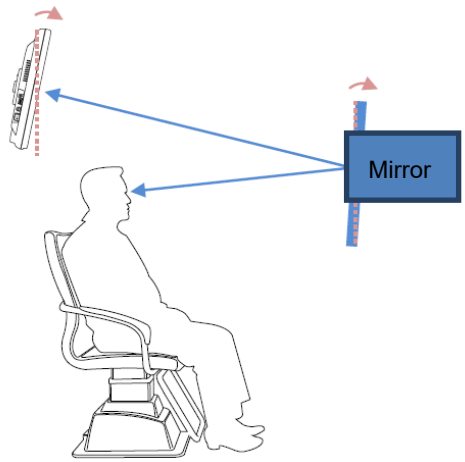


7.2.2 Installation with a Mirror

① Fix the main body on the wall by using the wall mount.

② Set and fix a mirror at the position that meets the required test distance. The test distance is calculated by summing the distance from examinee to the mirror and from the mirror to the LCD panel.

③ Put the power adaptor to the main body and connect the power cord to the wall outlet.



NOTE

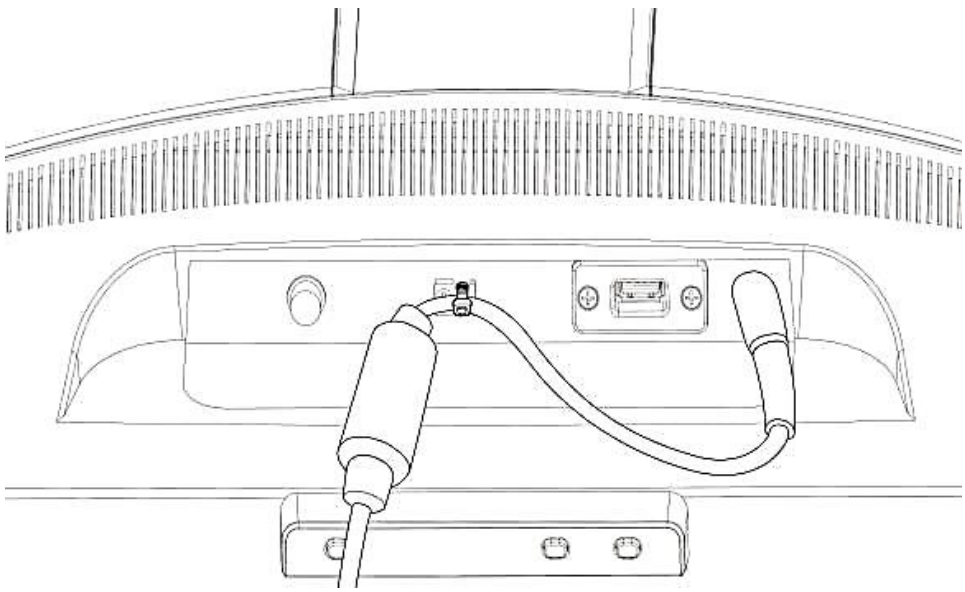
Test distance should be calculated by sum of distance between LCD panel and mirror and distance between mirror and examinee.

La distance d'essai doit être calculée en faisant la somme de la distance entre l'écran LCD et le miroir et de la distance entre le miroir et le candidat.

NOTE

After installing HDC-9100PF/N, fix the Power Cable with a cable tie as shown in the picture so that the Power Cable does not come off.

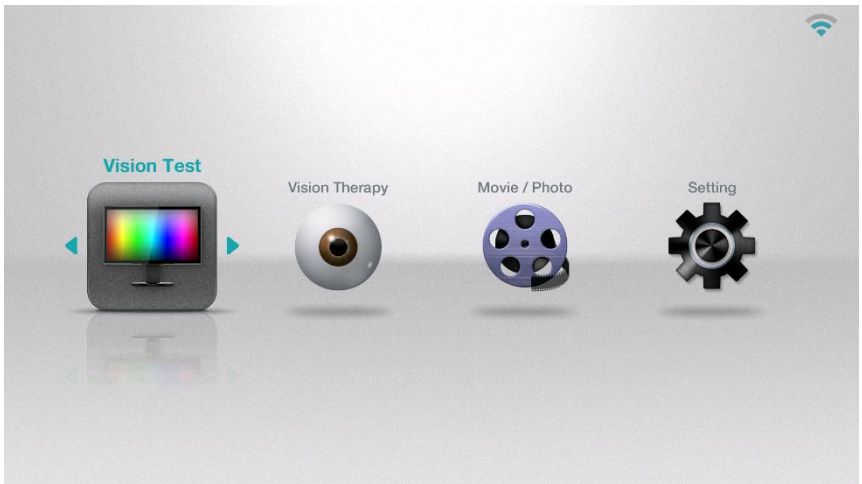
Après avoir installé le HDC-9100PF/N, fixez le câble d'alimentation avec un serre-câble comme indiqué sur l'image afin que le câble d'alimentation ne se détache pas.



7.3 Configuring the Settings

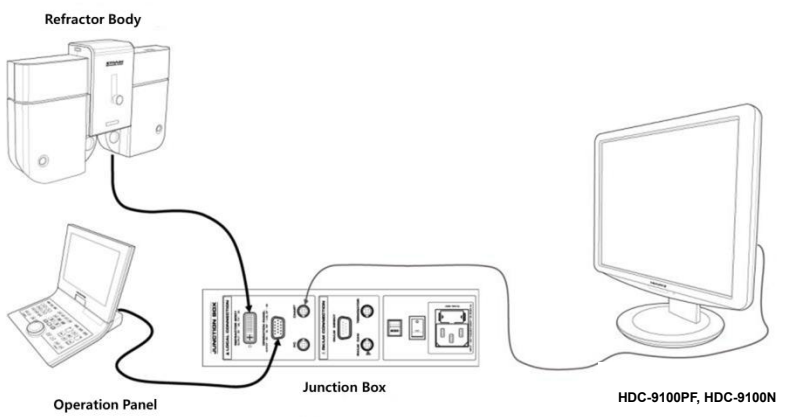
When this instrument is installed completely and is ready for starting up, turn it on and wait until it finishes the initialization.

If the system is started up without any problem, it shows the default chart on the display. Now it's the time to execute the menu mode and configure the internal settings to match the installation and the user's preferences. Press the MENU button on the remote and the system menu will be shown on the display like below



7.4 Interfacing with the Digital Refractor

This instrument allows interfacing it with the Huvitz Digital Refractor. In case of the model HDR-7000 / HDR-9000, it supports not only wired communication but also wireless communication by IR with this instrument. Refer to the installation manual of the digital refractor for detailed information about the interfacing how-to.

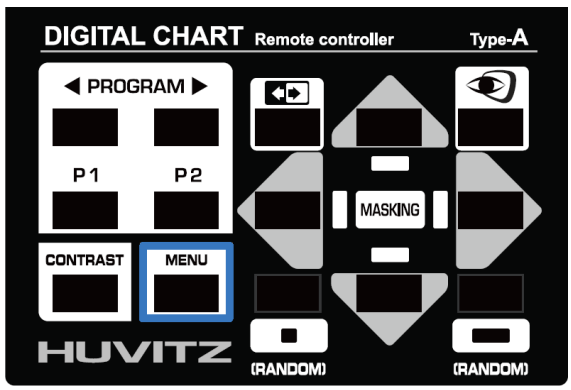


[Example of Wired Installation with HDR-7000]

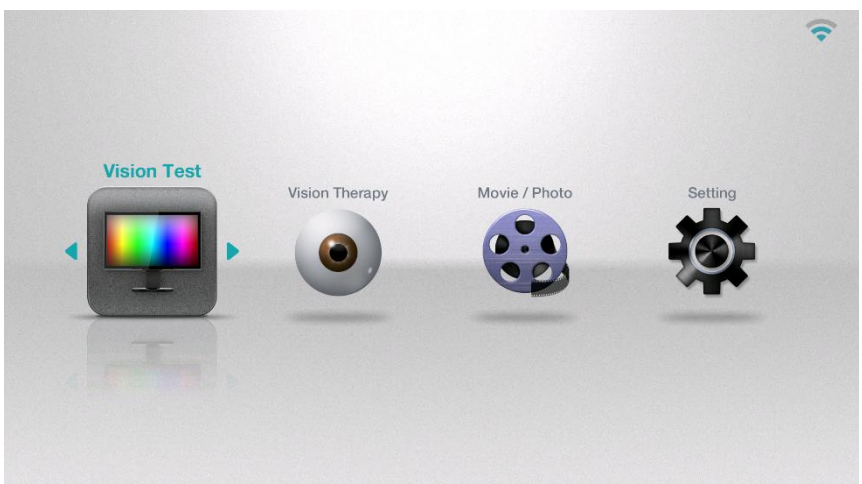
8. Using the Menu Mode and Functions

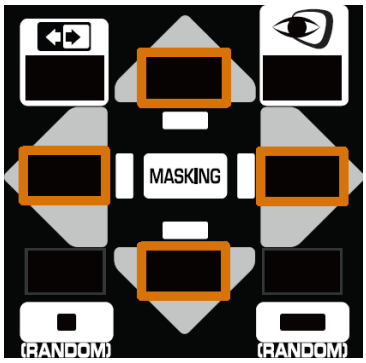
8.1 Executing and Operating the Menu Mode

Menu mode provides functions for setting options related with the chart and other adjustment functions. To execute the menu mode, press the MENU button on the remote.



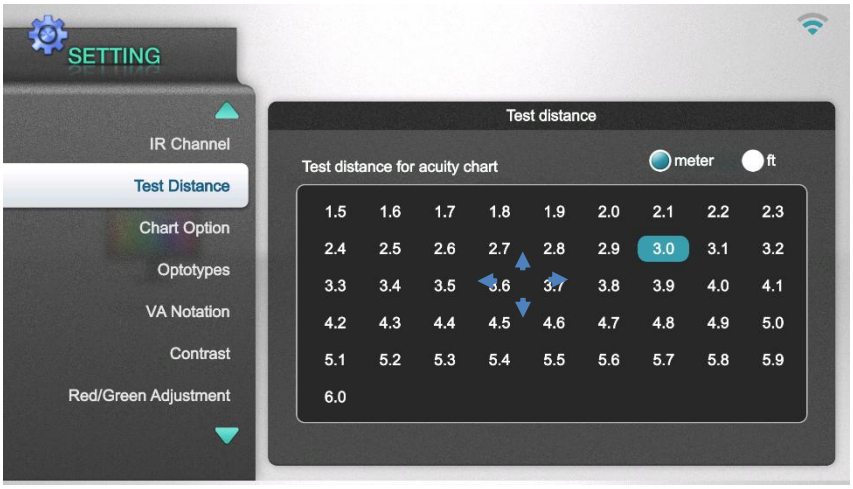
① Selecting and Executing Menu





Button	Function
	Changes the selection of the menu group between left and right side
	Changes the selection of menu item in a menu group vertically

② Selecting and Setting the Value of Option



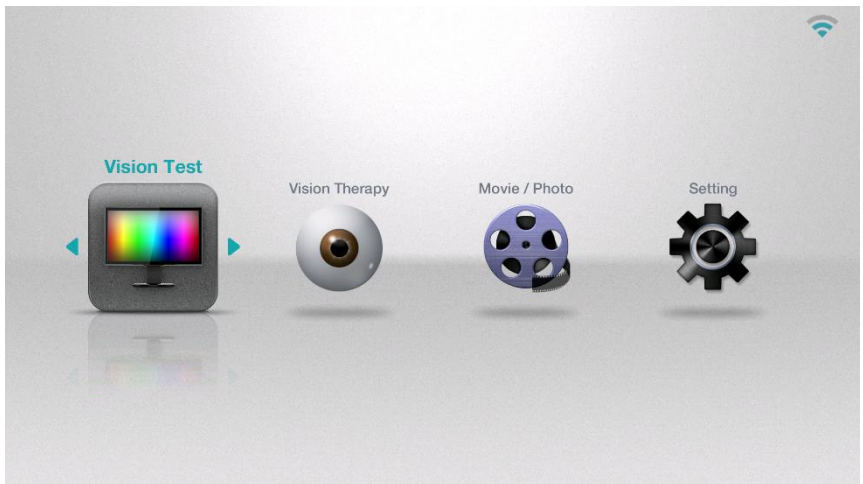
Use the arrow button to move to the menu or setting, and set the value with button.

③ Move to the upper menu

If you cannot find back button, you can go upper menu with button

8.2 Using the Menu Mode

Menu mode provides functions listed below.



- Vision Test
  Vision color test, contrast test, hue test

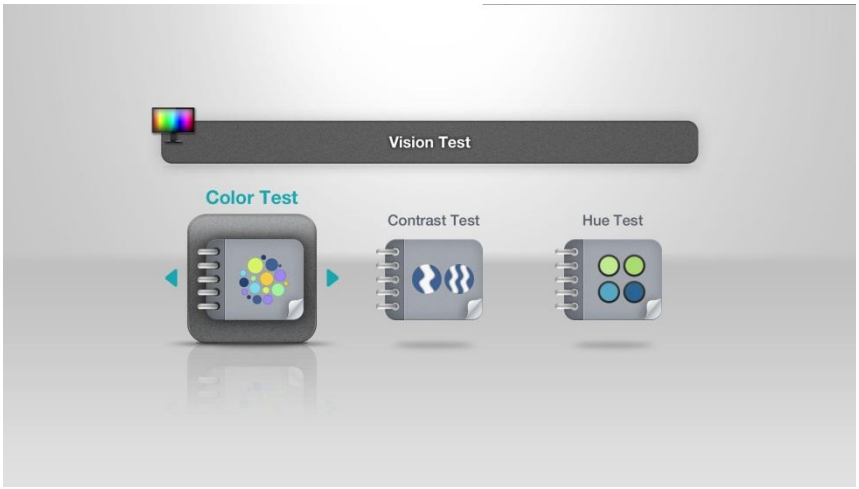
- Vision Therapy
  Vergence, Pursuit, Saccadic, Tracking, Amsler Grid, Stereopsis

- Movie / Photo
  Management for user designated movie/photos

- Setting
  Change value for chart setting

8.2.1 Vision Test

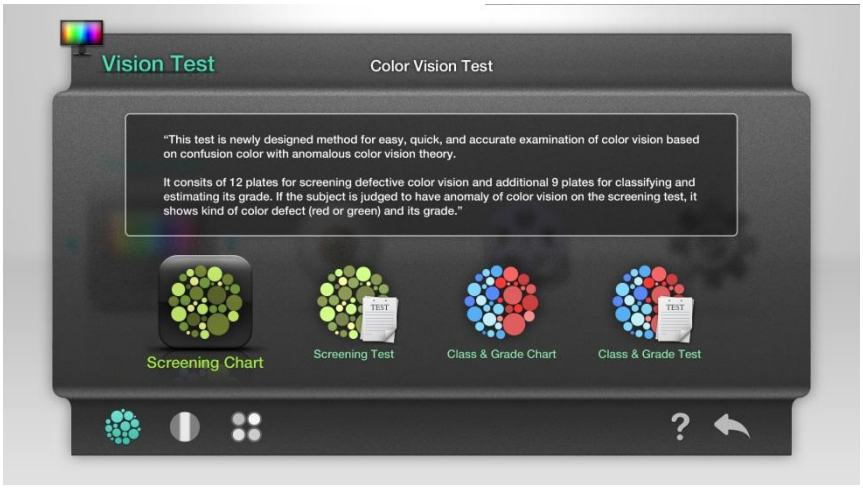
Vision Test is consist of Color Test, Contrast Test and Hue Test.



- Color Vision Test

This test is newly designed method for easy, quick, and accurate examination of color vision based on confusion color with anomalous color vision theory

It consists of 12 plates for screening defective color vision and additional 9 plates for classifying and estimating its grade. If the subject is judged to have anomaly of color vision on the screening test, it shows kind of color defect (red or green) and its grade



NOTE

The Color Vision Test must be executed in the indoor room where you can see LCD clearly. And set the distance at 1.5m. When examinee can read number in 3 second, and can draw a curved line in 10 second,
These are regarded as correct answers. But in the case of child or mental deficiency, It's OK not to restrict the time.

HDC-9100 Color Vision Test would not produce the same result owing to the property of LCD panel. Use HDC-9100 test result as examinee's guide and if necessary consult with an eye specialist.

Le test de vision des couleurs doit être exécuté dans une pièce intérieure où vous pouvez voir clairement l'écran LCD. Et mettre le distance à 1,5m. Lorsque le candidat peut lire le nombre en 3 secondes et tracer une ligne courbe en 10 secondes, celles-ci sont considérées comme des réponses correctes. Mais dans le cas d'une déficience mentale ou infantile, c'est bien de ne pas limiter le temps.

Le test HDC-9100 Color Vision ne produirait pas le même résultat en raison de la propriété du panneau LCD. Utilisez le résultat du test HDC-9100 comme guide du candidat et, si nécessaire, consultez un ophtalmologiste.

- Screening Chart

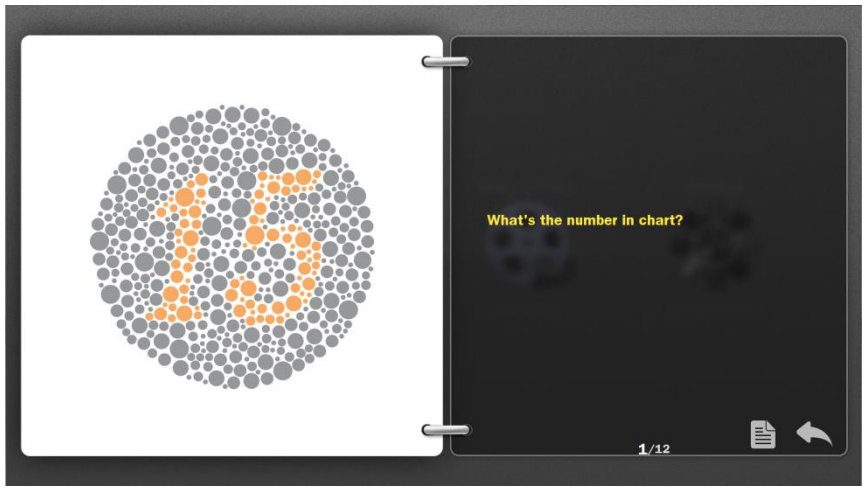
We provide 12 kind of chart to find defective color vision. You can change chart with button of remote control.

The chart will be seen differently depends on defective color vision.

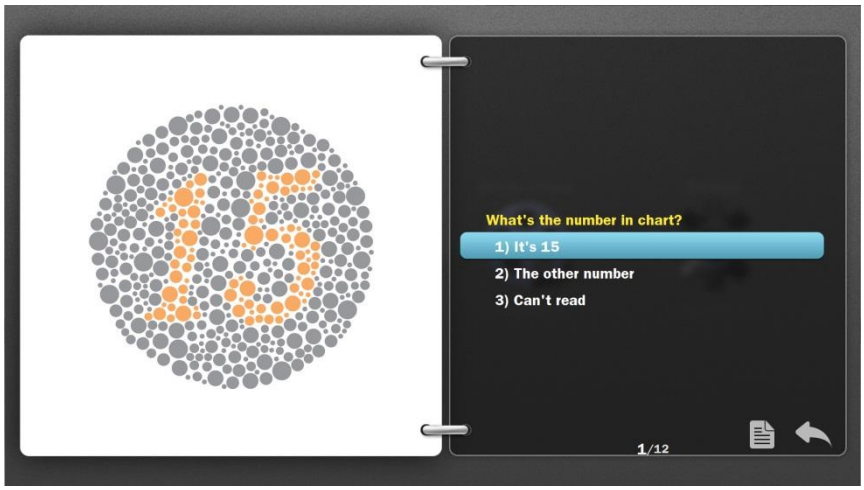
	15	15	15	15
	5	3	5	X
	75	16	75	X
	8	5	8	X
	48	13	48	X
	6	X	6	X
	20	X	20	X
	7	X	7	X
	X	5	X	X
	66	66	X	X
	O	X	O	X
	O	X	O	X

- Screening Test

Start test to find vision color defective.



After asking that examinee can read number or line like photo above, Press  button. Then the question and possible answers will appear.



Select the right answer by pressing  button. With use of  button.

If you select the paper shaped icon, the program discontinue the test and go to the result page. In the result page, It show the number which examinee selected and the number which is seen when examinee had defective color vision like next picture.

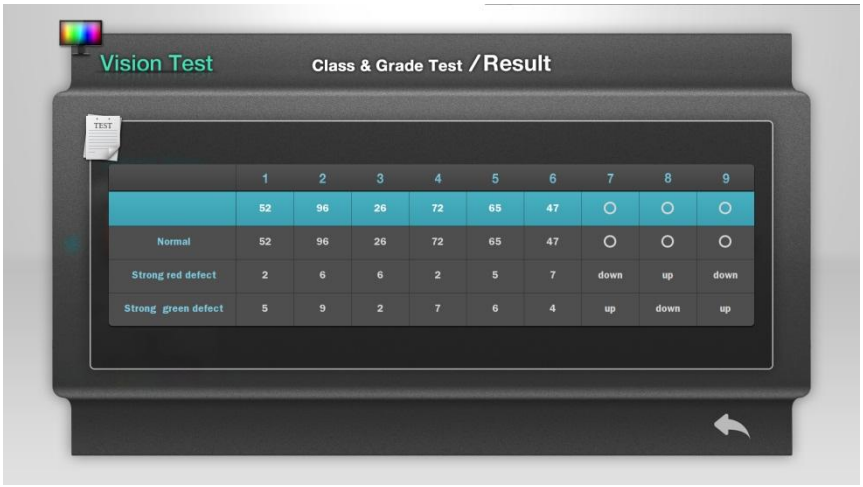


- Class & Grade Chart

It show chart to classify level of color deficiency. Judge the level of color vision by whether read the chart. The contents in the chart is like under picture.

52	2	5	52	52	52	52
96	6	9	96	96	96	96
26	X	X	6	2	26	26
72	X	X	2	7	72	72
65	X	X	X	X	5	6
47	X	X	X	X	7	4
up/down	down	up	up/down	up/down	up/down	up/down
up/down	X	X	up	down	up/down	up/down
up/down	X	X	X	X	down	up

- Class & Grade Test
  Start the test to judge the color defective. If the examinee fail to the former test, the other test is not appeared in the screen. And you will see result directly.



■ Contrast Test



"This test is designed method to measure the ability to recognize the object in the surroundings with low illumination or similar color. Usual Acuity test use acuity chart consists of black dark letters with white background having high illumination, then makes them look clearly. So patient could have troubles to identify the object if he has good sight in Acuity test, but low contrast sensitivity.

It consists of Contrast Letter Chart to examine the lowest level of contrast threshold recognizable the letter and Contrast Sensitivity Test to examine contrast sensitivity along with spatial frequency by using directional sine wave gratings to consider cognitive difference in visual cells".

- Contrast Letter Test

  Contrast test by use of letter



  Fist test distance is set to 1.5m. The chart can be changed via button on the remote control in units of 0.5 m, and via button the chart can be change in unit of 0.1 log.

- Contrast Sensitivity Chart

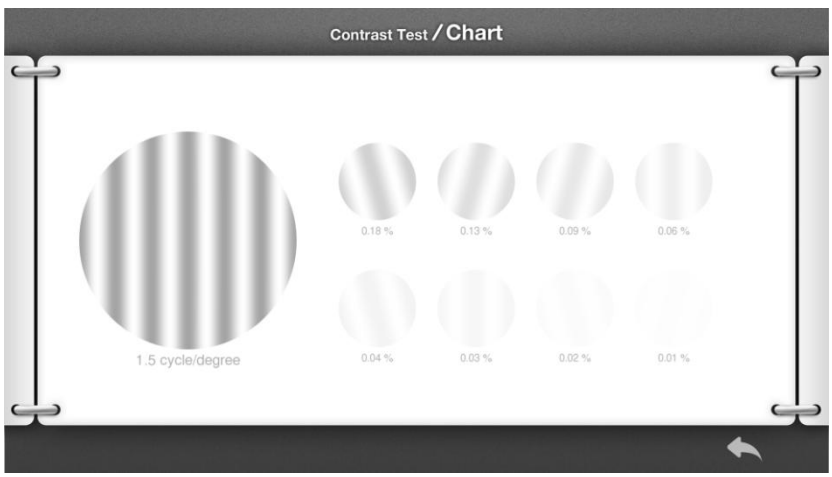
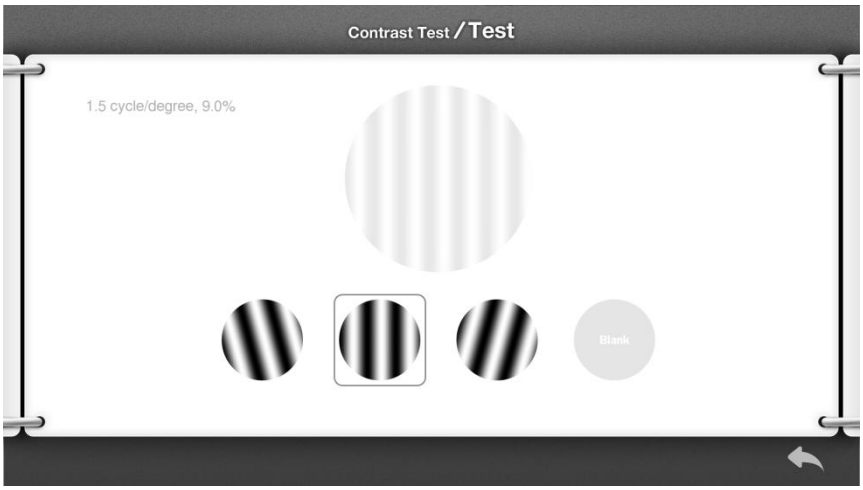


  Chart page could be changed by button, and you can check the contrast sensitivity cycle/degree of next level.

  You can activate the back button by button and can return to the menu by button or button.

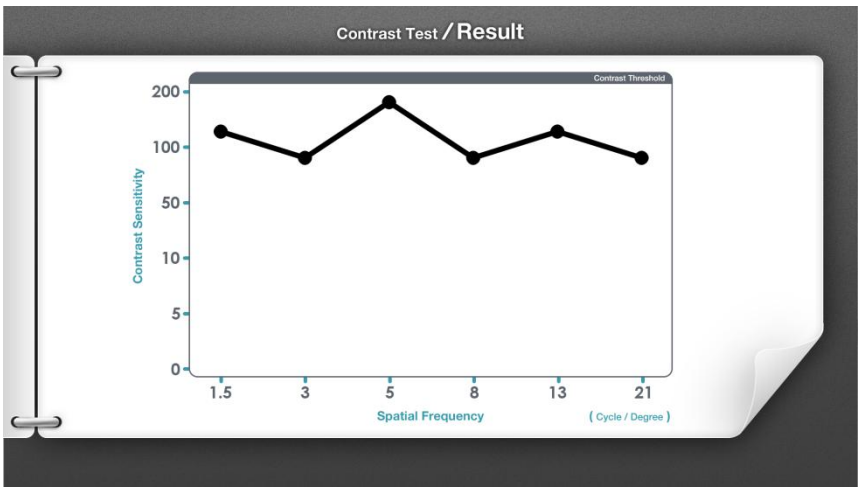
- Contrast Sensitivity Test

  Execute the contrast test by use of sign pattern.



Move to the pattern by button, and select by button.

After the end of test, it will display the graph like following picture.



NOTE

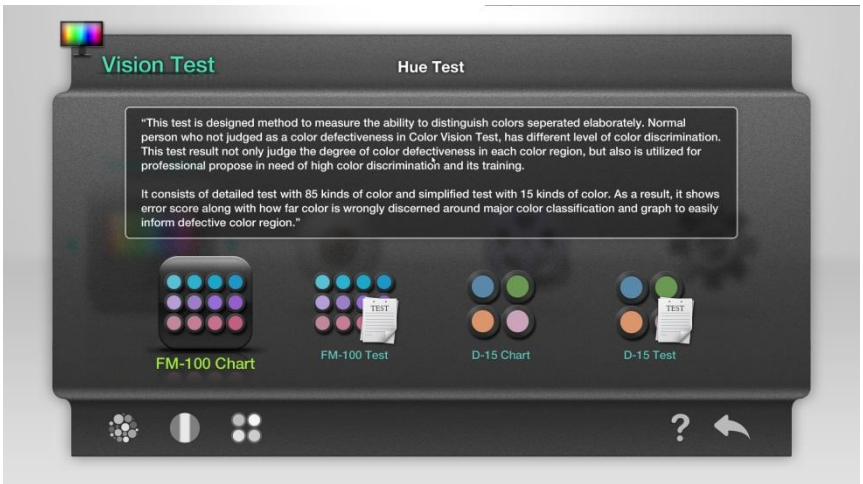
Contrast Sensitivity Test must be executed in the indoor room where you can see LCD clearly. And set the distance at 1.5m

Le test de sensibilité au contraste doit être exécuté dans une pièce intérieure où vous pouvez voir clairement l'écran LCD. Et régler la distance à 1,5m

■ Hue Test

This test is designed method to measure the ability to distinguish colors seperated elaborately. Normal person who not judged as color defectiveness in Color Vision Test, has different level of color discrimination. This test result not only judge the degree of color defectiveness in each color region, but also is utilized for professional propose in need of high color discrimination and its training.

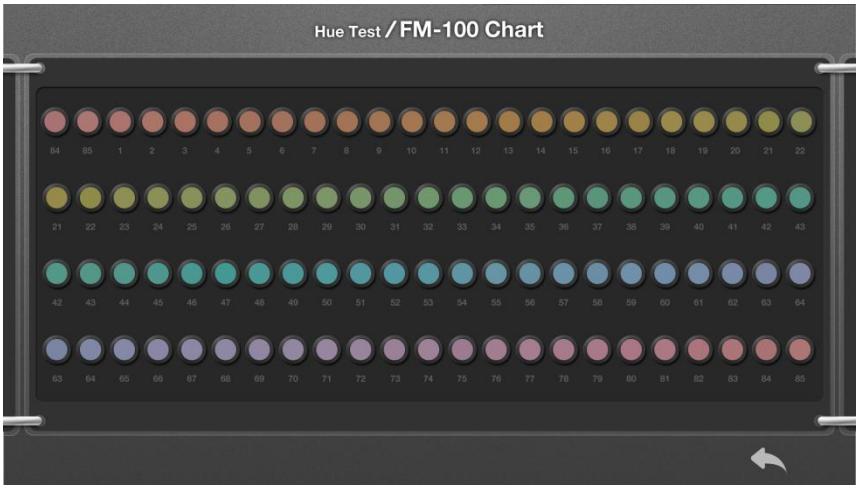
It consists of detailed test with 85 kinds of color and simplified test with 15 kinds of color. As a result, it shows error score along with how far color is wrongly discerned around major color classification and graph to easily inform defective color region



● FM-100 Chart

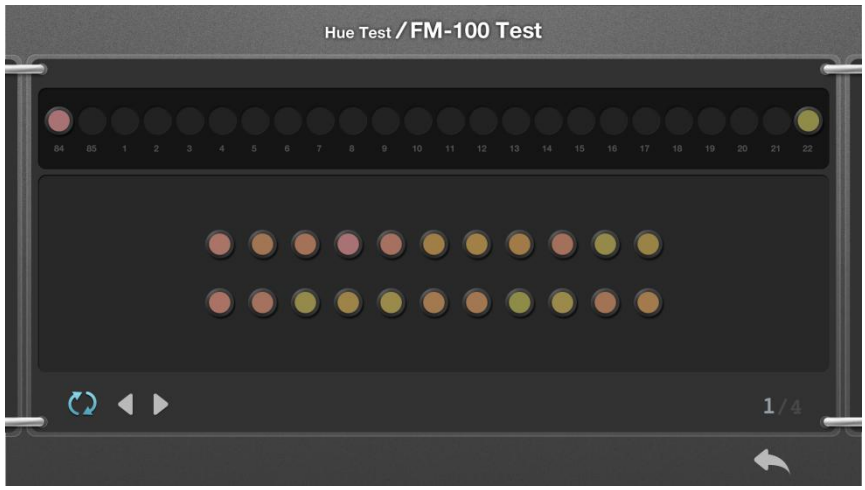
Check the color which used in FM-100 test.

Activate the return icon by pressing button. You can return to the menu by button or button.



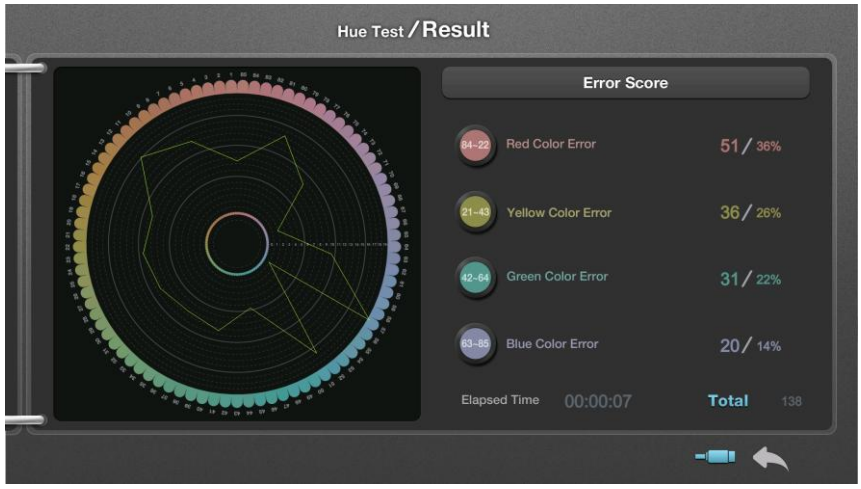
- FM-100 Test

Execute the FM-100 test. Let arrange the bars similar to upper side. Select color with button.



And in the position where you select first, if you press button or button, the selection is canceled. Also you can change the color position with mouse.

After all test you can see the result view.



If the result is close to 0, it means that bars were well arranged.

▪ When you execute FM-100 Test or D-15 Test, it is convenient to use mouse.
▪ Connect the mouse at the USB port in the rear of HDC-9100. (refer User Manual 6.1. Mani Body ⑧ USB Port)
▪ The result screen can be saved by unplugging the mouse from the USB connector and connecting the external storage (USB).
▪ HDC-9100 FM-100 Test will not produce the same result owing to the property of LCD panel.
Use HDC-9100 test result as examinee's guide.

▪ Lorsque vous exécutez le test FM-100 ou le test D-15, il est pratique d'utiliser la souris.
▪ Connectez la souris au port USB situé à l'arrière du HDC-9100. (voir le manuel d'utilisation 6.1. Mani Body ⑧ Port USB)
▪ L'écran de résultat peut être enregistré en débranchant la souris du connecteur USB et en connectant un stockage externe (USB).
▪ Le test HDC-9100 FM-100 ne produira pas le même résultat en raison de la propriété du panneau LCD.
Utilisez le résultat du test HDC-9100 comme guide du candidat.

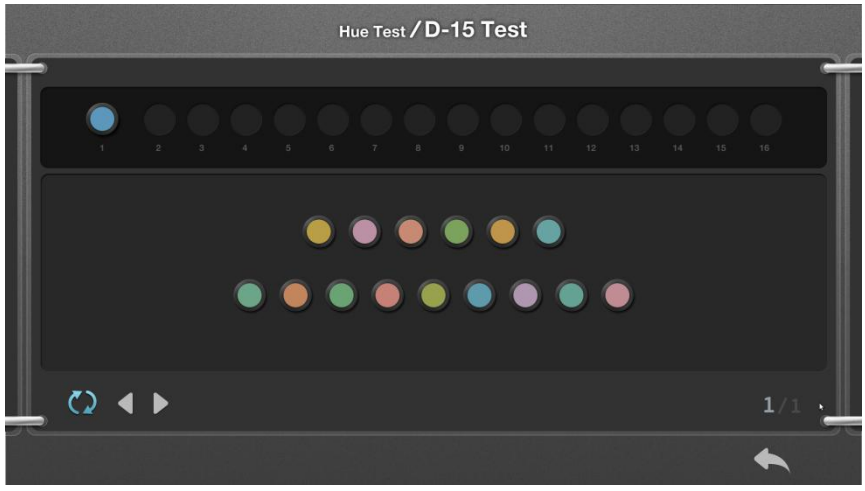
- D-15 Chart

  Check the color which used in D-15 test.



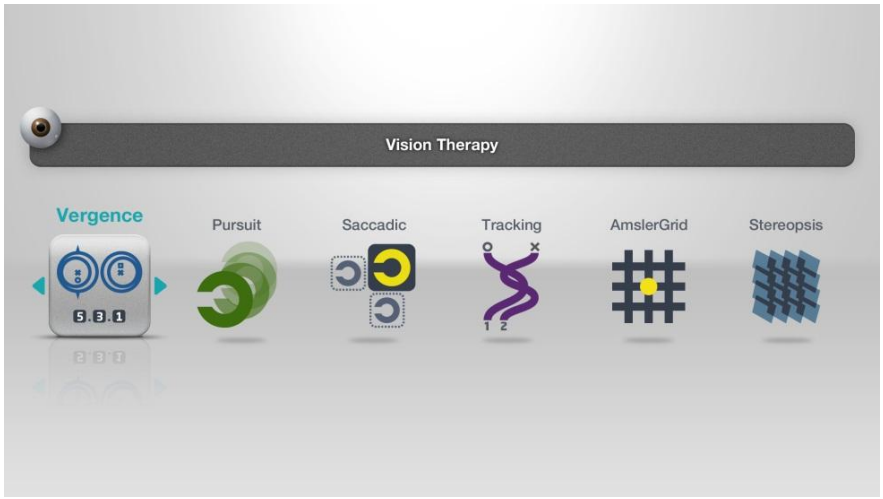
- D-15 Test

  Execute the D-15 test. The test procedure is similar to FM-100 test.

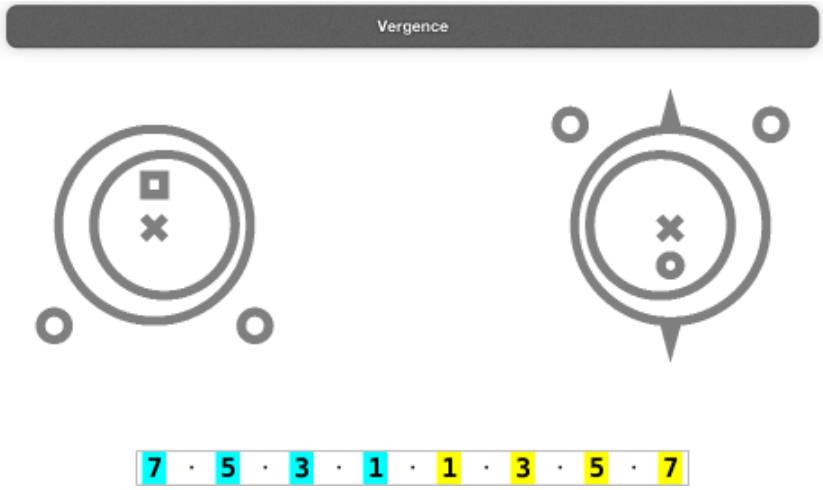


8.2.2 Vision Therapy

We provide following type of vision therapy.



- Vergence training

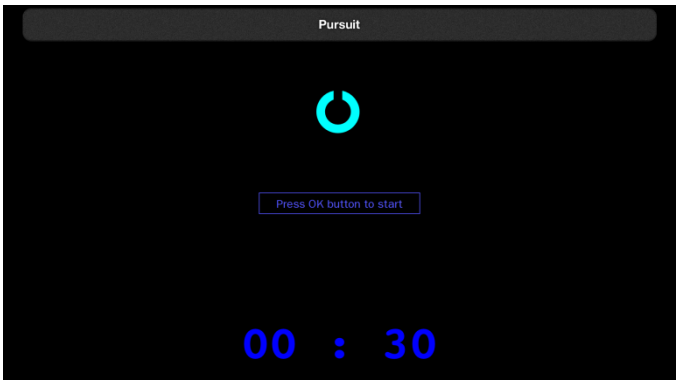


Vergence training could help to enhance the ability of eye by stimulation of eye.

- Pursuit training

  This training could help to enhance the ability of eye by stimulation of eye through the tracking the moving object.

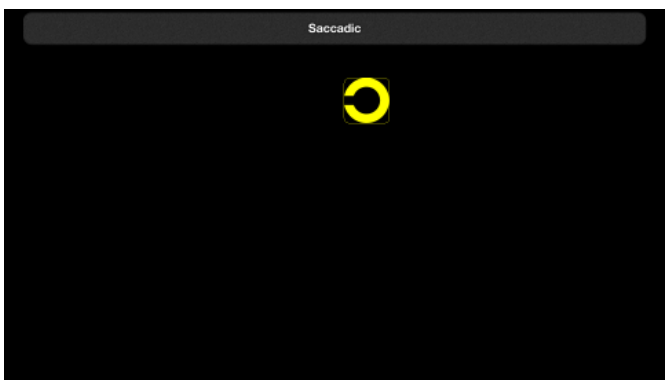
  When next picture is appeared, press  button again.



  When you match the direction of Landolt ring with remote-control, another Landolt ring will be appeared randomly.

- Saccadic training

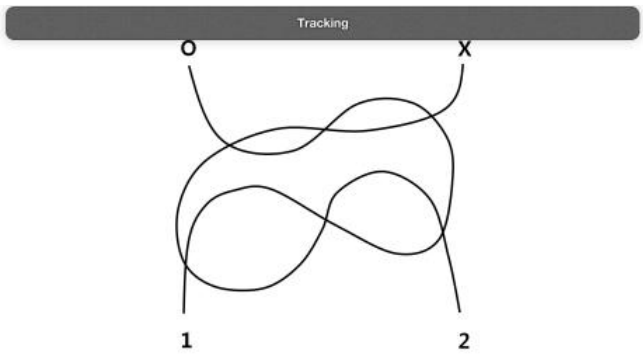
  This training is rapidly perceive popup object.



  When you match the direction of Landolt ring with remote-control as soon as possible, another Landolt ring will be appeared randomly.

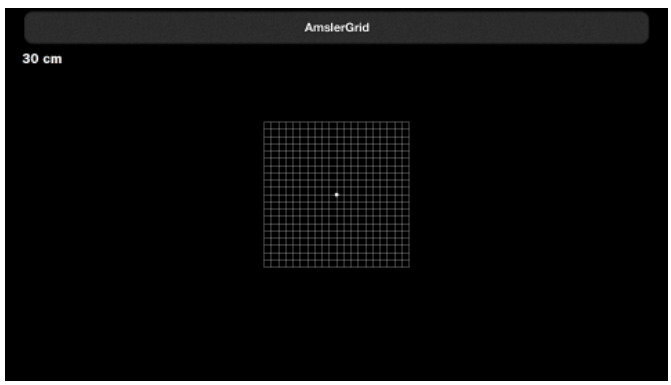
- Tracking training

  You can enhance the eye concentration ability through the tracking the lines of various pattern.



- Amsler Grid

  You can check whether eye was defective or not through the amsler grid.



- Stereopsis training

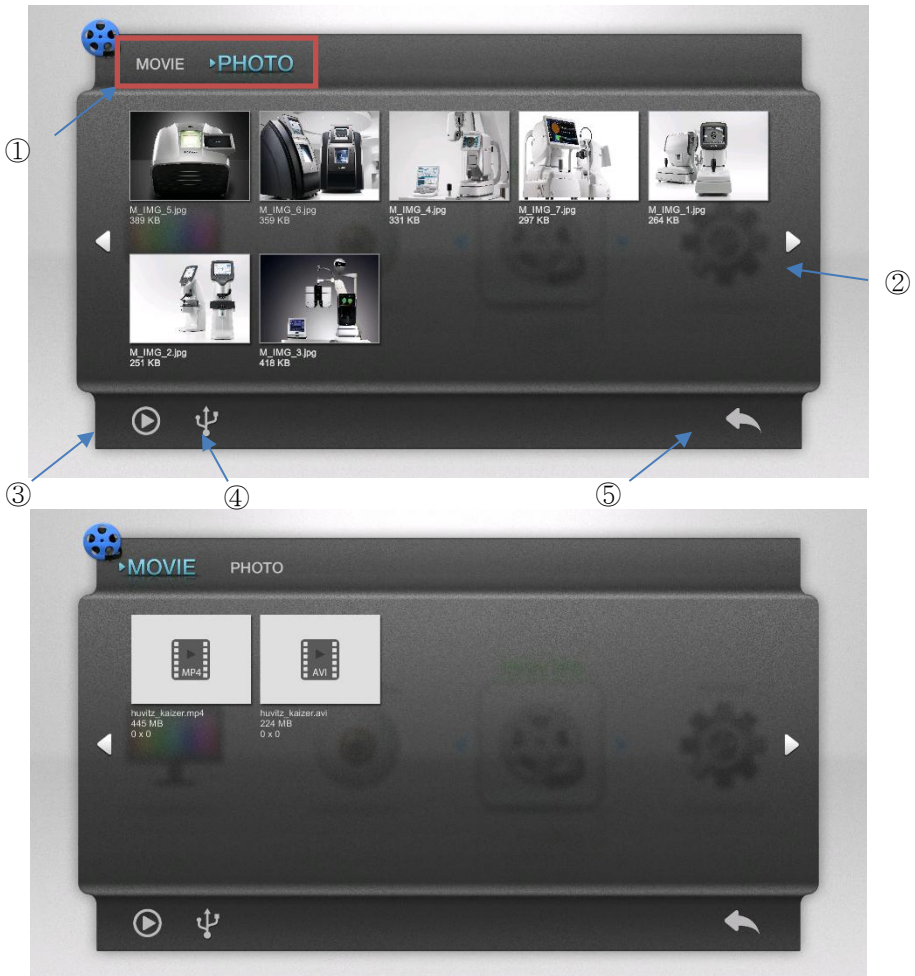
  This training could help to recovery the fatigue of eye.



8.2.3 Mode for Movie / Photo

In mode for movie/photo, we provide functions which can display movie and photo from HDC-9100 or USB memory.

After selection with remote control, when you press button, you can see yellow border line. Yellow border line means that the file is selected.



① In the icon of “Movie/Photo” you can select movie management mode or photo management mode by left/right button.

② There are icons left and right side. If the icon’s color is blue, it means exist of next page.

③ Display selected file.

④ Select external storage (USB) or Select internal storage of HDC-9100.

⑤ Escape the Mode for Movie/Photo

▪ The information in inner storage of HDC-9100 cannot be changed, If you want to use your own movie or photo, use external storage (USB).

▪ If external storage(USB)'s name was consist of non-english letter, HDC-9100 cannot read it.

▪ Video files in external storage device (USB) can only be viewed under 2GB.

▪ HDC-9100 can read only movie of avi, mp4, mkv type.

▪ It may take long time as largeness of file. So please wait a minute.

▪ Les informations de la mémoire interne du HDC-9100 ne peuvent pas être modifiées. Si vous souhaitez utiliser votre propre film ou photo, utilisez une mémoire externe (USB).

▪ Si le nom du stockage externe (USB) était composé d'une lettre n'ayant pas la même signification que l'anglais, le HDC-9100 ne peut pas le lire.

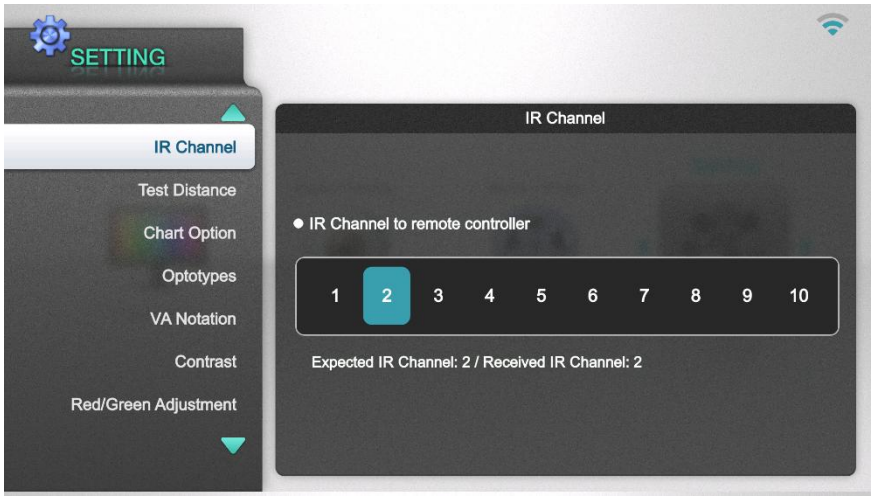
▪ Les fichiers vidéo sur un périphérique de stockage externe (USB) ne peuvent être visualisés que sous 2 GB

▪ HDC-9100 ne peut lire que les vidéos de type **avi, mp4, mkv.**.

▪ La longueur du fichier peut être longue. Alors s'il vous plaît attendez une minute.

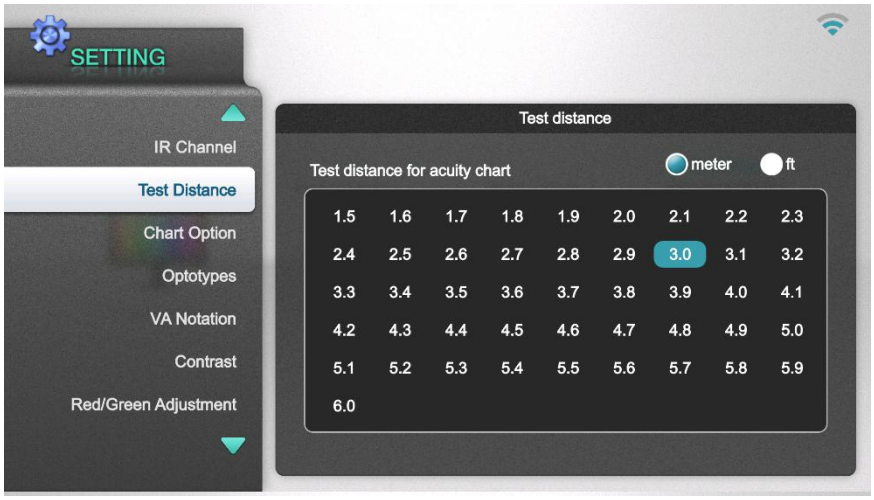
8.2.4 Setting

- IR Channel



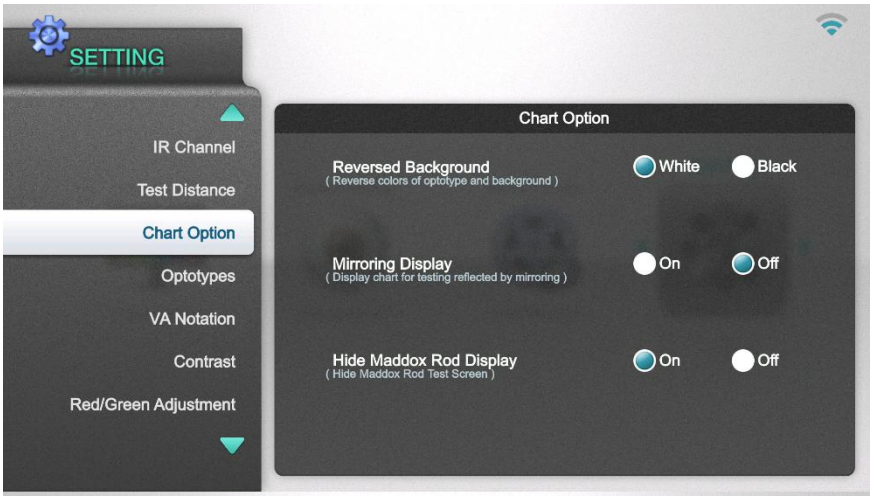
- ✓ Change IR channel of remote controller
- ✓ After the change of main body, Change IR channel of remote controller.
- ✓ The order of change IR channel of remote controller is 1→2→3→4→5→6→7→8→9→10→1. You can change channel by pressing button and button at the same time.
- ✓ If you do former procedure, you can see changed Received IR Channel value on the screen.

- Test Distance



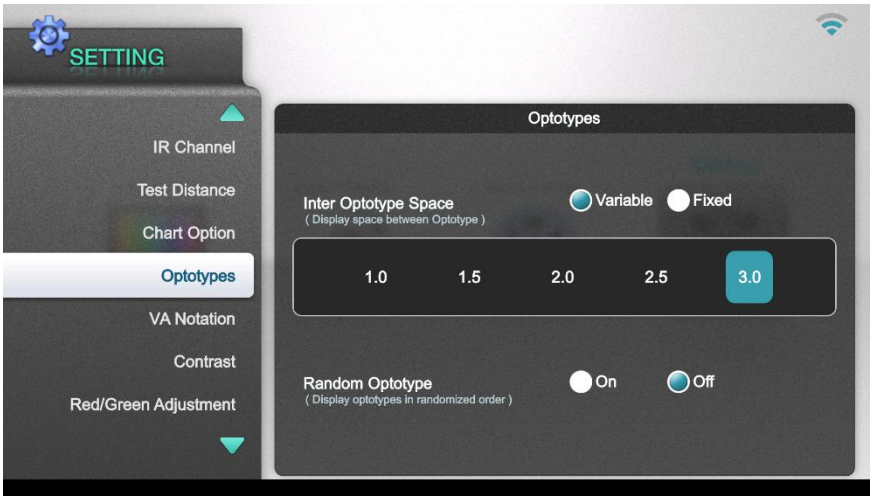
- ✓ In this menu, you can set the unit of length as meter or feet.
- ✓ When you set the test distance over the 5.8 meter or over the 19.0 feet, you will not use 0.03 chart.

■ Chart Option



✓ You can set whether you will use Reversed Background function, Mirroring Display function and Hide Maddox Rod Display function.

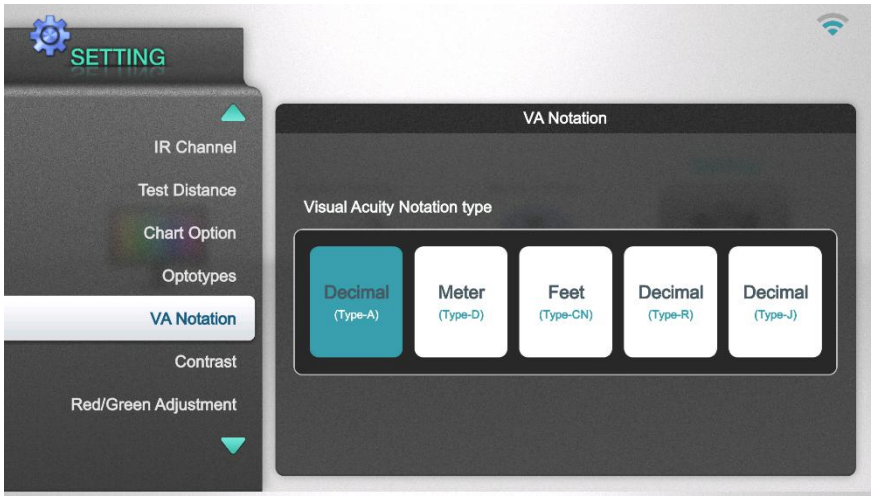
■ Optotypes



✓ Adjust value of optotype space.

✓ To prevent to memory chart letter, you can turn on Random Optotype function..

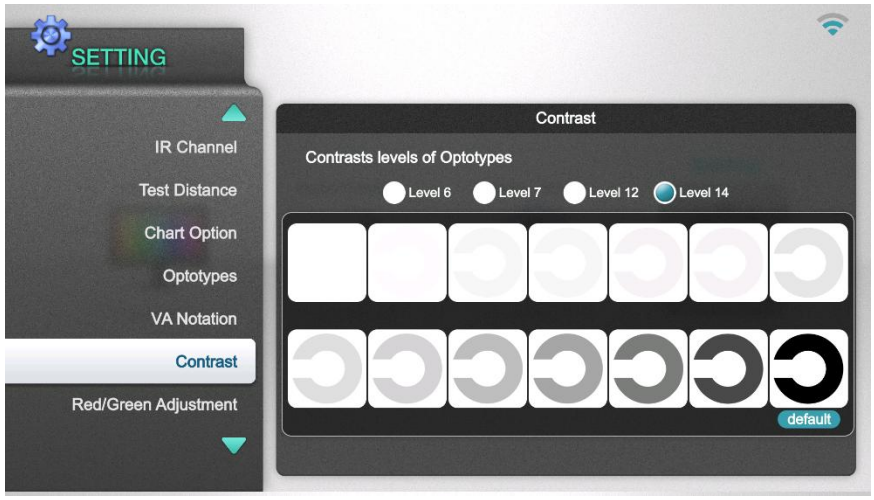
■ VA Notation



✓ Set the visual acuity notation type.
✓ Type-R, Type-J support Russian character and Hiragana.

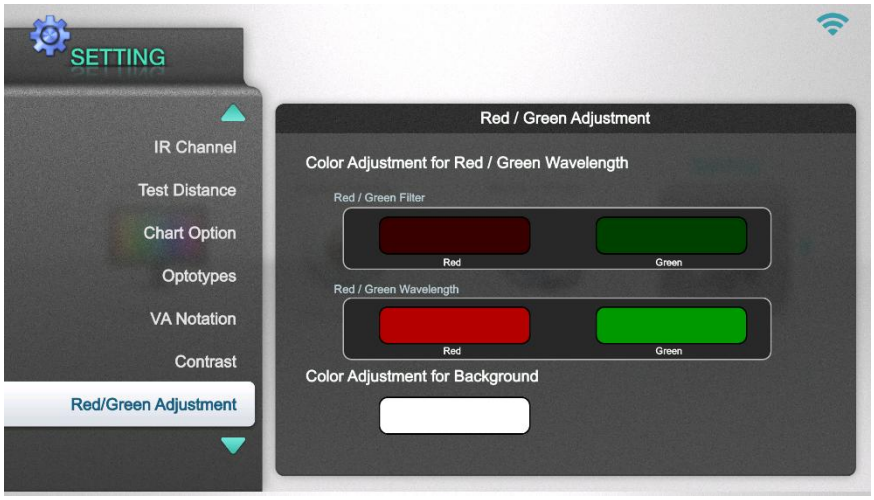
■ Contrast

This menu is that control brightness of background and color contrast.
This enable selection of Level value to atomize the changed quantity.

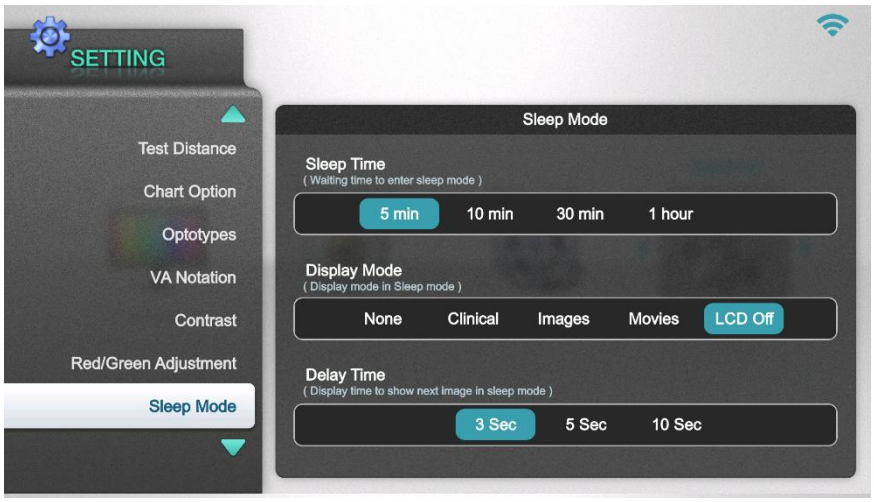


■ Red/Green Adjustment

Adjust color and balance of Red/Green chart and vergence chart.



■ Sleep Mode

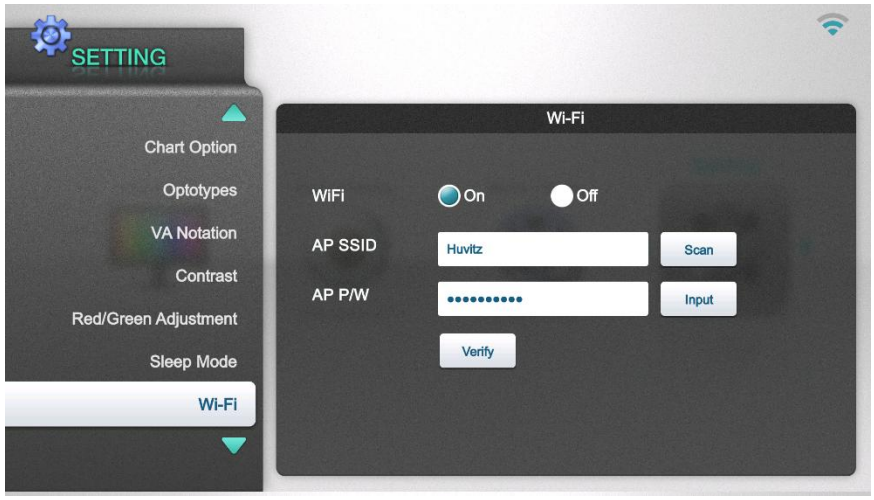


- **In the menu mode, sleep mode is not working.**
- **When device is set for Movies, flickering screen is not malfunction.**
- **File in the external storage (USB) is not used for screen saver.**

- **Le mode d'économie d'énergie ne fonctionne pas en mode menu.**
- **Lorsque l'appareil est réglé pour les films, l'écran scintillant n'est pas un dysfonctionnement.**
- **Les fichiers sur le stockage externe (USB) ne sont pas utilisés comme économiseurs d'écran.**

■ Wi-Fi

HDC-9100 can be connected to Huvitz Digital Refractor using Wi-fi network without direct cable connection.



You can search for nearby AP by pressing the “Scan” button, or enter AP directly with the “Input” button.
If you use the “Scan” button to search nearby AP, a pop-up list of available AP appears and you can select it.

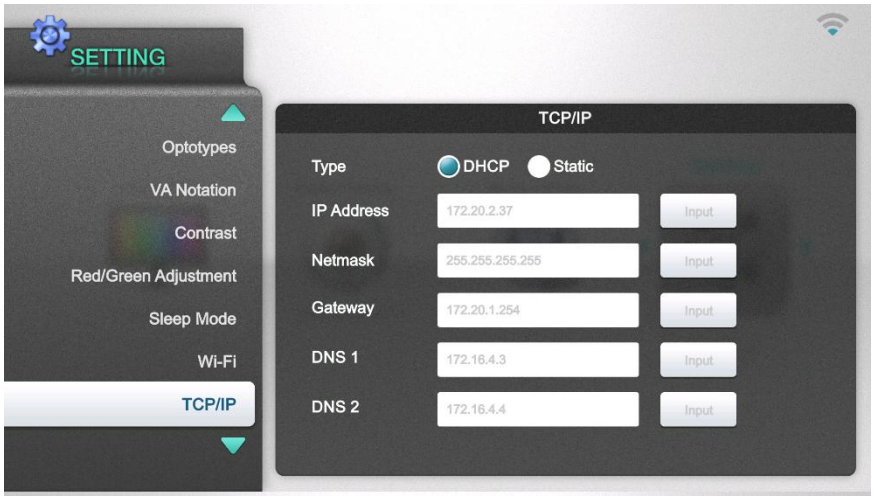


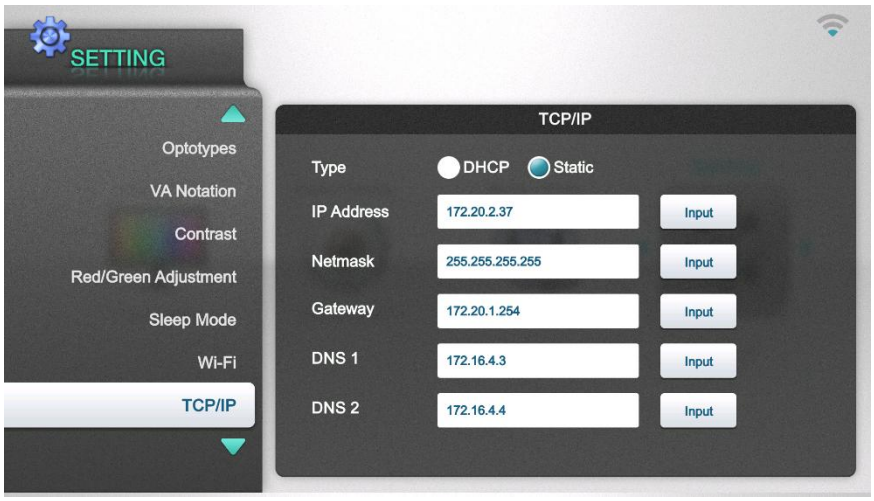
▪ If you are using the wireless function, it is recommended to install an AP or wireless repeater in the optometry room.
▪ If the AP signal strength is weak, communication between devices may not be smooth

▪ Si vous utilisez la fonction sans fil, il est recommandé d'installer un point d'accès ou un répéteur sans fil dans la salle d'optométrie.
▪ "Si la force du signal AP est faible, la communication entre les appareils peut ne pas être fluide."

■ TCP/IP

You can set DHCP/Static mode on this screen.





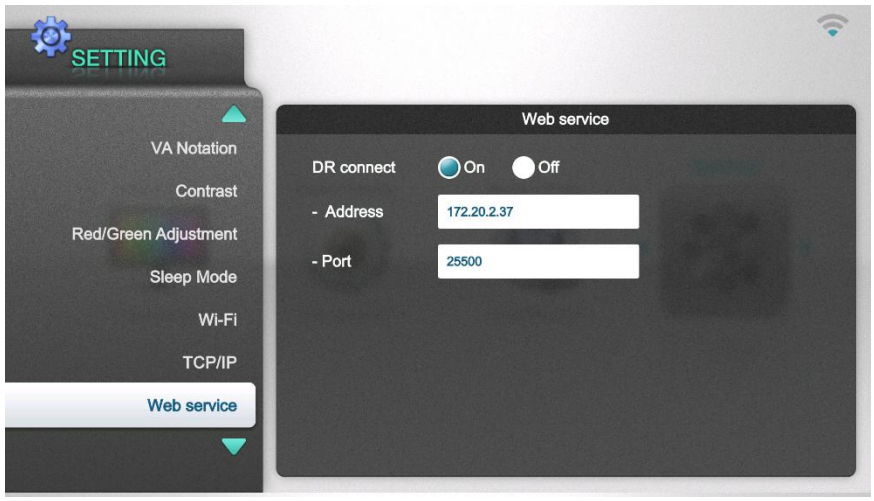
▪ If Wifi in Setting is turned Off, TCP/IP is disabled and the input field is blank.
▪ When setting up static IP, you must first check the bandwidth of the IP in DHCP mode.

▪ Si le Wi-Fi est désactivé dans les paramètres, TCP / IP est désactivé et le champ de saisie est vide.
▪ Lors de la configuration d'une adresse IP statique, vous devez d'abord vérifier la bande passante de l'adresse IP en mode DHCP.

■ Web service

This screen can set the Huvitz Digital Refractor connect using the Wi-fi.

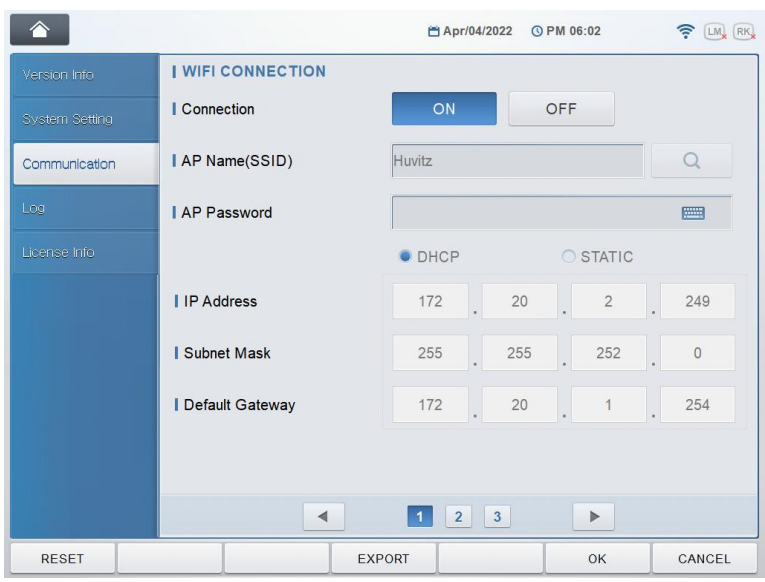
✓ DR connect
: Turn on/off the connection with HDR or CDR.



■ ETC

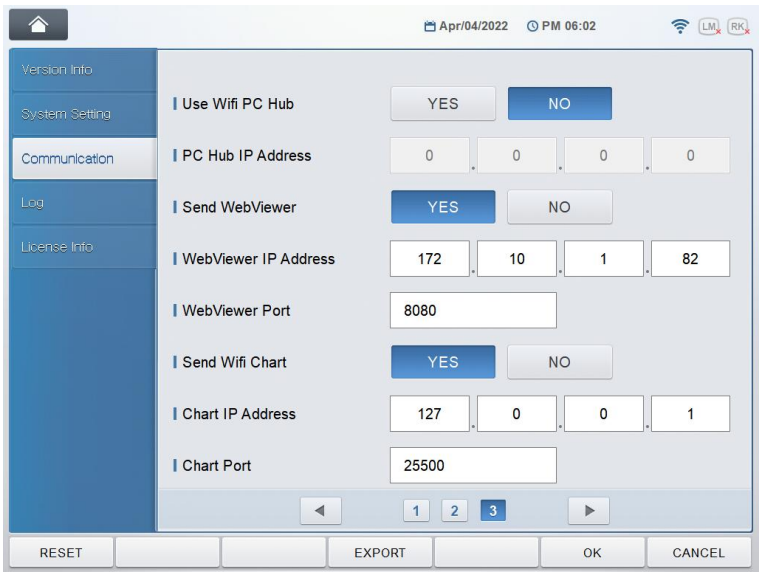
When using HDR and Wi-Fi (AP) connections, connect as follows.
(If the connection is incorrect, the product may not operate normally.)

✓ Wi-Fi
: ON



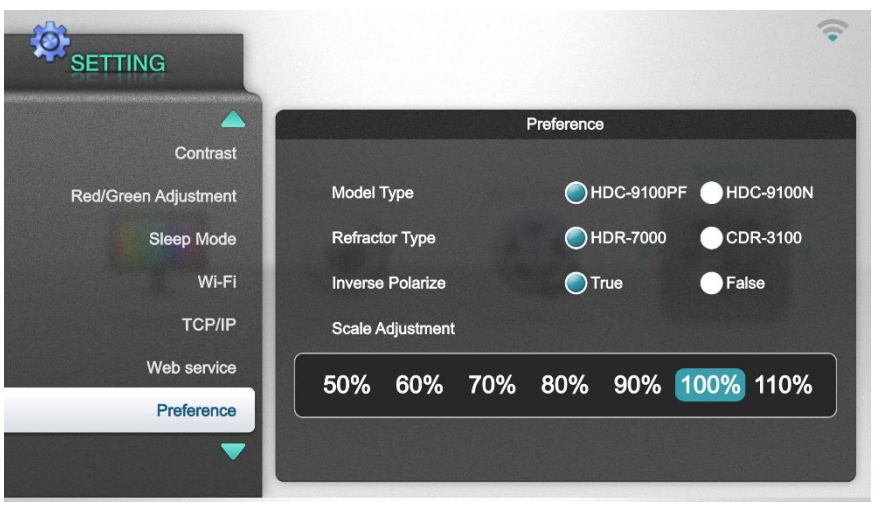
✓ Send Wifi Chart
: ON (In the case of Off, the HDC-9100 should be set the same. DR connect – Off)

✓ Chart IP Address
: The chart IP address should be entered as HDC-9100 Web service - DR connect - Address.



■ Preference

Select the Model Type, Refractor Type and Inverse Polarize.
Scale adjustment.



▪ When connecting to the Huvitz Digital Refractor using the CAN port of HDC-9100, you must select the Refractor Type appropriate for the model to be connected.
▪ CAN cable provided by Huvitz must be used.
▪ Refer to the installation manual of the digital refractor for detailed information about the interfacing how-to.

▪ Lors de la connexion au réfracteur numérique Huvitz à l'aide du port CAN du HDC-9100, vous devez sélectionner le type de réfracteur approprié pour le modèle à connecter.
▪ Le câble fourni par Huvitz doit être utilisé.
▪ Reportez-vous au manuel d'installation du réfracteur numérique pour des informations détaillées sur la procédure d'interfaçage.

■ About

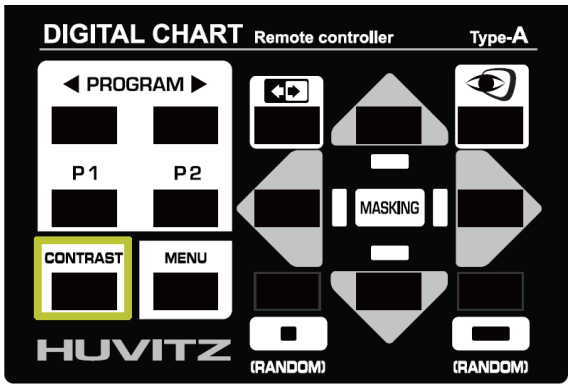
Display license information and date of update of HDC-9100.



8.3 Other Functions

8.3.1 Adjusting the Contrast Sensitivity

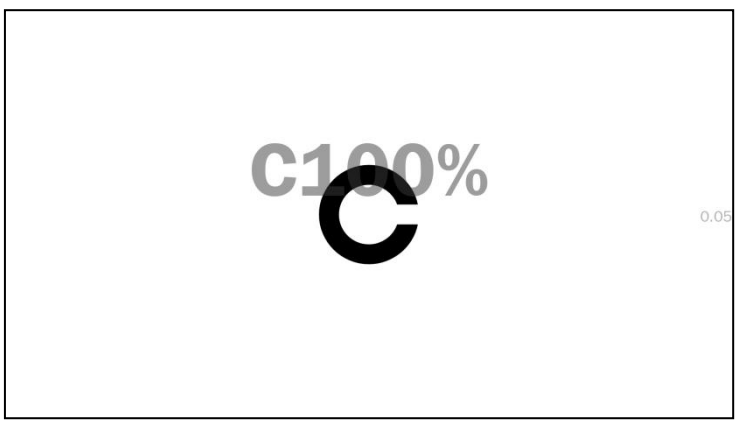
During performing an examination, the operator may adjust the contrast of the chart display for various reasons. It's possible either by pressing the "CONTRAST" button on the remote.



When the contrast-adjusting button is pressed, adjusted contrast value is displayed on the screen temporarily.

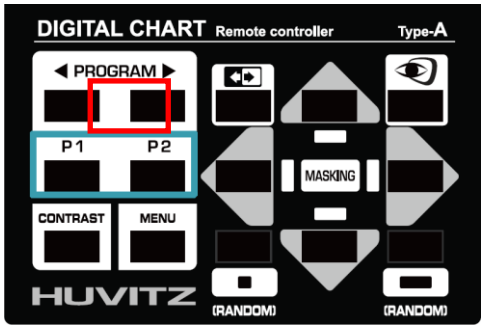
The contrast is leveled down step by step each time the operator presses the "CONTRAST" button

In configuration, you can subdivide changed quantity by selecting Level value in Contrast mode.



8.3.2 Input Custom Program

The buttons PGM1 and PGM2 on the remote execute custom program. By default PGM1 contains the system providing programmed sequence but PGM2 is empty. The users can reset and input their own optometric sequence into both the PGM1 and PGM2



Method to input program to P2

① When press P2 button 3 times, screen will display “Programming PGM2”
② Select one chart and save with right button of ◀PROGRAM▶.
③ Select another chart and save in the method of ②.
④ Select several charts in the method of upward.
⑤ After the complete of selection and save, escape with the P2 button.

Method to use program to P2

① Press P2 button one time, and then the chart which was saved first will appear.
② To see the second chart, press the right button of ◀PROGRAM▶.
③ As press right button of ◀PROGRAM▶, The charts will appear in the order of save.
If press left button of ◀PROGRAM▶, The former chart will re-appear.
④ Press chart button which is not saved in program. And then if press right button of ◀PROGRAM▶
The program will continue from the chart which escaped..

8.3.3 Changing the Channel of the Remote Control

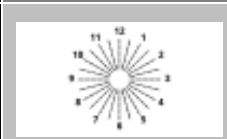
The IR channel of the remote should always be identical with that of the main body. After the IR channel of the main body is changed by using the remote, the remote does not access to the main body immediately after saving and exiting the menu mode.

To change IR channel of remote control, it is convenient that change in the “IR Channel” mode.
For more details, refer to the section 8.2.4. of User Manual.

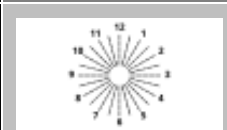
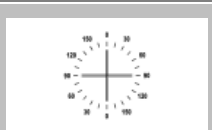
The order of change IR channel of remote controller is 1→2→3→4→5→6→7→8→9→10→1. You can change channel by pressing button and button at the same time.
If you not changed the channel in settings, you cannot distinguish in naked eye. So check the response of remote control when you press channel change button. If the main body response with button press, the channel synchro was completed.

9. Optometric Test Using the Digital Chart

9.1 Cylinder Axis Test

Title	Content
	To determine the correcting astigmatic axis roughly.
	  
	None
	① Occlude one eye that's not to be examined. ② Add spherical lens power as much as the patient can read numbers around the chart. ③ Ask the patient if any direction is seen thicker. ④ If all the directions are seen even, there is no astigmatism exists. Otherwise thickest direction to get astigmatic axis.

9.2 Cylinder Power Test

Title	Content
	To determine the correct cylinder power
	   
	None
	① Occlude one eye that's not to be examined. ② Add cylinder power until the patient sees all the directions evenly. ③ If the thickest direction changes by adding cylinder power, adjust the cylinder axis together. - Plus the axis if the thickest direction changes in clockwise. - Minus the axis otherwise.

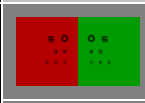
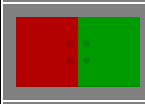
9.3 Binocular Cylinder Axis Test

Title	Content
	To determine the correcting astigmatic axis roughly.
	
	Polar
	① Add spherical lens power as much as the patient can read numbers around the chart. ② Ask the patient if any direction is seen thicker. ③ If all the directions are seen even, there is no astigmatism exists. Otherwise thickest direction to get astigmatic axis.

9.4 Binocular Cylinder Power Test

Title	Content
	To determine the correcting cylinder power
	
	Polar
	① Add cylinder power until the patient sees all the directions evenly. ② If the thickest direction changes by adding cylinder power, adjust the cylinder axis together. - Plus the axis if the thickest direction changes in clockwise. - Minus the axis otherwise

9.5 Red/Green Test

Title	Content
	To determine the correcting spherical power
	
	 None
	 Polar
	 Cross Cylinder(Fixed at 90°)
	① (Occlude one eye that's not to be examined). ② Add about 0.5D for fogging if necessary. ③ Ask the patient which side looks clearer, on the green or on the red. Add plus or minus power until the patient sees the both side the same. - Add plus power if the letters on green side is clearer. - Add minus power if the letters on red side is clearer. ③ (Cross Cylinder) Ask the patient if the horizontal lines and the vertical lines are the same in thickness. - Increase the spherical power by 0.25D if the horizontal lines are thicker. - Decrease the spherical power by 0.25D if the vertical lines are thicker.

9.6 Cross Cylinder Test for Axis

Title	Content
	To refine the correcting cylinder axis
	
	Jackson Cross Cylinder (±0.25 or ±0.50)
	① Occlude one eye that's not to be examined. ② Place the JCC lens before the eye such that its axes straddle at 45 degrees angles the correcting cylinder axis. ③ Find the exact cylinder axis by repeating circulating the JCC lens and asking the patient which view is sharper or less blurry until the two views are the same in sharpness. - Plus the axis if the view before circulation is sharper. - Minus the axis if the view after circulation is sharper.

9.7 Cross Cylinder Test for Power

Title	Content
	To refine the correcting cylinder power
	
	Jackson Cross Cylinder(±0.25 or ±0.50)
	① Occlude one eye that's not to be examined. ② Place the JCC lens before the eye such that its axes straddle at 90 degrees angles the correcting cylinder axis. ③ Find the exact cylinder power by repeating circulating the JCC lens and asking the patient which view is sharper or less blurry until the two views are the same in sharpness. - Decrease the cylinder power by -0.25 if the view before circulation is sharper. - Increase the cylinder power by -0.25 if the view after circulation is sharper.

9.8 Binocular Balance Test

Title	Content
	To equalize the accommodative stimulus for two eyes
	 
	Polar
	① Open the both eyes. ② Place the polarizing filters before the eyes, 135 degree on the right and 45 degree on the left. ③ Fog the both eyes by +0.5D. ④ Ask the patient if the clearness of the top line and the bottom line is equal. - Add +0.25D on the right if the top line is clearer - Add +0.25D on the left if the bottom line is clearer

9.9 Dominant Eye Test for Patients with Phoria

Title	Content
	To determine the dominant eye of the patient with heterophoria
	
	Red/Green
	① Open the both eyes. ② Place the red filter before the right eye and the green filter before the left eye. ④ Ask the patient which bar is along with the central dot, red or green.

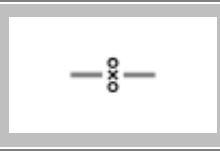
9.10 Worth 4 Dot Test

Title	Content
	To Check the fusion and suppression
	
	Red/Green
	① Open the both eyes. ② Place the red filter before the right eye and the green filter before the left eye. ③ Ask the patient how many targets he or she is seeing.

9.11 Polarized Cross Test

Title	Content
	To measure the lateral and vertical phoria
	 
	Polar
	① Open the both eyes. ② Place the polarizing filters before the eyes, 135 degree on the right and 45 degree on the left. ③ Add prism before the eyes until the patient sees the horizontal and vertical lines aligned.

9.12 Fixation Disparity Test

Title	Content
	To measure the fixation disparity
	   
	Polar
	① Open the both eyes. ② Place the polarizing filters before the eyes, 135 degree on the right and 45 degree on the left. ③ Add prism before the eyes until the patient sees the lines aligned

9.13 Coincidence Test

Title	Content
	To check the aniseikonia and measure the lateral and vertical phoria
	
	Polar
	① Open the both eyes. ② Place the polarizing filters before the eyes, 135 degree on the right and 45 degree on the left. ③ Check the coincidence of right and left bracket

9.14 Schober test

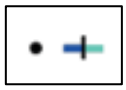
Title	Content
	To measure the lateral and vertical phoria
	
	Red/Green
	① Open the both eyes. ② Place the red filter on the right and green filter on the left. ③ Add prism before eyes until the patient sees the cross in the center of the circles

9.15 Von Graefe Test

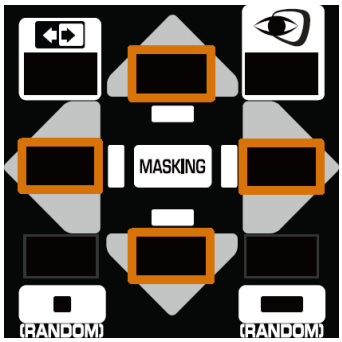
Title	Content
	To measure the phoria
	
	 6 BU split prism before right eye
	 10 BI split prism before left eye
	① Open the both eyes ② Place the proper prism before eye. ③ Add prism before eyes until the patient sees the two bars aligned

9.16 Maddox Rod Test & Thorington Test

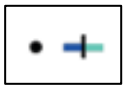
Title	Content	
	To measure the phoria	
		
	Vertical Maddox Rod Test	Vertical Maddox Rod on right
	Horizontal Maddox Rod Test	Horizontal Maddox Rod on left
	① Open the both eyes. ② Place the proper lens before eye. ③ Add prism before eyes until the patient sees the dot and bar aligned	

If you press the  button, the LED light on the upper LCD Panel will be turned on.

You can control the LED light by the direction button of the remote controller as below.



Button	Function
	Selecting between the upper LED light and the right LED light.
	Adjusting the brightness of the LED light

If a button except for  is pressed, the LED light will be turned off automatically.

By pressing the  button, you can turn on the LED light again.

If you want to turn off the LED light while the chart () is projected, press the  button.

By pressing the  button, you can turn on the LED light again.

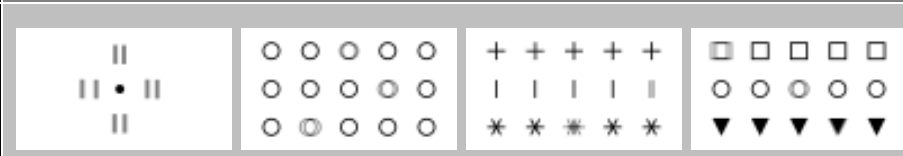
9.17 Zeiger Test

Title	Content
	To measure the phoria
	  
	Polar
	① Open the both eyes. ② Place the polarizing filters before the eyes, 135 degree on the right and 45 degree on the left. ③ Add prism before eyes until the patient sees the lines and gradations aligned.

9.18 Stereo Test

Title	Content
	To check the stereoscopic vision
	   
	Polar
	① Open the both eyes. ② Place the polarizing filters before the eyes, 135 degree on the right and 45 degree on the left. ④ Ask the patient if the patient can see the chart as stereopsis.

9.19 Minute Stereo Test

Title	Content
	To measure the fine depth perception of stereoscopic vision.
	
	Polar
	① Open the both eyes. ② Place the polarizing filters before the eyes, 135 degree on the right and 45 degree on the left. ③ Ask the patient if the which bars(which symbols) are distinguished in depth.

10. Maintenance

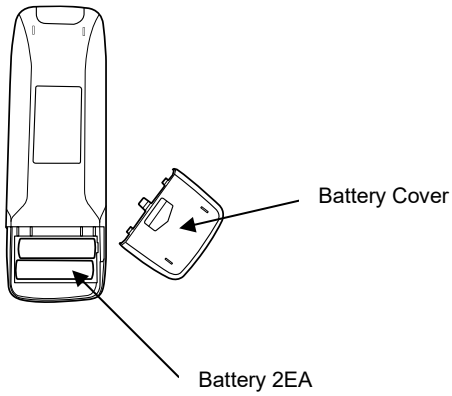
10.1 Replacement of battery of remote controller

① Open the cover with pushing cover.

② Change old battery to new battery. And close cover.

Please make sure the direction of (+), (-). The specification of battery is LR6(AA) 1.5V .

S'il vous plaît assurez-vous que la direction de (+), (-). La spécification de la batterie est LR6 (AA) 1.5V.



10.2 Cleaning

① Sweep the outer surface and LCD panel with soft fabric material.

② When you do not use this device, store with dust cover.

10.3 Disposal

When you dispose the device and accessory kit, Comply with related law and recycling plan.
Disposal of Lithium battery can cause the environmental pollution.
When you dispose the packing material, Comply with related law and recycling plan.

Respectez la loi et le plan de recyclage applicables lors de la mise au rebut de l'appareil et de son kit d'accessoires.

L'élimination de la batterie au lithium peut causer la pollution de l'environnement.

Lorsque vous jetez le matériel d'emballage, respectez la loi et le plan de recyclage en vigueur.

11. Troubleshooting

11.1 LCD screen is not turned on

① Check the power adapter. When the connection between adapter and main body is not adhere properly, the device cannot turn on properly.

② Check the power adapter which plug in, if power outlet have switch, Check the switch which is placed “on”.

③ Press ⏻ power switch at the bottom of the LCD panel, the power LED turns on with one beep.

④ Check if the Logo is displayed on the LCD panel.

⑤ If the problem persists after checking the above procedure, contact the local distributor you purchased this instrument.

11.2 Chart displays broken image

① If the chart images are not displayed in normal. The SSD card could be damaged. Contact the local distributor for replacement.

11.3 The main body is not responsible to the remote

① Check if the remote is installed with the standard batteries. Refer to the label on the back of the remote for the size and type information about the battery.

② Replace the batteries with new ones. The batteries could have been discharged.

③ Check the IR channel of the remote. The channel should be identical with that of the main body.

- ✓ Try each channel number by changing the number in the setup menu.
  (Refer to the 8.3.4. section of User Manual)

④ If the problem persists after checking the above procedure, contact the local distributor you purchased this instrument.

11.4 The screen is too bright or too dark

① “Contrast” or “background adjust” button can be pressed not properly. Execute the menu mode and set proper settings.
(Refer to the 8.2.4. section of User Manual)

② Other reason for unsuitable brightness could be outer influence from environment. Adjust brightness refer to the number ①.

③ If the problem persists after checking the above procedure, contact the local distributor you purchased this instrument..

11.5 Visual acuity test results in overcorrection or undercorrection

① Check the test distance in the setup menu. The test distance should be matching the real distance from the examinee to the chart display.

② The test distance could be changed. So re-measure the test distance and check the test distance in setting menu.
(Refer to the 8.2.4. section of User Manual)

11.6 Visual acuity test results in overcorrection or undercorrection

① When it is possible to adjust lightness of inspection room. Adjust lightness properly.

② Check the wavelength balance of red/green chart. The ambient illumination may affect the result of duochrome test. Execute the color adjustment menu and try adjusting the red/green balance.
(Refer to the 8.2.4. section of User Manual)

11.7 Red/Green filter is not filtering completely

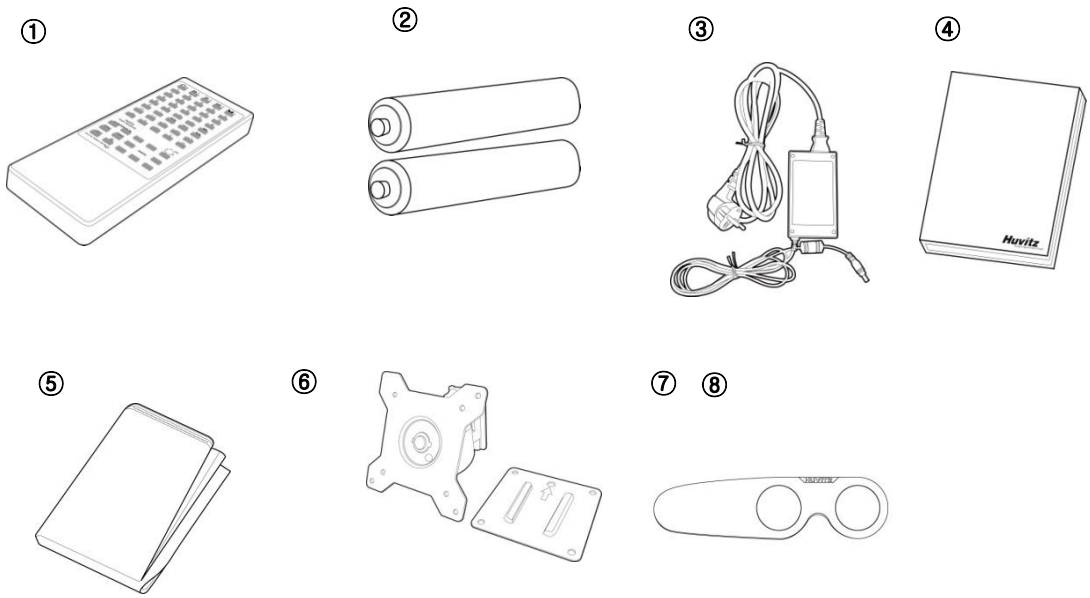
① Check and adjust the red/green filter in the color adjustment menu.
(Refer to the 8.2.4. section of User Manual)

11.8 Polarizer test is not working

① Check if protective film on the LCD panel has been removed. The film or any other similar materials could obstruct the polarizer test.

② Check the viewing angle of the LCD panel with the examining eyes. The angle should be re-adjusted depending on the height of the examinee.

12. Components List



① Remote Controller

② Battery of remote controller (AA)

③ Adaptor and Power cable

④ User Manual

⑤ Dust Cover

⑥ Wall mount

⑦ Red/Green glasses (Optional)

⑧ Polarization glasses (Optional)

13. Product Specification

LCD Type	N-type (Non- polarized panel) : 24 inch Full HD TFT LCD PF-type (Polarized panel) : 24 inch Full HD TFT LCD
Resolution	1920 x 1080 pixels
White Luminance	250 cd/m^2
Chart window size	24 Inch : 531.4mm(H) x 298.9mm(V)
Adapter power consumption	100-250 V~, 1.5-0.75 A, 50-60 Hz Model: MDS-060AAS12BM
Product power consumption	12 Vdc, 4 A
Main Body Size	568mm(W) x 336mm(H) x 80mm(D) / 6.1kg
Remote Control Size	64mm(W) x 195mm(H) x 21mm(D) / 160g
Test Distance	1.5 m ~ 6 m (0.1m step)
External Input	USB (Memory stick), CAN
Controls	▪ wired (CAN) – HDR-7000 / HDR-9000 / CDR-3100 ▪ wireless (IR) – Remote Control / HDR-7000 / HDR-9000 ▪ WiFi (IEEE802.11b 2.4GHz) – Remote Control / HDR-9000 ▪ Bluetooth 3.0
Main Body fixing Method	Wall mount
Optional	▪ Red/Green glasses ▪ Polarization glasses
Chart	▪ Landolt Ring, Alphabet, Number, Tumbling E ▪ Figures for Children, Russian Letter, Hiragana ▪ Functional Chart (Red/Green, Cross Cylinder, Binocular Balance, Fusion Suppression, Phoria, Aniseikonia, Streopsis Etc)
Masking Filter	▪ Dot, Row, Column ▪ Red/Green Filter
Setting	▪ Change IR channel of remote controller (10 channel)

	▪ Mode for Movie or Photo ▪ Sleep Mode ▪ Contrast rearrange ▪ Red/Green balance ▪ Color adjustment for Red/Green filter ▪ Random function ▪ Chart space adjustment ▪ Chart background switching
Test	▪ Color vision test ▪ HUE test ▪ Contrast Sensitivity test
Etc	▪ Vergence, Saccadic, Stereopsis training ▪ Custom Program (2 program support)

14. EMC Information

Precautions to be taken to prevent adverse events to the PATIENT and the OPERATOR due to Electromagnetic Disturbances are listed in the column “Electromagnetic environment – guidance” in the tables below.

The HDC-9100 is intended for use in home healthcare environment.

Details of emissions limit and immunity test levels based on environment location of intended use is in the below.

1) Electromagnetic Emission

Emissions test	Compliance	Electromagnetic environment-guidance
Radiated disturbance CISPR 11	Group 1 Class B	The EMISSIONS characteristics of HDC-9100 make it suitable for use in home healthcare environment (CISPR 11 class B). HDC-9100 uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
Mains terminal disturbance voltage CISPR 11	Group 1 Class B	The HDC-9100 is suitable for use in all establishments, including domestic establishments and those directly connected to the public low voltage power supply network that supplies buildings used for domestic purposes.
Harmonic current IEC 61000-3-2	Class A	
Voltage Fluctuation/Flicker IEC 61000-3-3	Complies	

2) Electromagnetic Immunity

Test of Electronic Interference Resistance	IEC60601-1-1-2 Test Level	Compliance Level	Electromagnetic Environment Guideline
Electrostatic Discharge (ESD) IEC 61000-4-2	Discharge by 8 kV direct contact 15 kV of Air-gap discharge	Discharge by 8 kV direct contact 15 kV of Air-gap discharge	The floor should be wooden or cemented floor or ceramic tile floor. In case that the floor is made of chemical compound materials, the relative humidity should be at least 30%
Radiated RF Electromagnetic Field immunity IEC 61000-4-3	10 V/m 80 MHz-2.7 GHz 80% AM at 1 kHz	10 V/m 80 MHz-2.7 GHz 80% AM at 1 kHz	HDC-9100 is suitable to use in home healthcare environment.
Immunity to Proximity Fields from RF wireless Communications Equipment IEC 61000-4-3	28 V/m Max. 385-5785 MHz in according to table 9 in IEC 60601-1-2	28 V/m Max. 385-5785 MHz in according to table 9 in IEC 60601-1-2	RF communication equipment is used no closer than 30 cm to any part of the HDC-9100, including cables specified by Huvitz.
Electrical Fast Transient/Burst IEC 61000-4-4	± 2 kV for power supply lines 100 kHz repetition frequency	± 2 kV for power supply lines 100 kHz repetition frequency	The quality of supplied power for HDC-9100 should be suitable for residence or commercial environment.
Surge IEC 61000-4-5	± 1 kV line to line ± 2 kV line to earth	± 1 kV line to line ± 2 kV line to earth	The quality of supplied power for HDC-9100 should be suitable for residence or commercial

			environment.
Immunity to conducted disturbances induced by RF fields IEC 61000-4-6	3 V 0.15-80 MHz 6 V in ISM and amateur bands between 0.15 and 80 MHz 80% AM at 1 kHz Power supply line	3 V 0.15-80 MHz 6 V in ISM and amateur bands between 0.15 and 80 MHz 80% AM at 1 kHz Power supply line	The strength of RF field in the frequency range for residence low voltage supply from 150 kHz to 80MHz, the strength of the RF field should be smaller than 3 V except for ISM and amateur radio band.
Voltage dips/ Voltage interruption according to IEC 61000-4-11	0 % U_T: 0.5 cycle At 0°, 45°, 90°, 135°, 180°, 225°, 270° and 315° 0 % U_T; 1 cycle and 70 % U_T; 25/30 Cycles Single phase: at 0º 0 % U_T; 250/300 cycle	0 % U_T: 0.5 cycle At 0°, 45°, 90°, 135°, 180°, 225°, 270° and 315° 0 % U_T; 1 cycle and 70 % U_T; 25/30 Cycles Single phase: at 0º 0 % U_T; 250/300 cycle	The quality of supplied power should be suitable for residence or commercial environment. For the user to operate the equipment continuously even the electric power supply is interrupted, It is recommended that the uninterruptable power supply device (UPS) or battery is prepared.
Magnetic field of supply frequency (50/60Hz) according to IEC	30 A/m	30 A/m	The magnetic field of power frequency should be coincided with the general value found in the residence or commercial

61000-4-8			environment
Note: U_T is the AC voltage of the power before using test level			

Manufacturer announcement – electromagnetic waves trouble

Electromagnetic waves trouble	
HDC-9100N/PF should be used in the below mentioned electromagnetic wave environment. HDC-9100N/PF purchaser or user needs to confirm whether HDC-9100N/PF is used in this type of environment.	
Trouble test	**Question of appropriateness**
RF emissions CISPR 11	Group 1
RF emissions CISPR 11	Class B
Harmonic emissions IEC 61000-3-2	Class A
Voltage fluctuations/flicker IEC 61000-3-3	Complies

Manufacturer announcement – electromagnetic waves tolerance

electromagnetic waves tolerance		
HDC-9100N/PF is to be used in the below designated electromagnetic wave environment. HDC-9100N/PF customer and user need to guarantee that the HDC-9100N/PF will be used in this type of environment.		
Tolerance test	**IEC 60601 test level**	**Appropriateness level**
Electrostatic discharge(ESD) IEC 61000 - 4 - 2	contact ±8 kV in the air ±15 kV	contact ±8 kV in the air ±15 kV
Electric rapid transients/bust IEC 61000 - 4 - 4	power supplying line ±2 kV input/output line ±1 kV	power supplying line ±2 kV input/output line ±1 kV
Surge IEC 61000 - 4 - 5	between lines ±1 kV between line and grounding ±2 kV	differential mode ±1 kV common mode ±2 kV
Voltage dip, instantaneous interruption, voltage fluctuation at the power input line IEC 61000 - 4 - 11	For 0.5 cycle < 5 %*U*T(*UT's* > 95 % decrease) For 5 cycle 40 %*U*T(*UT's* 60 % decrease) For 25 cycle 70 %*U*T(*UT's* 30 % decrease) For 5 seconds < 5 % *U*T(*UT's* > 95 % decrease)	For 0.5 cycle < 5 %*U*T(*UT's* > 95 % decrease) For 5 cycle, 40 % *U*T(*UT's* 60 % decrease) For 25 cycle, 70 %*U*T(*UT's* 30 % decrease) For 5 seconds, < 5 % *U*T(*UT's* > 95 % decrease)
Power frequency magnetic field (50/60 Hz) IEC 61000 - 4 - 8	30 A/m	30 A/m
Other *U*T is the a.c. power voltage for before approving the test level.		

Electromagnetic waves tolerance		
HDC-9100N/PF is to be used in the below mentioned electromagnetic wave environment. HDC-9100N/PF purchaser or user needs to confirm whether HDC-9100N/PF issued at this environment.		
Tolerance test	**IEC 60601 test conditions**	**Appropriateness level**
Conductivity RF electromagnetic field IEC 61000 - 4 - 6	3 Vrms 150 kHz~80 MHz 6 Vrms in ISM band 6.765 MHz to 6.795 MHz 13.553 MHz to 13.567 MHz 26.957 MHz to 27.283 MHz 40.66 MHz to 40.70 MHz	3 Vrms 6 Vrms
Radioactivity RF electromagnetic field tolerance IEC 61000 - 4 - 3	3 V/m 80 MHz~2.7 GHz scope	3 V/m

15. 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 section 11, 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.
- We recommends customers to fill up the following form after purchase and retain this manual as a permanent record of purchase.

Date of purchase: _____

Distributer: _____

Address: _____

Contact: _____

Model No.: _____

Serial No.: _____

- 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.

Huvitz Co., Ltd 38, Burim-ro 170beon-gil, Dongan-gu, Anyang-si, Gyeonggi-do, 14055 Republic of Korea	**Tel:** +82-31-428-9100 **Fax**: +82-31-477-9022(FA) **URL : http://www.huvitz.com** **e-mail:** svc@huvitz.com