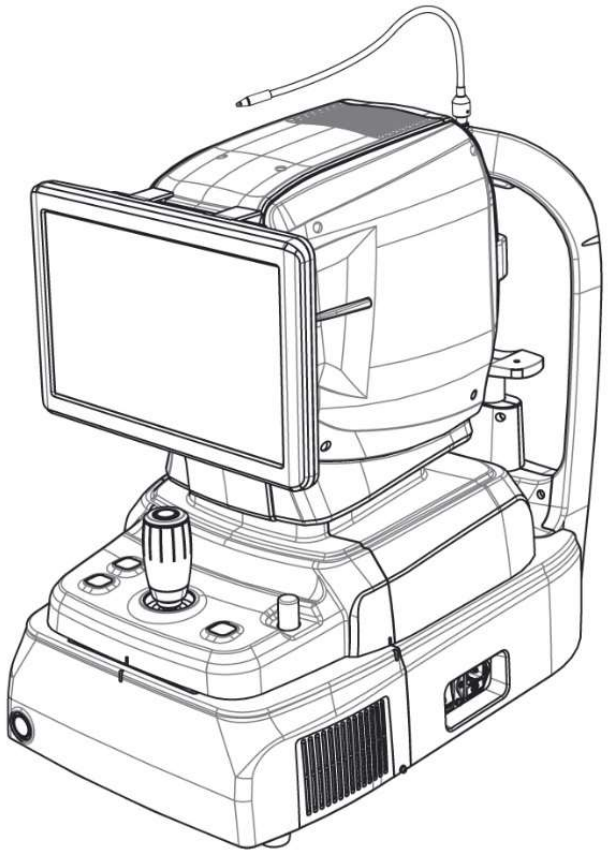
Huvitz

OPTICAL COHERENCE TOMOGRAPHY

HOCT-1/1F

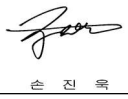
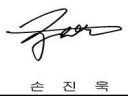
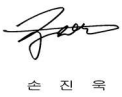
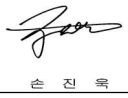
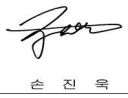
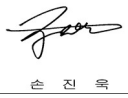
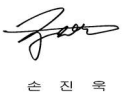
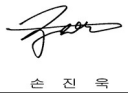
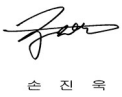
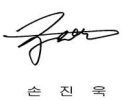
USER MANUAL



IMPORTANT NOTICE

This product may malfunction due to electromagnetic waves caused by portable personal telephones, transceivers, radio-controlled toys, etc. Be sure to avoid having objects such as, which affect this product, brought near the product.
The information in this publication has been carefully checked and is believed to be entirely accurate at the time of publication. HUVITZ assumes no responsibility, however, 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 documentation to reflect such changes.

■ Revision History

Revision	Date	Approval	Description
A	2017.11.21		First issued
B	2018.10.16		3.2 Intended Use - “and so on” was deleted. 6.3, 6.6.4, 6.6.5 - addition
C	2018.02.27		Various function is added and modified. (ex. Fundus enhancement, segmentation edit and so on)
D	2019.03.05		Angio Function Added.
E	2020.07.16		Representatives Information and Specification update add the French Warning and Caution according to UL regulation. Change some technical specification
F	2020.11.18		Information regarding Anterior Wide, Fundus Stereo, OCT Biometry and Topography Function Added.
G	2021.01.13		Information regarding OCT Biometry and Topography Function corrected in detail.
H	2021.04.16		Representative Information updated
I	2022.01.15		Information regarding external ports in Technical Specifications and Configuration and Functions Section Updated. Canada Representative information updated UK , Switzerland Representative Information added
J	2022.07.21		Revised based on Medical devices - Information to be supplied by the manufacturer (ISO 20417:2021)
K	2023.08.28		Updated Camera specification by deleting Built-in 12Mega pixel, Color.
L	2024.10.25		Updated the Scan speed to Max. 80,000 A-Scan/sec Brazil Representative information updated QR Consulting

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(2024.10.25)

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1

SAFETY PRECAUTIONS

1.1. Overview

Safety is everyone's responsibility. The safe use of this instrument is largely dependent upon the installers, users, operators, and managers. It is prerequisite to read and understand these specifications before installing, using, cleaning, fixing or revising. Fully understanding the whole instructions must be the first priority. For this reason, 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 signs of Warnings and Cautions.

⚠ 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 qui pourrait entraîner des blessures graves, la mort ou des dommages matériels importants si ignoré.

⚠ CAUTION

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

"Caution" indique la présence d'un danger pouvant entraîner des blessures légères ou des dommages matériels en cas d'ignorance.

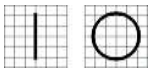
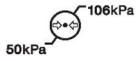
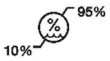
⚠ NOTE

This is used to emphasize essential information.
Be sure to read this information to avoid operating the device incorrectly.
Ceci est utilisé pour souligner les informations essentielles.
Assurez-vous de lire ces informations pour éviter de mal utiliser l'appareil.

2

Symbol Information

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.)
	I and O on power switch represent ON and OFF respectively. (O sur l'interrupteur d'alimentation représentent respectivement ON et OFF.)
	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)
	Keep away from sunlight (Tenir à l'écart de la lumière du soleil)
	Stack layer limit (Limiter la couche de pile)
	CE Mark (Marque CE)
	Use no hook (N'utilisez aucun crochet)
	WEEE Symbol – EU only Disposal of your old appliance 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 Mise au rebut de votre ancien appareil 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.)
	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)
	Type B Isolated patient connection (Type B Connexion patient isolée.)
	Warning: Crushing or insert of hand (Attention: écrasement ou insertion de la main)
	QR code (QR code)
	Alternating Current (Courant alternative)

	Consult instructions for use (Consulter les instructions d'utilisation)
	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.)
	Class I Laser Product (Produit au laser de classe I)
	CE for RoHS RoHS Directive Compliance 2011/65/EU (CE pour les RoHS Respect de la directive en matière de conformité 2011 / 65 / CE)
	To indicate this product is Medical device (Pour indiquer que ce produit est un dispositif medical)
	Authorized representative in Switzerland (Représentant autorisé dans la Suisse)

2.1. Usage Precautions

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.

⚠ CAUTION

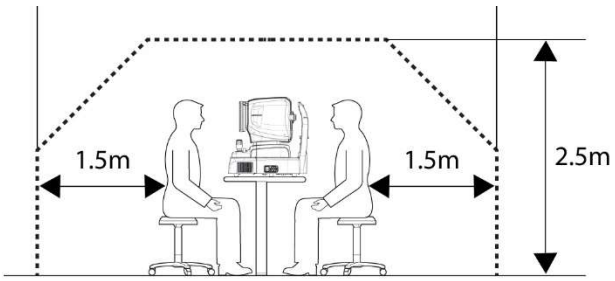
For use of equipment in rated voltage less than 125Vac, minimum 6A, Type SJT or SVT, 18/3AWG, 10A, max 3.0m long: One end with Hospital Grade Type, NEMA 5-15P Other end with appliance coupler. For use of equipment in rated voltage less than 250Vac, minimum 6A, Type SJT or SVT, 18/3AWG, 10A, max 3.0m long: One end terminated with blade attachment plug(HAR) Type, NEMA 6-15P.

Pour l'utilisation d'équipements à une tension nominale inférieure à 125 Vca, minimum 6 A, type SJT ou SVT, 18 / 3AWG, 10 A, max 3,0 m de long: une extrémité avec type hospitalier, NEMA 5-15P Autre extrémité avec coupleur d'appareil. Pour l'utilisation d'équipements à une tension nominale inférieure à 250 Vca, minimum 6 A, type SJT ou SVT, 18 / 3AWG, 10 A, max 3,0 m de long: une extrémité se termine par un connecteur de lame (HAR), NEMA 6-15P.

⚠ CAUTION

Use instrument that comply with IEC60601-1 in the patient environment. [The figure below show]

Utilisez un instrument conforme à la norme IEC60601-1 dans l'environnement du patient. [La figure ci-dessous montre]



If and instrument that does not comply with IEC 60601-1 is to be used, use an isolation transformer.

If a person handling a conductive part of the system comes into contact with a patient at the same time, hazard may occur due to leakage current exceeding the value specified in the applicable standard. Be careful not to touch patients when connecting or removing the power plug or cable connectors.

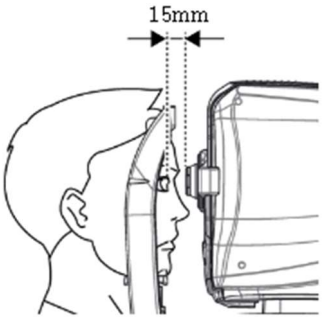
Si un instrument non conforme à la CEI 60601-1 doit être utilisé, utilisez un transformateur d'isolement.

Si une personne manipulant une partie conductrice du système entre en contact avec un patient en même temps, un danger peut se produire en raison d'un courant de fuite dépassant la valeur spécifiée dans la norme applicable. Veillez à ne pas toucher les patients lors de la connexion ou du retrait de la fiche d'alimentation ou des connecteurs de câble

⚠ CAUTION

During the Anterior segment image operation, pull the joystick toward the operator before adjusting the alignment. Move the body to align patient's eye. Move the body slowly while watching patient's eye and body, because working distance is just 15mm that the front lens is very close to patient's eye.

Pendant l'opération d'image du segment antérieur, tirez le joystick vers l'opérateur avant de régler l'alignement. Déplacez le corps pour aligner l'œil du patient. Déplacez le corps lentement tout en observant les yeux et le corps du patient, car la distance de travail n'est que de 15 mm, la lentille frontale est très proche de l'œil du patient.



⚠ CAUTION

This instrument includes lithium battery. This hazardous material needs to be disposed of properly to limit environmental pollution. Please contact to the professional waste disposal company.

Cet instrument comprend une pile au lithium. Cette matière dangereuse doit être éliminée correctement pour limiter la pollution de l'environnement. Veuillez contacter la société professionnelle d'élimination des déchets.

⚠ CAUTION

Do not install any software on OCT built-in computer without our consent.
The manufacturer is not responsible for any failure due to random installation.

N'installez aucun logiciel sur l'ordinateur intégré OCT sans notre accord.
Le fabricant n'est pas responsable de toute défaillance due à une installation aléatoire.

⚠ CAUTION

The equipment is a Class I LED Product. The LED used for the equipment is safe under expected use conditions

including situation such as looking into the LED using optical equipment.
However, observe the following precautions when using the equipment

L'équipement est un produit LED de classe I. La LED utilisée pour l'équipement est sûre dans les conditions d'utilisation prévues, y compris dans des situations telles que la recherche dans la LED à l'aide d'un équipement optique. Cependant, respectez les précautions suivantes lors de l'utilisation de l'équipement

- Do not direct LED beams to human eyes when unnecessary.
- Do not look into the objective lens for a prolonged time.
- Class 3R invisible LED radiation when Optical system subassembly open.
  Avoid exposure to the beam.
- The longer the duration of exposure and the greater the number of pulses, the greater the risk of ocular damage. Exposure to light from this instrument when operated at maximum output will exceed the safety guideline after 9.9 x 107 sec for Retina IR, 5.3 x 107 sec for Working dot(Manual Focusing), 4.1 x 107 sec for Kerato ring(Auto / Manual Tracking), 9.5 x 107 sec for Kerato focus(Auto/Manual Tracking), 1.0 x 108 sec for Split focus(Optimizing), 9.1 x 105 sec for external fixation lamp, 4.8 x 107 sec for SLD Laser(OCT scanning), 1,936,114 pulses for the light source of fundus image capture.

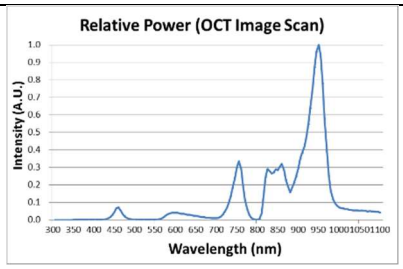
● Ne pas diriger les feux DEL vers les yeux de l'homme lorsque cela n'est pas nécessaire.
● Ne pas regarder dans la lentille objective pendant une période prolongée.
● Radiation LED invisible de classe 3R lorsque le sous-ensemble du système optique est ouvert.
Éviter l'exposition au faisceau.
● Plus la durée de l'exposition est longue et plus le nombre d'impulsions est élevé, plus le risque de lésion oculaire est grand. L'exposition à la lumière de cet instrument, lorsqu'il est utilisé à la sortie maximale, dépassera la ligne directrice de sécurité après 9,9 x 107 s pour la rétine IR, 5,3 x 107 s pour le point de travail (focalisation manuelle), 4,1 x 107 s pour l'anneau Kerato (suivi automatique / manuel), 9,5 x 107 s pour l'accent Kerato (suivi automatique/ manuel), 1,0 x 108 s. sec pour la lampe de fixation externe, 4,8 x 107 sec pour le laser SLD (balayage OCT), 1 936 114 impulsions pour la source lumineuse de capture d'images de fundus.

Note 1: The exposure time and number of pulses from all light sources is cumulative and additive.
Note 2: If the intensity of any of the light sources is reduced to 50% of the maximum intensity, the exposure time or number of pulses for that light source to reach the exposure guideline is doubled. This linear relationship can be used to determine the time to reach the exposure guideline for the combination of light sources at various intensity settings.

Remarque 1: Le temps d'exposition et le nombre d'impulsions de toutes les sources lumineuses sont

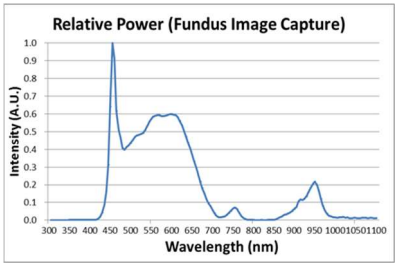
Cumulatifs et additifs.

Remarque 2: Si l'intensité de l'une des sources de lumière est réduite à 50% de l'intensité maximale, le temps d'exposition ou le nombre d'impulsions pour que cette source de lumière atteigne la ligne directrice d'exposition est doublé. Cette relation linéaire peut être utilisée pour déterminer le temps nécessaire pour atteindre la ligne directrice d'exposition pour la combinaison de sources lumineuses à divers réglages d'intensité.



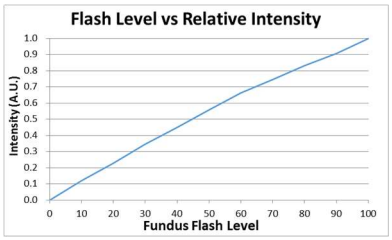
Note 3: The weighted retinal radiant exposure guideline is 10 J/cm2

Note 3: La ligne directrice pondérée d'exposition au rayonnement rétinien est de 10 J / cm2



<Spectrum output of all light source during measurement (maximum light intensity)>

<Sortie spectrale de toutes les sources lumineuses pendant la mesure (intensité lumineuse maximale)>



<Relationship between fundus flash level and maximum light intensity>

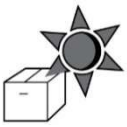
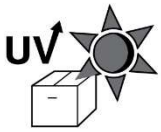
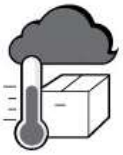
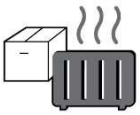
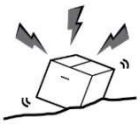
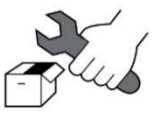
Relation entre le niveau de flash du fond d'œil et l'intensité lumineuse maximale>

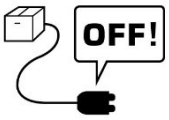
Intended User Profile

The device must be operated only by a, or under direct supervision of properly trained and qualified person/s such as ophthalmologist.
a. Age: adult (> 21 years of age)
b. Occupation: Optometrist, ophthalmologist
c. Level of training: Recommend completing training how to use the device
d. Education: Basic training is required for the use of equipment. (Obtains a certificate of qualification such as optics, medical school, etc., after completing a certain amount of education)

2.2. Environmental Considerations

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 35°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℃ ~ 35℃ (50°F ~ 95°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.
Do not expose products or packing to environmental conditions outside of those specified above.

2.3. Safety Precautions

1. This is an electric medical device. Use is limited to doctors or persons qualified by the law of each country.

2. Do not make a diagnosis base on a single captured image. Doctors are responsible for making the final diagnosis based on the present and past medical records of the patient such as captured images. Without sufficient information, proper diagnosis may not be made.

3. When instrument is send back to A/S center for repair or maintenance, or before authorized service man is arrived at the place for repair or maintenance, wipe the surfaces of the instrument (especially, the areas that come into contact with the patient) with a clean cloth dampened with rubbing alcohol.

4. If a user uses power save supported by Windows 10 except for the power save in User setting, it causes some trouble in HOCT. The manufacturer isn't responsible for the problem.

WhfWhw

5. User must not change the setting supported by the manufacturer, this change might make some trouble in HOCT. The manufacturer isn't responsible for the problem.

6. This equipment must not be used in an area that is in danger of explosions and in the presence of flammable, explosive, or volatile solvent such as alcohol, benzene or similar chemicals.

7. Do not place or store this instrument in humid area. Do not expose the device to water splashes, dripping water, or sprayed water. Do not place containers with fluids, liquids, or gases on top of this instrument.

8. The instrument must be operated by a trained and qualified person or under his or her supervision.

9. Repair of this instrument must be conducted by HUVITZ's service technicians or other authorized persons.

10. Maintenance by users must observe the User's Manual and Service Manual. Any additional maintenance may only be performed by HUVITZ's service technicians or other authorized persons.

11. Manufacturers are responsible for the safety, reliability, and performance of this instrument only when the following requirements are fulfilled.
    (1) When the instrument has been installed in a proper area, following the manual.
    (2) When the instrument has been operated and maintained according to the manual and service manual.

12. Manufacturers are not responsible for the damages caused by unauthorized alterations. Such tampering will forfeit any rights to receive services during the term of guarantee.

13. This instrument must be connected with the accessories supplied by HUVITZ. If you are to use other accessories, their safety or usability must be checked and proved by their manufacturers or HUVITZ.

14. Only those who have undergone proper training and instructions are authorized to install, use, operate, and maintain this instrument.

15. Keep the User's Manual and Service Manual in a place easily accessible at all times for persons operating and

maintaining the equipment.

16. Do not apply excessive force to cable connections. If the cable does not connect easily, make sure that the connector (plug) is appropriate for the receptacle (socket). If you caused any damage to a cable connector(s) or receptacle(s), let the damage(s) be repaired by an authorized service technician.

17. Please do not pull on any cable. Always grab the plug when disconnecting cables.

18. Before you use, check the exterior of the instrument and its conditions.

19. Do not block any ventilation outlet necessary for proper heat dissipation.

20. If smoke, sparks or any abnormal noise or smell is noticed coming from the instrument, please switch the power off immediately and pull out the plug.

21. When you carry this product, please use a hand cart. If you want to move the product to other area, please contact customer service center.

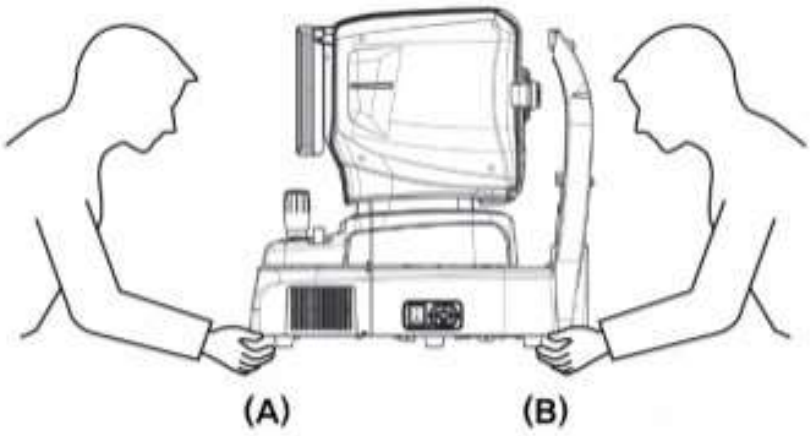
22. To avoid the risk of electric shock, this instrument must only be connected to protective earth.

23. Do not place the instrument where it is difficult to operate the disconnecting device. (disconnecting device: power cable)

24. The equipment may be impaired if it is used in a manner not specified by the manufacturers or manual.

25. External equipment intended for connection to signal input, signal output or other connectors of this instrument, 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 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.

26. When you carry this product, please hold on left(A) and right(B) bottom of the product.



27. Do not touch directly if an operator has a hand injury or a significant allergic reaction to the material used in the operation contact part.

Part Name	Material
LCD Touch pannel	Glass
Joystick / button	ABS + Silicon, Aluminum(A6061 T6)
Power switch	PC + PA66
Cover	ABS
Chin Rest	ABS

28. In the event of a serious incident involving the device, the user shall report it to the manufacturer and the competent authority of the Member State in which the user and/or patient are established.

29. When packing box is unintentionally open before use or damaged, please call A/S center.

30. Make sure that you always have an up to date virus scanner and firewall installed on your system.

31. Avoid resetting or turning off the PC when the HOCT-1/1F running.

32. Even if back up is set to be performed, if the power is not turned on or if the backup location cannot be found, backup is not performed.

33. The connection of the electronic interface to an IT network that includes other equipment could result in previously unidentified risks to patients, users or third parties. The RESPONSIBLE ORGANIZATION is advised to identify, analyze, evaluate and control these RISKS.

34. Subsequent changes to the IT-NETWORK could introduce new RISKS and require additional analysis.
Changes to the IT-NETWORK include:
1) changes in IT-NETWORK configuration
2) addition of items (hardware and/or software platforms or software applications to the IT-NETWORK
3) removal of items from the IT-NETWORK
4) update of hardware and/or software platforms or software applications on the IT NETWORK
5) upgrade of hardware and/or software platforms or software applications on the ITNETWORK

3

INTRODUCTION

3.1. System Outline

The Huvitz Optical Coherence Tomography HOCT-1, HOCT-1F is a non-contact, high-resolution tomographic and bio-microscopic imaging device. It is indicated for in-vivo viewing, axial cross-sectional and three dimensional imaging, color fundus imaging (HOCT-1F only) and measurement of posterior ocular structures, including the retina, retinal nerve fiber layer, ganglion cell plus inner plexiform layer, ganglion cell complex, macula, optic nerve head, and imaging the microvasculature of the retina and choroid(Optional). It is also indicated for in-vivo viewing, axial cross-sectional and three dimensional imaging of anterior ocular structures, including the cornea.

The Optical Coherence Tomography HOCT-1, HOCT-1F with optional Biometry function is capable of measuring biometric parameter such as Axial Length, Central Corneal Thickness, Anterior Chamber Depth and Crystalline Lens Thickness. The Optical Coherence Tomography HOCT-1, HOCT-1F with optional Topography function is capable of taking image and analyzing the cornea topography.

HOCT-1, HOCT-1F software uses window 10 operating system which controls all system functions including the followings.

- To take picture tomography in retina or in cornea.
- To provide user interfaces in order to take above tomography picture.
- To display focusing state and move to focus position automatically.
- To analyze the tomography taken and make a thickness between layers.
- To manage patient information
- To support user setup for operation environment.
- To provide an angiography map to analyze the vessels in human eyes.

For HOCT-1F

- To take color picture in fundus
- To provide user interfaces in order to take a color fundus picture.
- To analyze the color fundus picture taken.

3.2. Intended Use

The HOCT-1, HOCT-1F is intended for use to aid in the diagnosis and management of ocular diseases such as macular holes, cystoid macular edema, diabetic retinopathy and aged related macular degeneration which are occurred at a macular, an optic disk, an inner structure of retina, and a cornea.

3.3. Classification

- Classification of product: Class IIa according to Annex VIII (Rule 10) of the Medical Device Regulation 2017/745
- Resistance against electric shock: Class I (earthed)
- Protection class against electric: Type B (Head rest, chinrest paper)
- Classification of Laser Product: Class 1 (laser based on IEC 60825-1:2014 Standard)

3.4. Contraindications

This device should not be used for:

- Patients who are hypersensitive to light.
- Patients who recently underwent photodynamic therapy
- Patients taking medication that causes photosensitivity

There is no any known residual risk other than risks arising from violating contraindication.
But, when unexpected event occurs or you encounter different problems, please contact your local distributor or Authorized Representatives.

3.5. Patient requirements

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

- After his/her face to the chinrest, forehead rest.
- Keep the eye open
- Understand and follow instructions when undergoing an examination.

If the patient does not conform to these conditions, it is not possible to take a picture correctly

3.6. Operating Principles

3.6.1. OCT

The light from the light source (LED) of the infrared family is bifurcated by the coupler, one branch is reflected by the reference mirror, and the other is reflected from the occupant's inner or anterior part and returned to the coupler.
The reflected two-pronged light causes interference, breaks down by wavelength through spectrometers and is detected by line-scan cameras. OCT images are generated through image processing such as noise rejection and FFT and these images are displayed on LCD screens.

3.6.2. Fundus image

The anterior of an eye is illuminated by IR light, the posterior of an eye is illuminated by an infrared light and a white LED, of which lightings are emitted by the fundus illumination optical system. The fundus observation/photography optical system forms and makes an image with image sensors, which images are observed and manipulated with the display panel.

3.6.3. The anterior segment/fundus tomogram

Formation of anterior chamber cross-sectional image, retinal cross-sectional image, and fundus image.
To form retinal cross-sectional images (OCT images) and fundus images (OCT Phase Fundus images), the system main body scans light over the eye to obtain interference light. The obtained interference light is dispersed into individual wavelengths and detected by the line image sensor. The detected light is converted to signals, and then computed to form images. With the anterior segment adapter (optional), a fundus tomogram can be formed.

3.6.4. The angiography of a retina (Optional)

To form retinal vessel maps, the system main body scans several times at the same position, and gets the same number of tomography images. And then the system calculates the variance among those tomography, finally projects those variances into 2D image. This projection is done at different layers which user choose.

3.6.5. Biometry in HOCT

OCT instrument has a reference mirror inside, which is tied and move by a motor. OCT get an interference signal between a reflected light from the reference mirror and a reflected light from a human's eye. Therefore, the instrument can get the focused tomograph images at interested layers in a human eye by moving the reference mirror. Those interested layers are a cornea, a crystal lens, a retina. Finally, the focused tomograph images and the positions of the reference mirror can be converted to the distances among each layer, those calculated distances are AL(=Axial Length), CCT(=Central Cornea Thickness), LT(=Lens Thickness), etc.

3.6.6. Topography in HOCT

HOCT instrument gets 16 tomograph images of a cornea, finds out the trajectories along a front side and a rear side at each image. Several curvatures for all points on the trajectories can be calculated according to its optical structure. Axial curvature, instantaneous curvature, refractive curvature, and so on are provided to analyze the structure of a cornea.

3.7. Applied Standard List

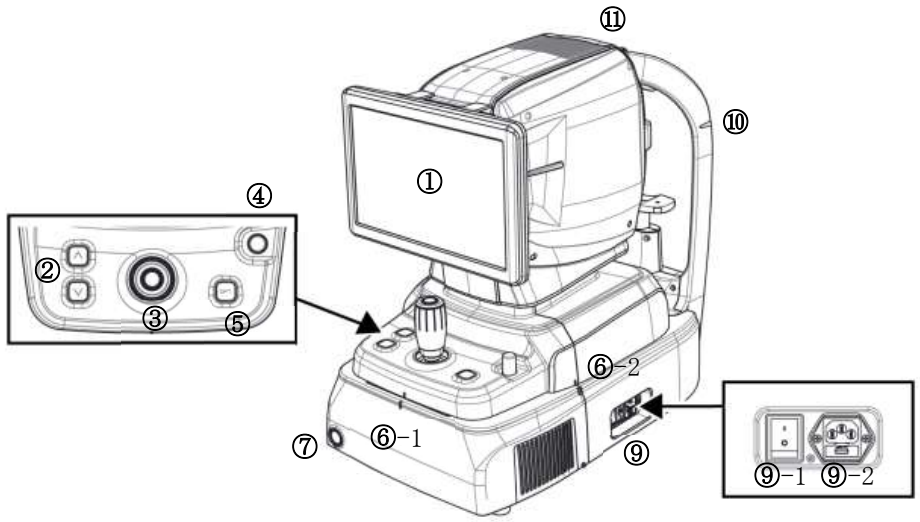
- IEC/EN 60601-1: MEDICAL ELECTRICAL EQUIPMENT
  - Part 1: General requirements for safety
- IEC/EN 60601-1-2: Medical electrical equipment Part1: General requirements for safety
  - Collateral Standard: Electromagnetic Compatibility-Requirements and tests
- ISO15004-1: Ophthalmic instruments
  - Fundamental requirements and test methods
    General Requirements applicable to all Ophthalmic instrument
- ISO15004-2: Ophthalmic Instruments-Fundamental requirements and test methods
  - Part 2: Light hazard protection
- ISO 10940: Ophthalmic instruments - Fundus Cameras
- ISO 16971: Ophthalmic instruments - Optical Coherence Tomography for the posterior segment of the human eye
- IEC 60825-1: Safety of laser products – Part1: Equipment classification and requirements

4

System Overview

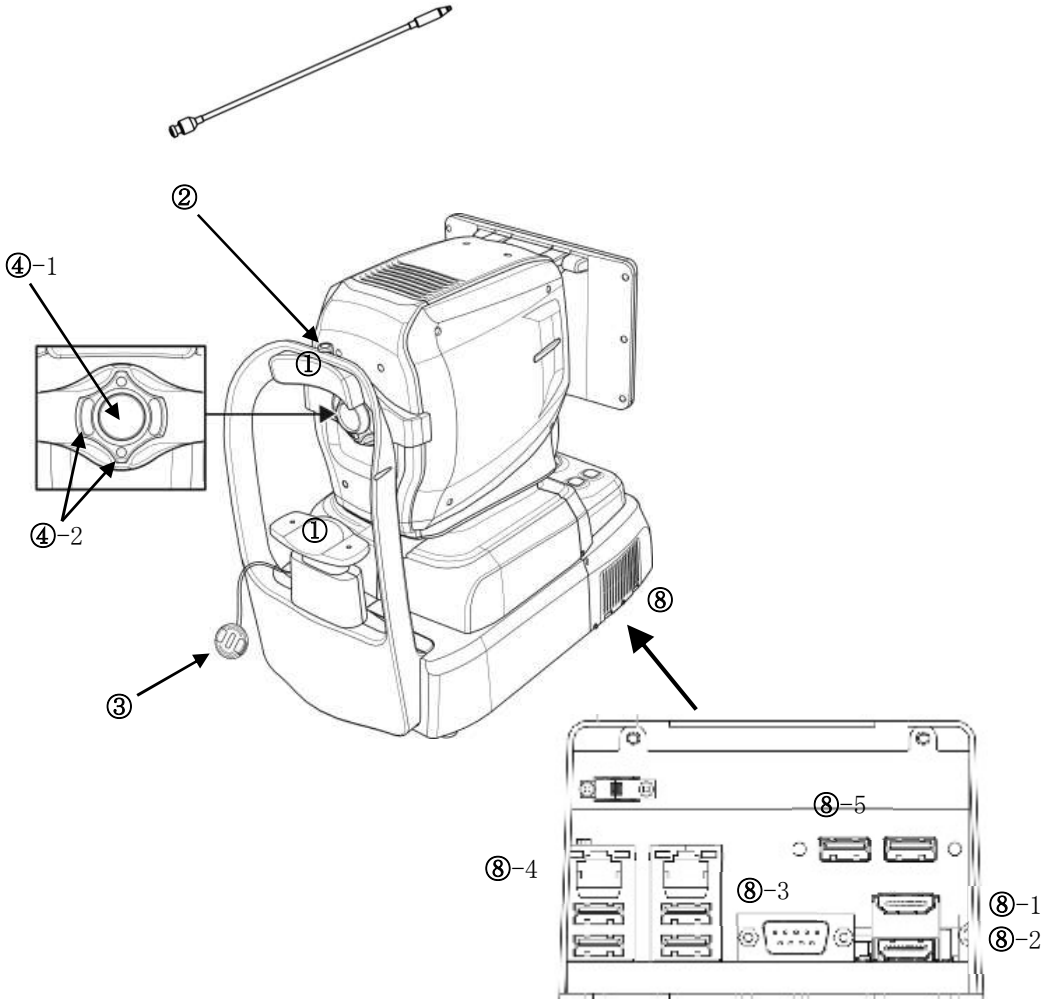
4.1. Configuration and Functions

Front View



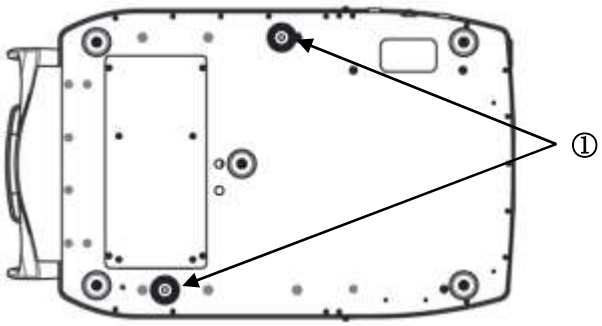
No	Part	Name	Description
1	Display	LCD	Monitor for displaying captured image and user interface icon.
2	Body	Chinrest button	Button for moving chinrest up and down.
3		Joystick	Joystick for aligning body to patient's eye. Button for capturing image.
4		User Lock	Lock for fixing body to base frame.
5		OPT button	Button for optimizing OCT signal
6-1 6-2		Align index mark	Mark for indicating center of body and base.
7	Base	Power button	Button for turning power of internal PC on/off. When the power is on, white light is lit.
9-1		Power switch	Switch for power on/off.
9-2		Power inlet	Inlet for connecting power cable.
10	Headrest	Eye level mark	Mark for indicating base height of patient's eye.
11	Body	Heat vent	Window for emitting internal heat.

Rear View



No	Part	Name	Description
1	Headrest	Forehead rest	Rubber for fix patient's head.
2		External LED	External LED for fixing patient's eyes.
3		Chinrest	For fixing patient's chin.
4-1	Body	Objective lens	Lens for passing illumination light from body and reflected light from patient's eye.
4-2		Mirering Focus LED	LEDs for checking working distance.
5	Headrest	Objective lens cap	Cap for protecting objective lens.
8	Base	External port	Port for communicating internal or external device.
8-1		External Monitor port	Port for connecting external monitor.
8-2			
8-3		RS-232 port	Port for communicating internal PC board and main board.
8-4		LAN port	Port for external network
8-5		USB port	Port for internal or external USB device

Bottom View

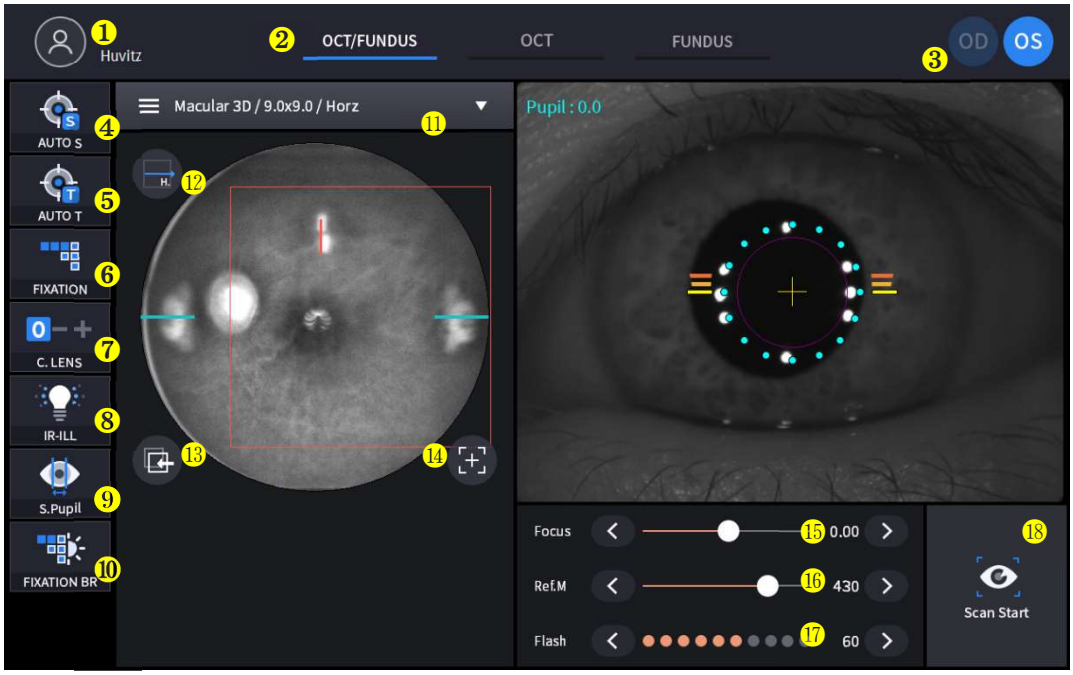


No	Part	Name	Description
1	Base	Packing lock	Lock for fixing body and base during transportation. (2 points)

4.2. Main Body Screen Description

OCT/Fundus mode (HOCT-1F only)

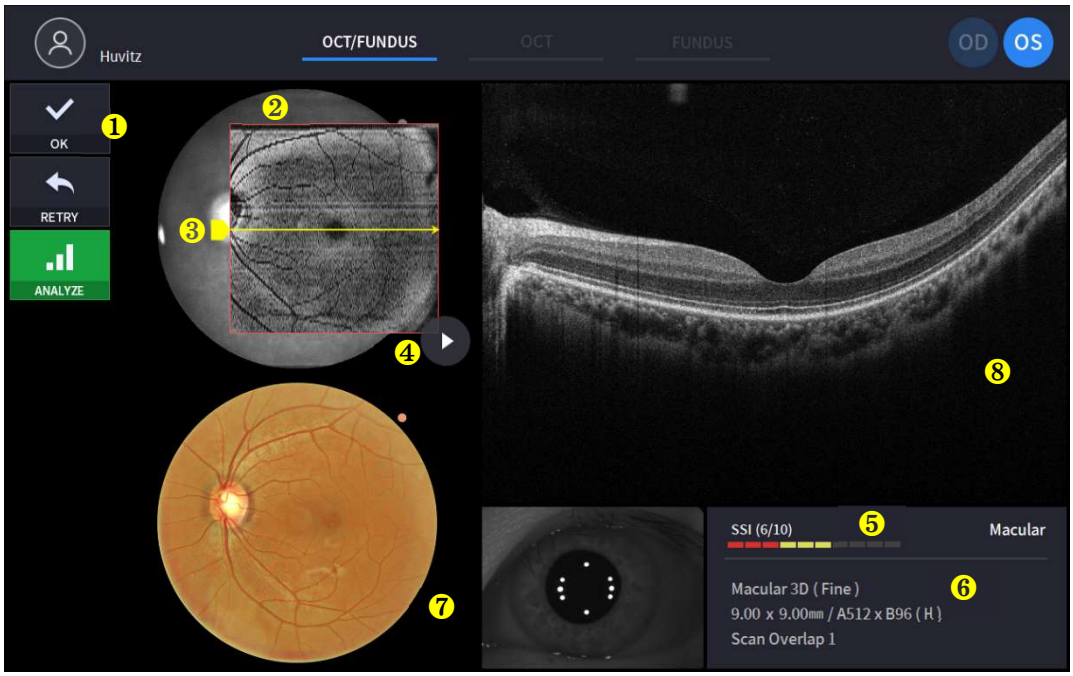
Observation screen



No	Name	Function
1	Patient information	Shows the information of patient ID and name. Go back to patient list by clicking the icon.
2	Observation mode	Show current observation mode. - OCT/Fundus: Capture OCT and Fundus image simultaneously. - OCT: Capture OCT image. - Fundus: Capture Fundus image.
3	OD/OS	Show current eye position. - OD: right eye - OS: left eye
4	AUTO S	Show auto shooting selection status.
5	AUTO T	Show auto tracking selection status.
6	FIXATION	Select position of internal fixation target.
7	C LENS	Show compensation lens status. 0: No compensation lens is used. -: Minus compensation lens is used. +: Plus compensation lens is used.
8	IR-ILL	Select brightness level of IR light for fundus observation. Normal / Bright mode is toggled by clicking.
9	S.Pupil	Show small pupil mode selection status for fundus image.
10	FIXATION BR	Control Fixation brightness.
11	Capture region	Select capture region and capture mode - Fundus/OCT or OCT mode: Macular, Disk, Anterior - Fundus mode: Single macular, Single disc, Widefield Panorama

12	Scan direction	Horizon, vertical changes are possible.
13	Follow-up	Follow up the scan position that was used&saved.
14	Reset scan position	Reset scan position to center.
15	Focus	Move in accordance with focus of patient's eye.
16	Ref.M	Move reference mirror position for OCT scan.
17	Flash	Change brightness level of white light for capturing fundus image.
18	Scan Start	Start OCT scan.

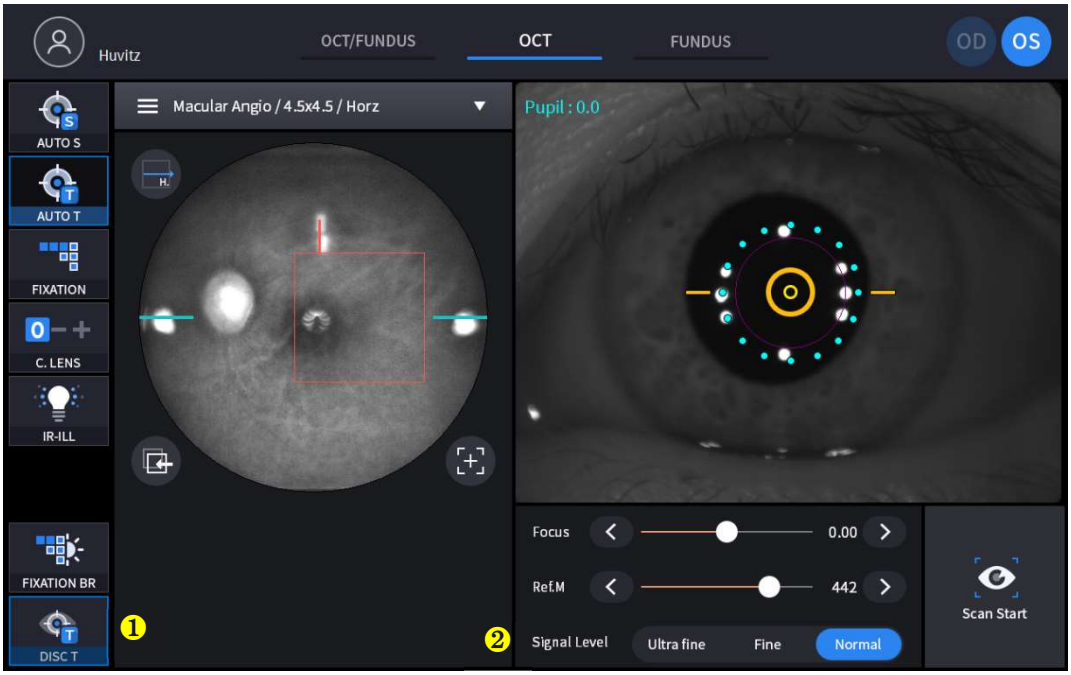
Confirmation screen



No	Name	Function
1	Image selection	Decide validity of current image. - OK: Save current image. - RETRY: Discard current image and retry capturing. - ANALYZE: Save the camera DATA and enter the analysis screen.
2	Scan range	Show OCT scan range.
3	Scan position	Show scan position of current OCT scan image displayed on the right.
4	Play image	Display captured OCT scan image continuously.
5	SSI	SSI: Scan Signal Index Show quality index of scan image.
6	Scan information	Display setting information of scan image.
7	Fundus image	Show captured fundus image.
8	OCT image	Show captured OCT image.

OCT mode

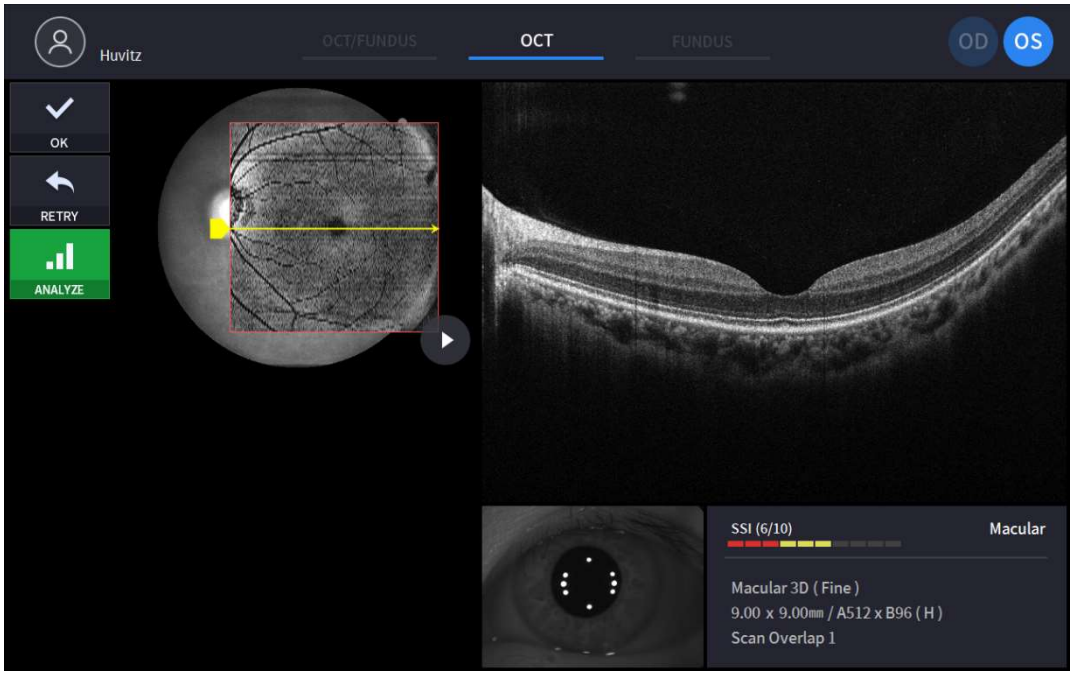
Observation screen



(Refer '4.2.1. OCT/Fundus mode – Observation screen' for uncommented item)

No	Name	Function
1	DISC T	Tracking the best status with disc while scanning.
2	Signal Level	Choose the signal strength.

Confirmation screen

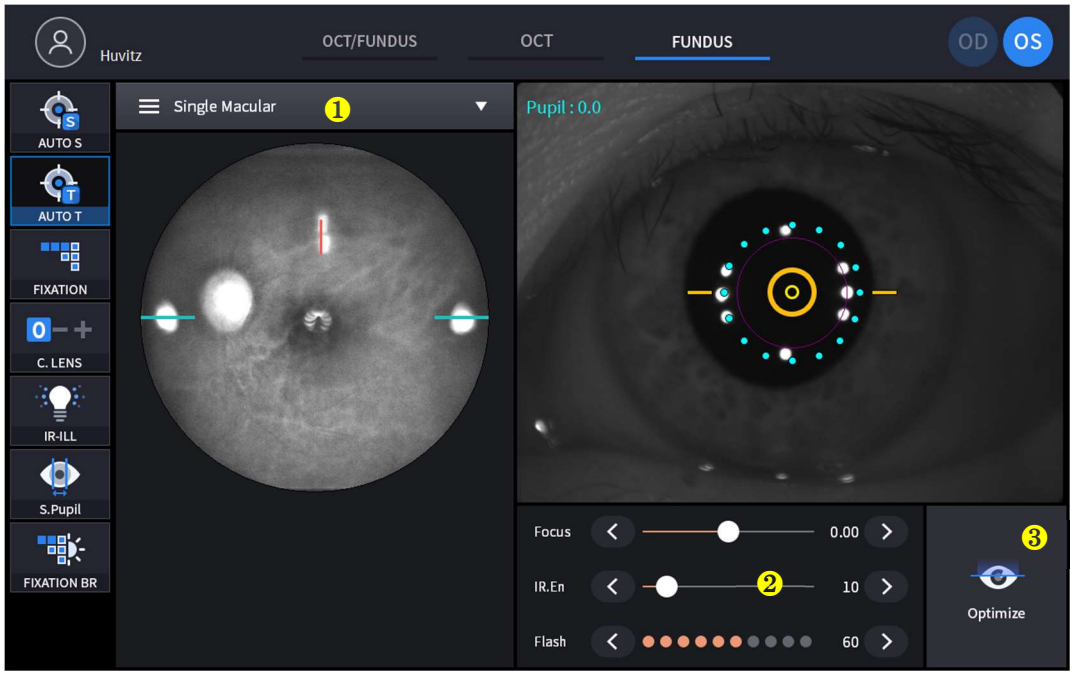


(Refer '4.2.1. OCT/Fundus mode – Confirmation screen' for uncommented item)

Single Fundus mode (HOCT-1F only)

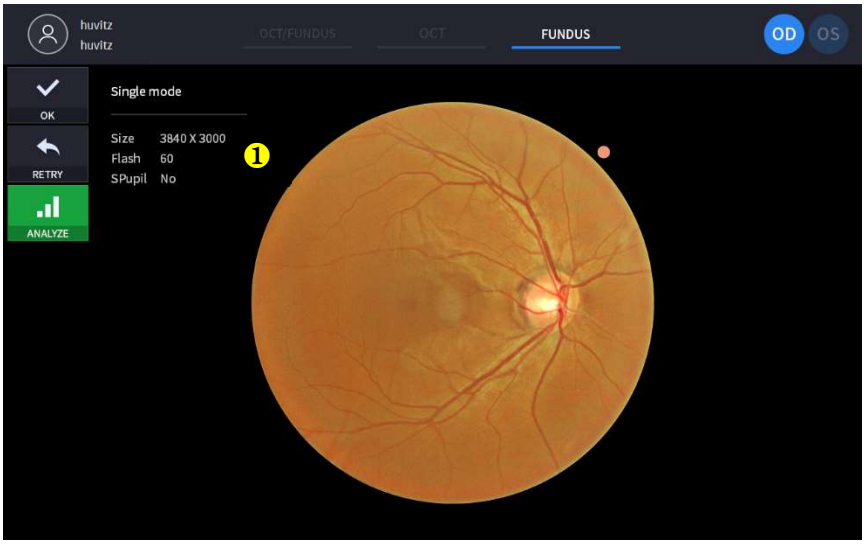
Observation screen

(Refer '4.2.1. OCT/Fundus mode – Observation screen' for uncommented item)



No	Name	Function
1	Capture mode	Select capture mode. - Single macular: Capture one fundus image at macular fixation. - Single Disc: Capture one fundus image at disc fixation. - Widefield Panorama: Capture maximum 7 images and stitch it.
2	IR.En	Change brightness of IR fundus image
3	Optimize	Find focus position automatically by split focus image.

Confirmation screen

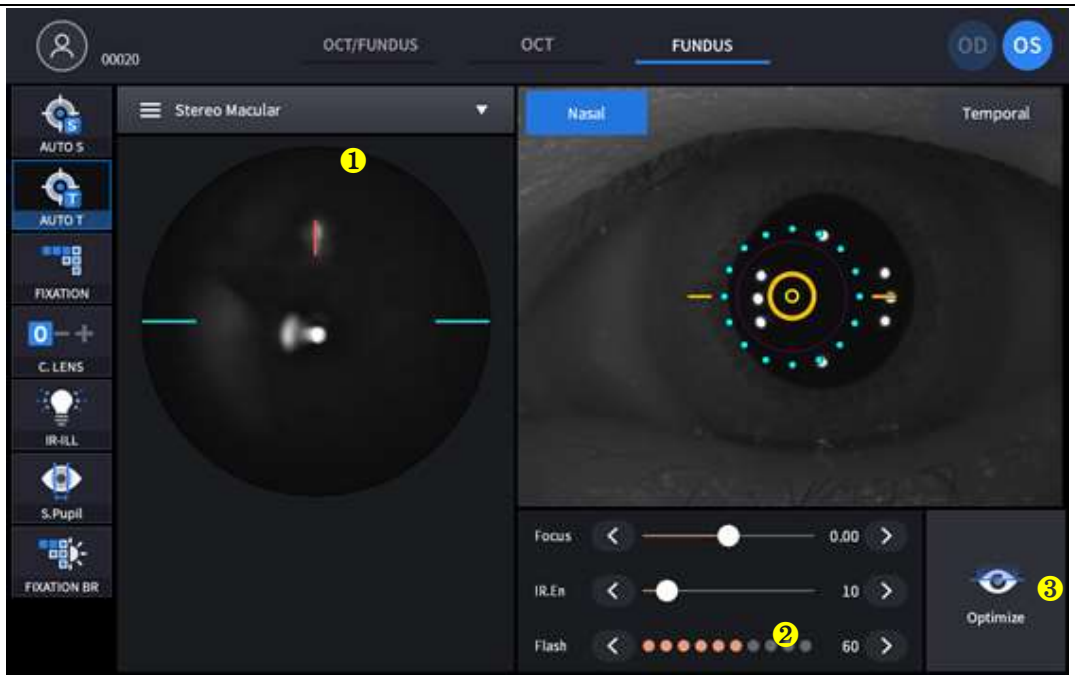


(Refer '4.2.1. OCT/Fundus mode – Confirmation screen' for uncommented item)

No	Name	Function
1	Fundus information	Display setting information of fundus image.

Stereo Fundus mode (HOCT-1F only)

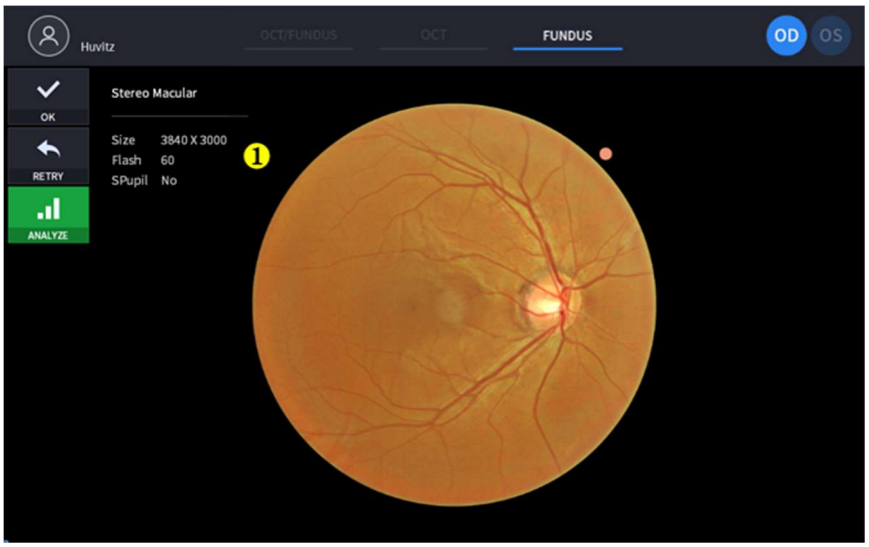
Observation screen



(Refer '4.2.1. OCT/Fundus mode – Observation screen' for uncommented item)

No	Name	Function
1	Capture mode	Select capture mode. - Single macular: Capture one fundus image at macular fixation. - Single Disc: Capture one fundus image at disc fixation. - Stereo: Capture two fundus images at nasal and temporal directions. - Widefield Panorama: Capture maximum 7 images and stitch it.
2	Direction	Show the direction (Nasal, Temporal)
3	Optimize	Find focus position automatically by split focus image.

Confirmation screen

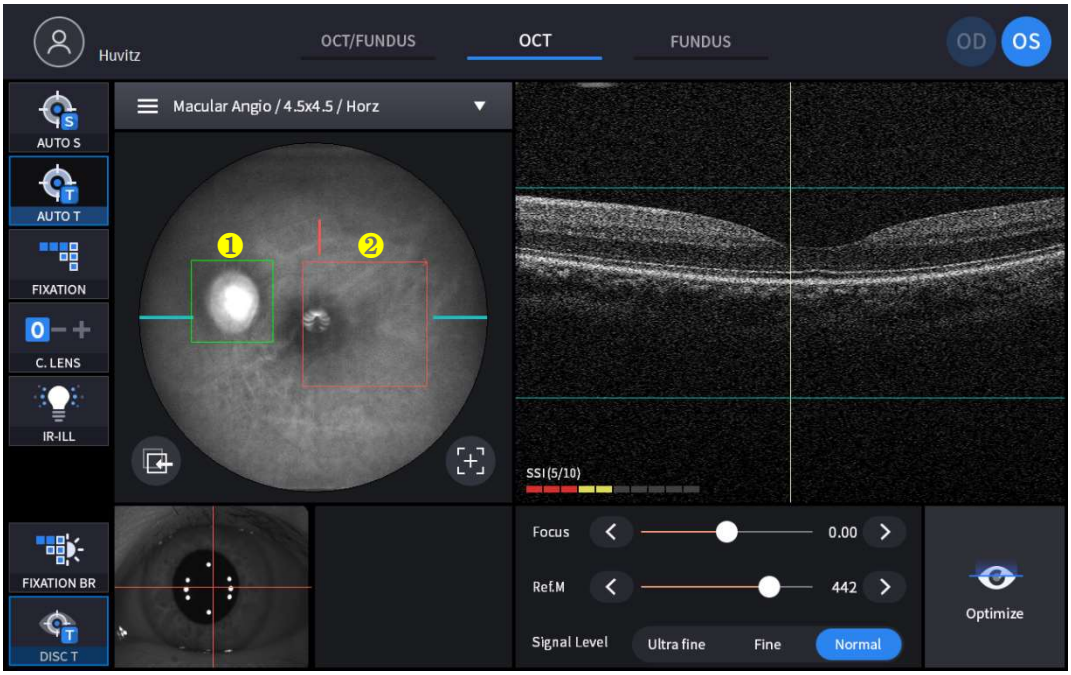


(Refer '4.2.1. OCT/Fundus mode – Confirmation screen' for uncommented item)

No	Name	Function
1	Fundus information	Display setting information of fundus image.

Angiography mode (Optional)

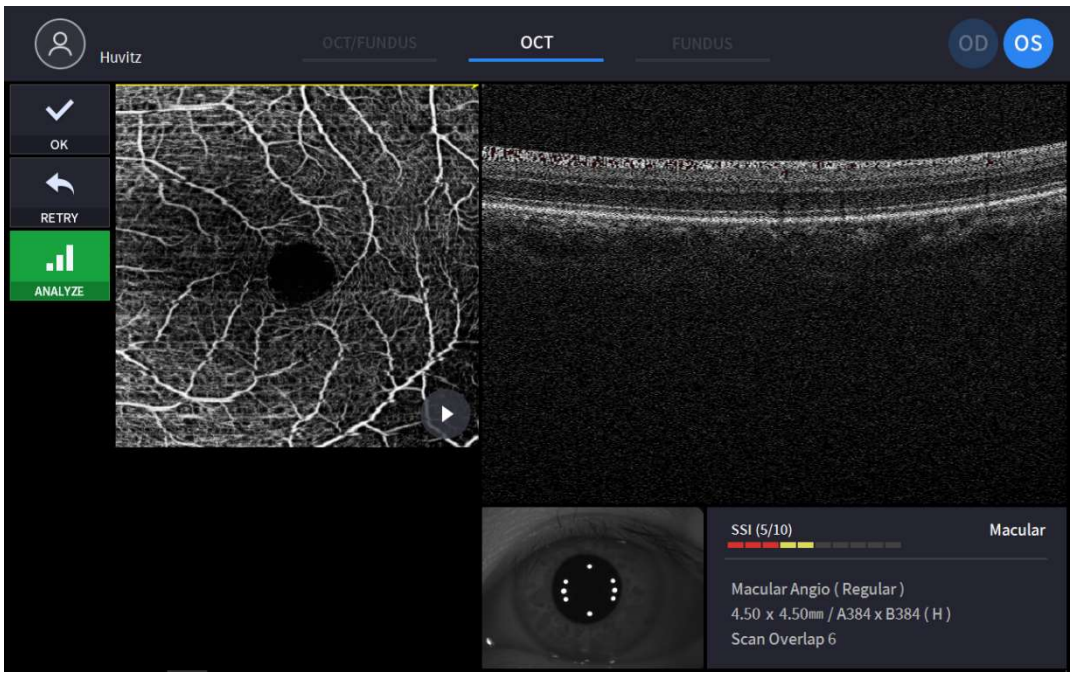
Observation screen



(Refer. OCT/Fundus mode – Observation screen' for uncommented item)

No	Name	Function
1	Disc tracking box	Tracking the best status with disc box while scanning.
2	Scan region	It is sized with scan range.

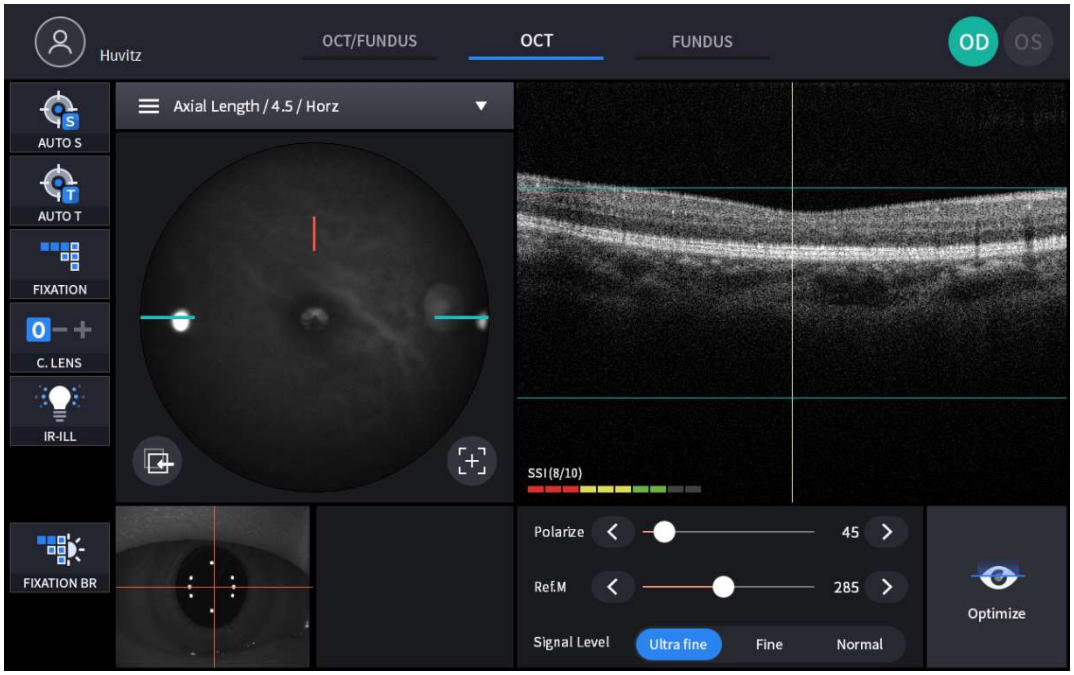
Confirmation screen



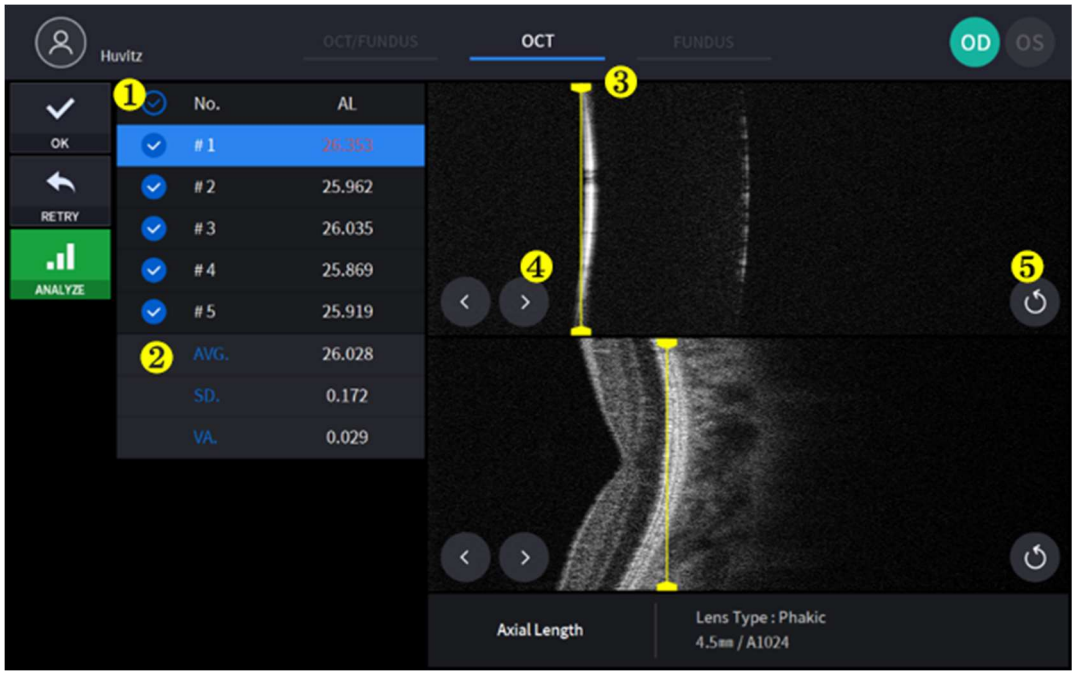
(Refer '4.2.1. OCT/Fundus mode – Confirmation screen' for uncommented item)

Biometry mode (Optional)

Observation screen (Axial Length)

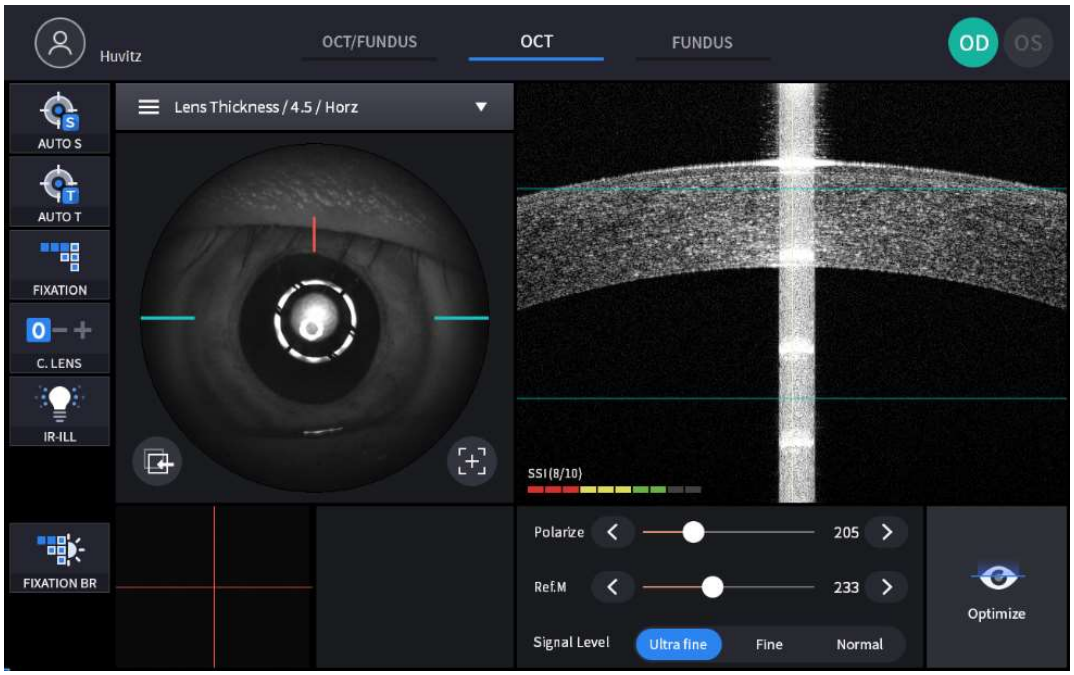


Confirmation screen (Axial Length)

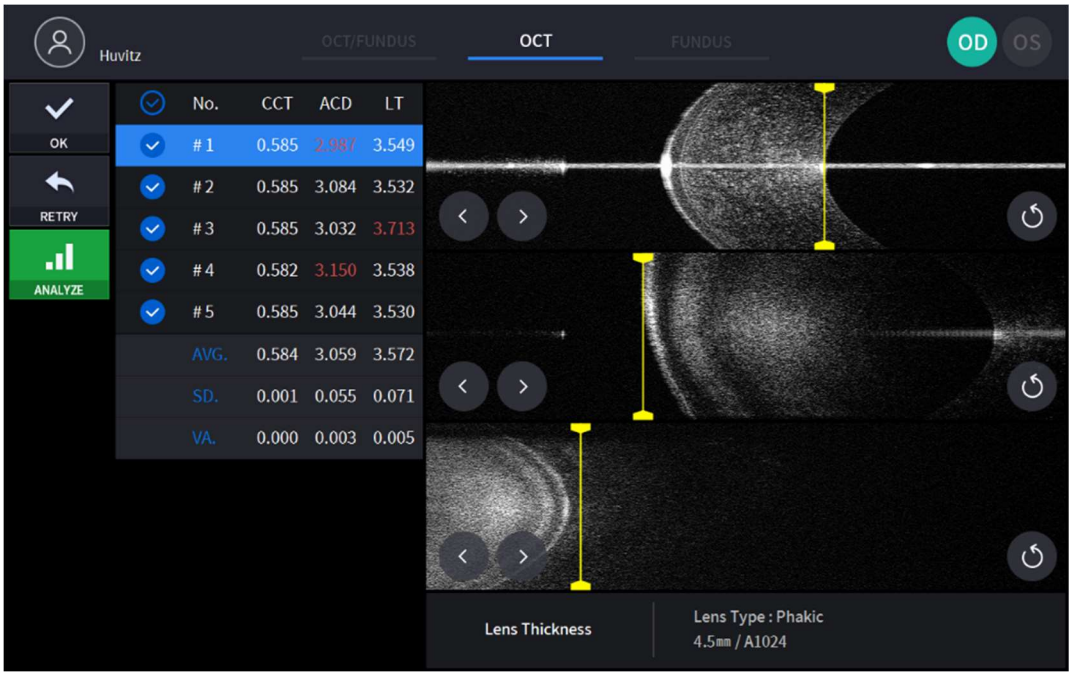


No	Name	Function
1	Axial Length Data	Axial Length Data, check an exam to save
2	Summary	Show average, standard deviation and variance
3	Segmentation line	Move segmentation line by drag
4	Next & Prev Button	Move segmentation line by button
5	Reposition	Move segmentation line to initial position

Observation screen (Lens Thickness)



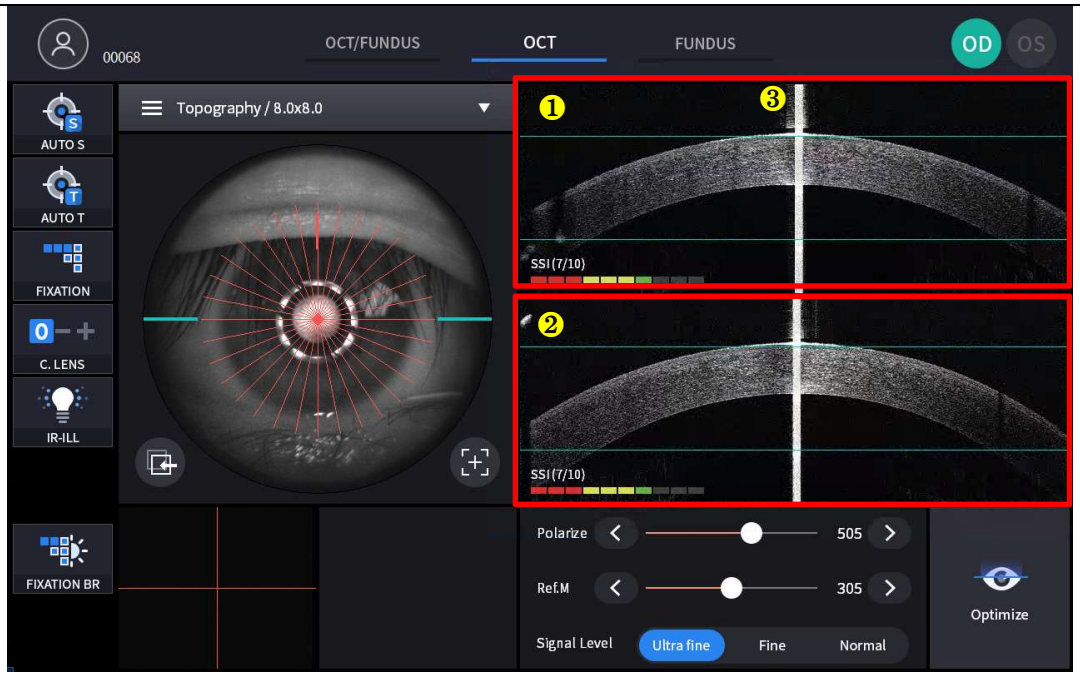
Confirmation screen (Lens Thickness)



(Refer. Biometry mode – Confirmation screen' for uncommented item)

Topography mode (Optional)

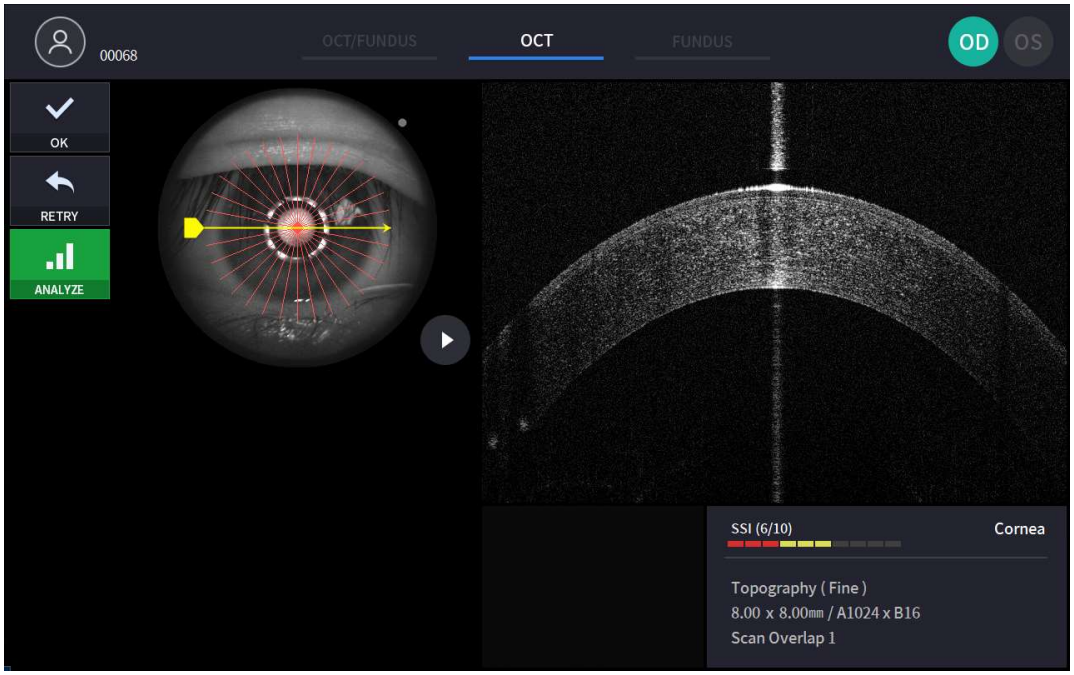
Observation screen



(Refer. OCT/Fundus mode – Observation screen' for uncommented item)

No	Name	Function
1	Horizontal BScan	Displays a horizontal BScan image.
2	Vertical BScan	Displays a vertical BScan image.
3	Corneal apex reflex	A reflection signal in a vertical direction.

Confirmation screen

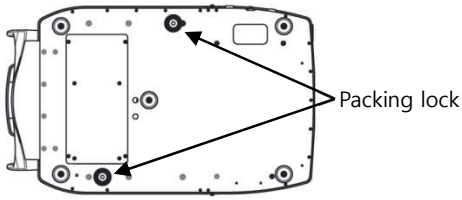


5

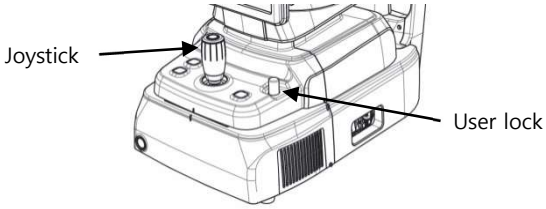
Installation Procedure

5.1. System installation

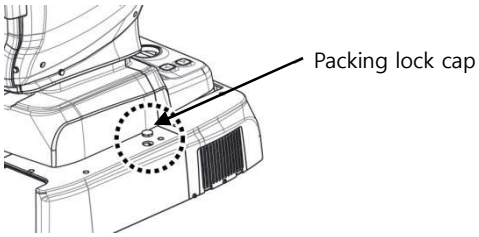
1. Place the main body unit on a stable table.
2. Loosen the two packing lock screw under the main body.



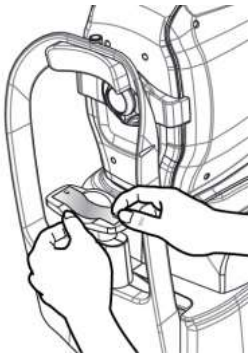
3. Unscrew the user lock lever on the body.



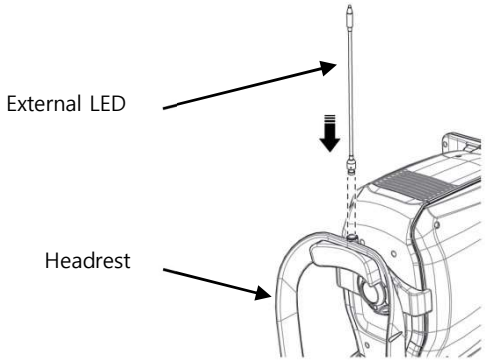
4. Attach two base packing lock cap while moving body left and right with joystick.



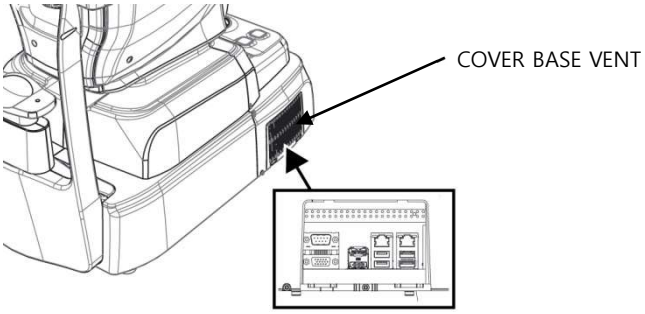
5. Attach the chinrest paper to the chinrest.



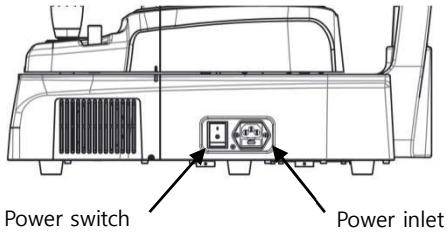
6. Attach external LED to the headrest (A).



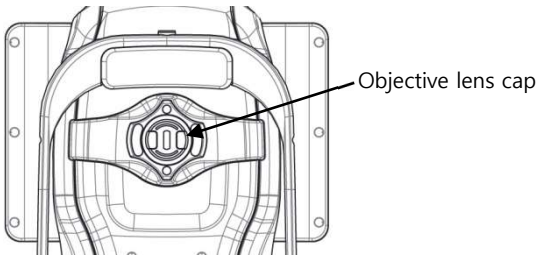
7. If needed, connect external devices.
   (1) Open ‘COVER BASE VENT’ on the left bottom of base with screw driver.
   (2) If needed, connect mouse or keyboard
   (3) Connect communication cable of external device.
   (4) Close ‘COVER BASE VENT’ with screw driver.



8. Check the power switch on the bottom right of base is off. (O position).
9. Connect power cable to power inlet. Also, connect the other side of power cable to electric outlet.

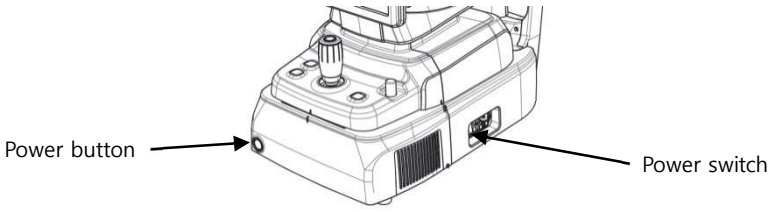


10. Remove objective lens cap, and check objective lens is clean,

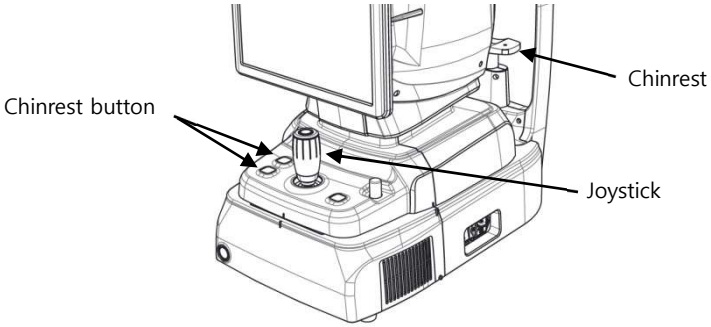


11. If external devices are connected, turn on external devices first.

12. Turn on the main body by pressing power switch (I position)
13. Turn on the internal PC by pressing power button.



14. Check there is no error during initialize process.
    Wait for until the initialization is complete.
15. Check the movement of body with joystick. Also, check the movement of motorized chinrest with chinrest button.

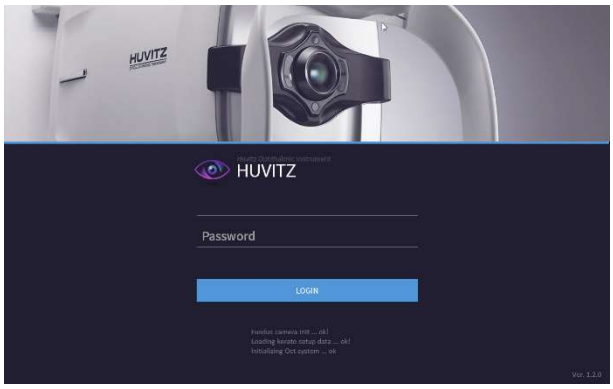


6

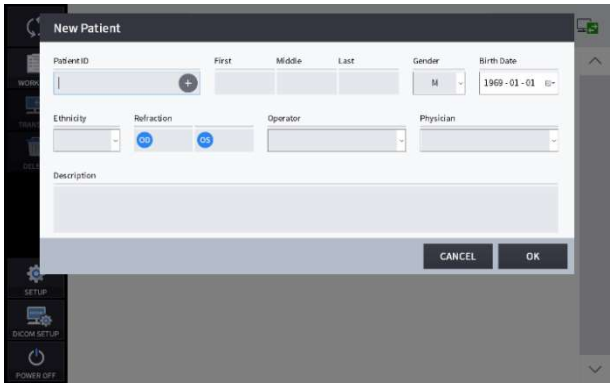
Operation

6.1. Software

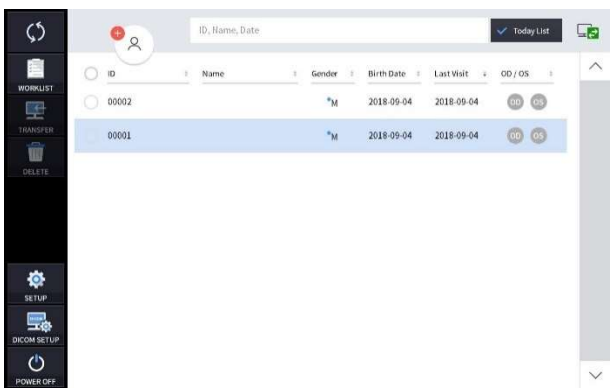
1. Input user ID and password for login.



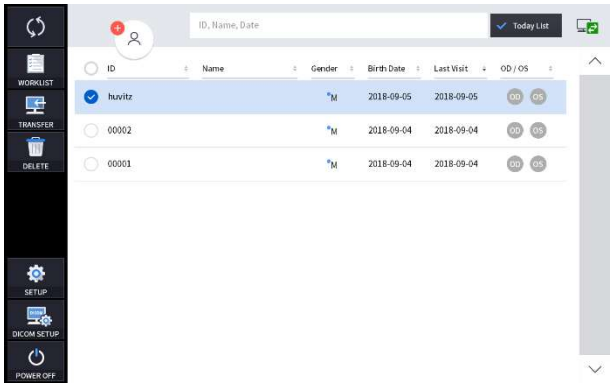
2. Press resist patient icon ( ) and input patient information. If patient is resisted already, skip this step.



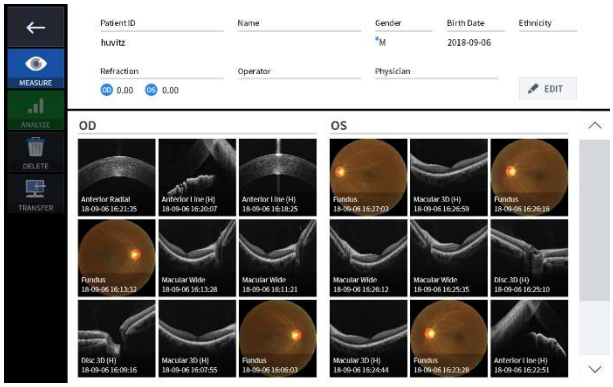
3. Select patient and check patient information is correct.



4. If you want to send patient information to a web viewer or delete patient information, select the circle next to the ID and press the TRANSFER icon or DELETE icon.

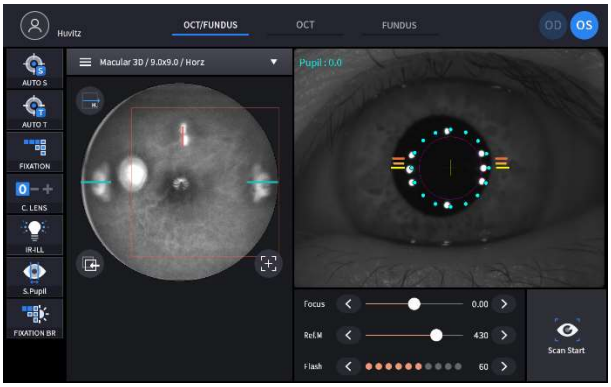


5. When you select a patient, the screen changes.



6. Enter observation mode by pressing measure icon (

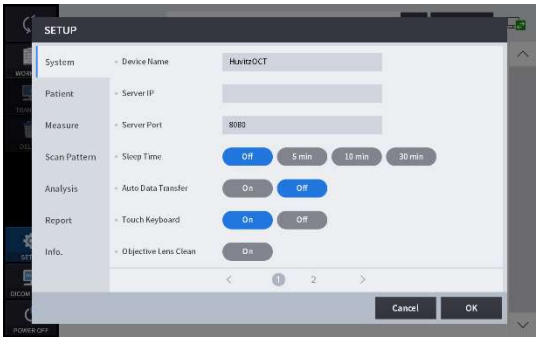
).
The screen of observation mode is as follow.

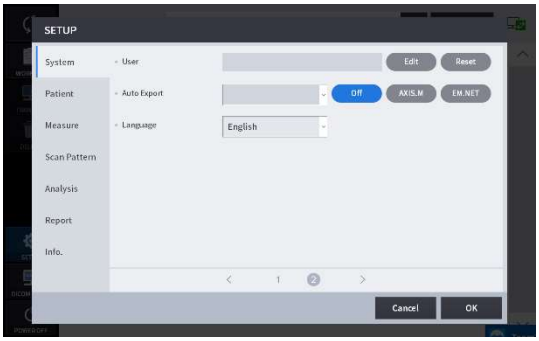


6.2. SETUP Mode

General Setting

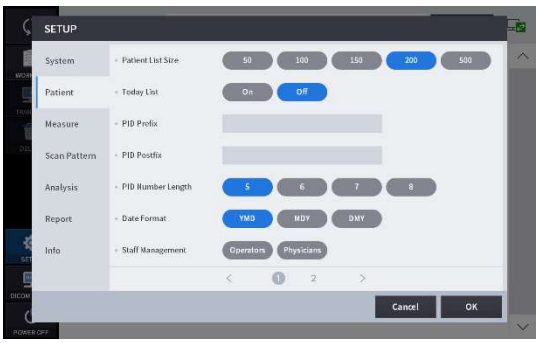
1. System Settings

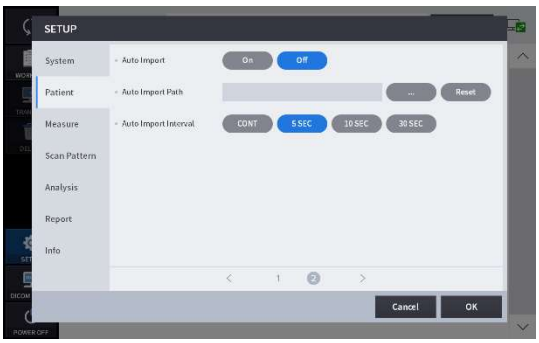




Device Name	Set Device Name.
Server IP	Web Viewer Server IP address setting.
Sever Port	Web Viewer Server port setting.
Sleep Time	Sleep mode setting.
Auto Data Trans	Set the function to transfer the measured data to Web Viewer automatically.
Touch Keyboard	Touch Keyboard ON/OFF setting.
Objective Lens Clean	When this option is turned on, the Light is turned on for convenient cleaning of the Objective Lens.
User	Set User ID and Password for Login.
Auto Export	Auto export setting
Language	Language setting.

2. Patient Settings

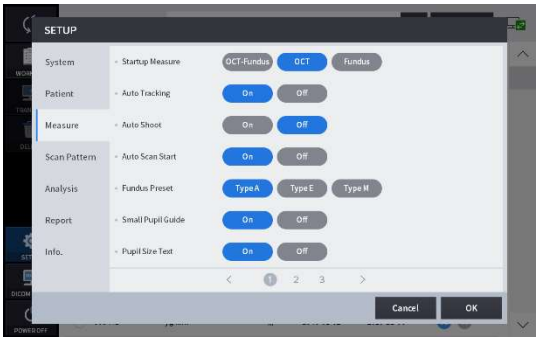


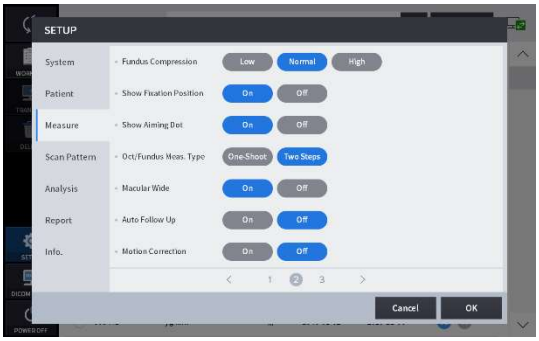


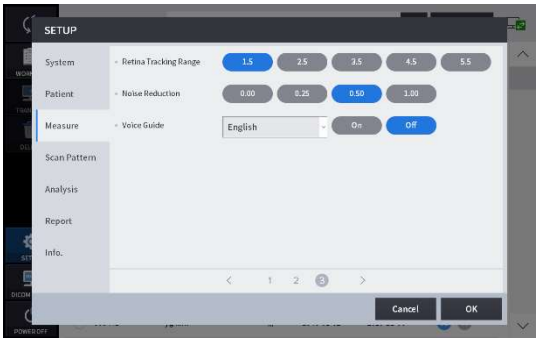
Patient List Size	Number of patients to be displayed per pages.
Today List	Today List (List of patients visited today) settings.
PID Prefix	The function to set the prefix of the patient ID.
PID Postfix	The function to set the postfix of the patient ID.
PID Number Length	The function to set the length of patient ID.
Date Format	Format of the date (Year, Month, Day).

Staff Management	The function to modify and add the operators & physicians information.
Auto Import	The function to set the auto import.
Auto Import Path	The function to designate the import path.
Auto Import Interval	The function to set the interval of import.

3. Measure Settings.



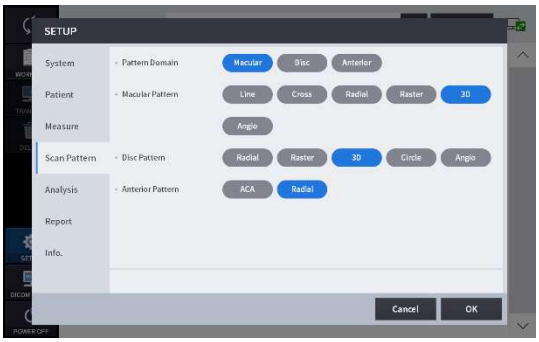




Startup Measure	Set the measure-mode to start first.
Auto Tracking	Auto Tracking ON/OFF setting.
Auto Shoot	Auto Shoot ON/OFF setting.
Auto Scan Start	Auto Scan Start ON/OFF setting.
Fundus Preset	Set the working-dot and IR brightness. (different ethnicities have different conditions.)
Small Pupil Guide	Small Pupil Guide ON/OFF setting.
Pupil Size Text	Pupil Size Text ON/OFF setting.
Fundus Compression	Compress the fundus image qualities.
Show Fixation Position	Show Fixation Position ON/OFF setting.
Show Aiming Dot	Show Aiming Dot ON/OFF setting.
Oct/Fundus Meas.Type	Choose the measure type in Oct/Fundus-mearsure-mode, whether to shoot at only one-step or at two-step.
Macular Wide	When the option is on and the Scan range is 12mm in Macular 3D mode, Macular and Disc can be analyzed simultaneously.
Auto Follow Up	Set the scan position automatically followed up
Motion Correction	Set Motion correction to eliminate or minimize eye movement artifacts on Angio OCT exams.
Retina Tracking Range	Set the tracking range in the Angio tracking mode.

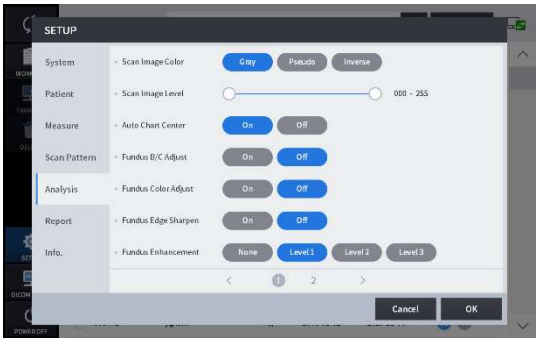
Noise Reduction	Set the noise reduction rate.
Voice Guide	Set the voice guide and voice guide language.

4. Scan Pattern Settings



Pattern Domain	Set the default pattern domain of OCT scan measurement to be either macular, disc, or anterior.
Macular Pattern	Set the default scan pattern of the macular domain.
Disc Pattern	Set the default scan pattern of the disc domain.
Anterior Pattern	Set the default scan pattern of the anterior.

5. Analysis Settings

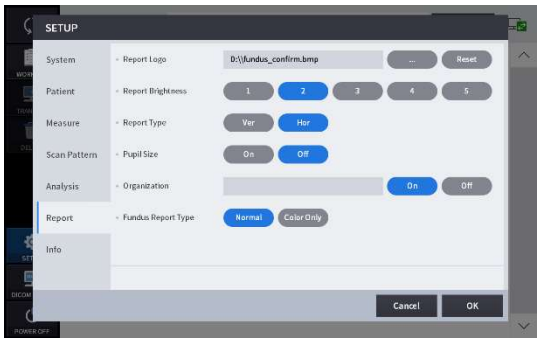




Scan Image Color	Set the default representation mode of Bscan image to be either gray, pseudo color, or inversed gray.
Scan Image Level	Adjust the gray level values of Bscan image.
Auto Chart Center	To move the center of the ETDRS or RNFL chart to the detected center of the macular or the disc.
Fundus B/C Adjust	Apply the standard values of brightness and contrast to the measured fundus image automatically.
Fundus Color Adjust	Apply the standard values of UB and VR to the measured fundus image automatically.
Fundus Edge Sharpen	Apply edge sharpening function to the measured fundus image automatically.
Fundus Enhancement	Enhance the fundus image.
Show Cup/Disc	If you click the Segmentation icon in Disk Analysis mode with the option turned on, the disk and cup positions are

	displayed above the Bscan image.
Relative map scale	Set the way how represent the relative map.
Text color	Set the measurement value text(ruler value) color.

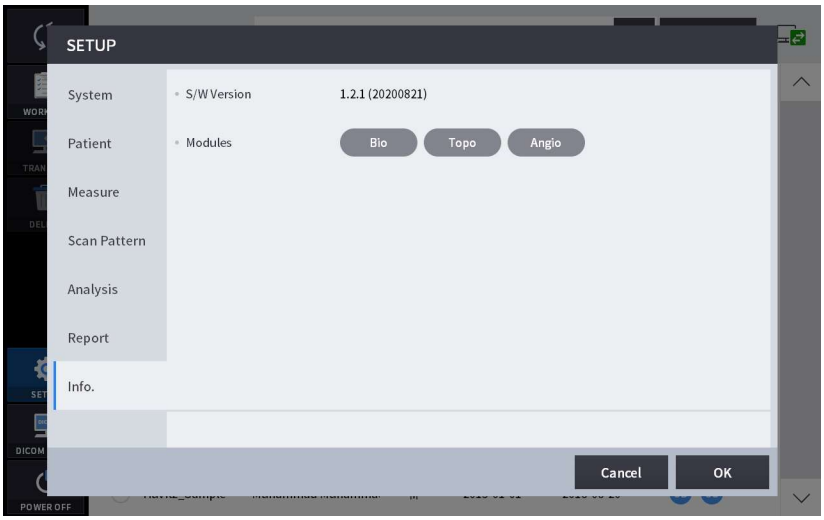
6. Report Settings



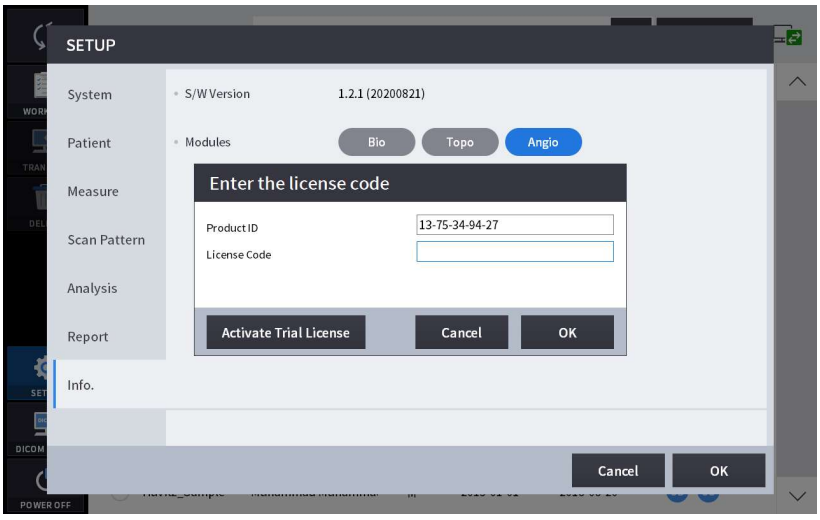
Report Logo	Add the Logo into report.
Report Brightness	Set the brightness of report.
Report Type	Set the report direction.
Pupil Size	Set the representation about pupil size.
Organization	Mark the organization name.
Fundus Report Type	Set the fundus type.

Module(Optional) setting

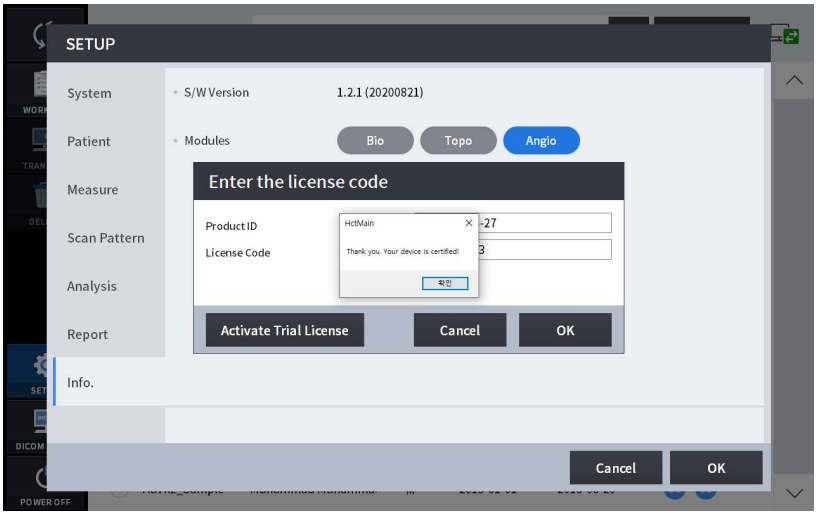
1. Click module button to add at [SET UP] – [Info.] page.



2. Put in License Code and Click [OK]button.

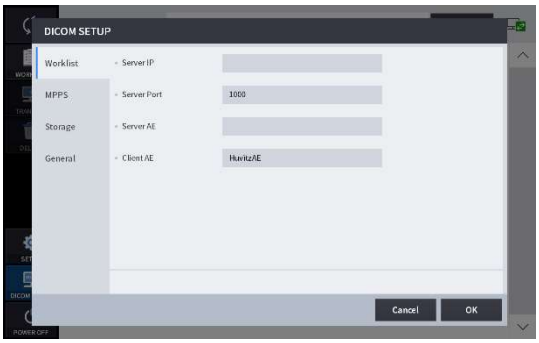


3. Then, pop up the certification message window.



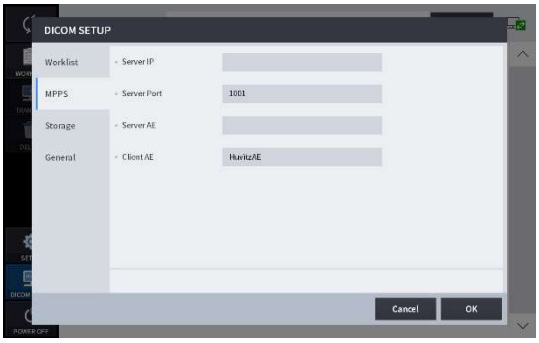
6.3. DICOM SETUP Mode

1. Worklist Setting



Server IP	IP Address of the PC where the server program is installed.
Server Port	Set Port Number.
Server AE	Set Server AE.
Client AE	Set Client AE.

2. MPPS Setting



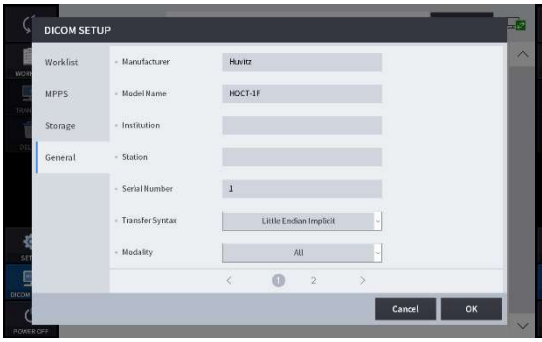
Server IP	IP Address of the PC where the server program is installed.
Server Port	Set Port Number.
Server AE	Set Server AE.
Client AE	Set Client AE.

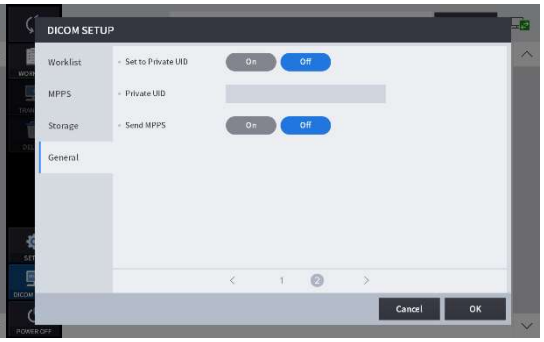
3. Storage Setting



Server IP	IP Address of the PC where the server program is installed.
Server Port	Set Port Number.
Server AE	Set Server AE.
Client AE	Set Client AE.

4. General Setting



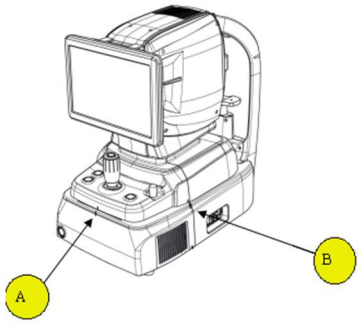


Manufacturer	Set the name of the manufacturer.
Model Name	Set the Model Name.
Institution	Set the name of the institution.
Station	Set the name of the Station.
Serial Number	Set the Serial Number.
Transfer Syntax	Set the Transfer Syntax.
Modality	Set the Modality.
Set to Private UID	Set Private UID ON/OFF setting.
Private UID	Set the Private UID.
Send MPPS	Set Send MPPS ON/OFF setting

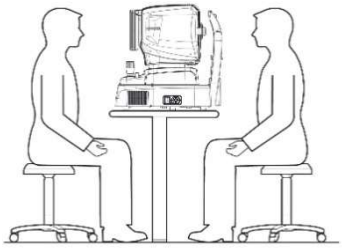
6.4. General Operation

1. Clean headrest and chinrest with a clean cotton swab or gauze. Remove a single sheet of chinrest paper if the chinrest paper is used.

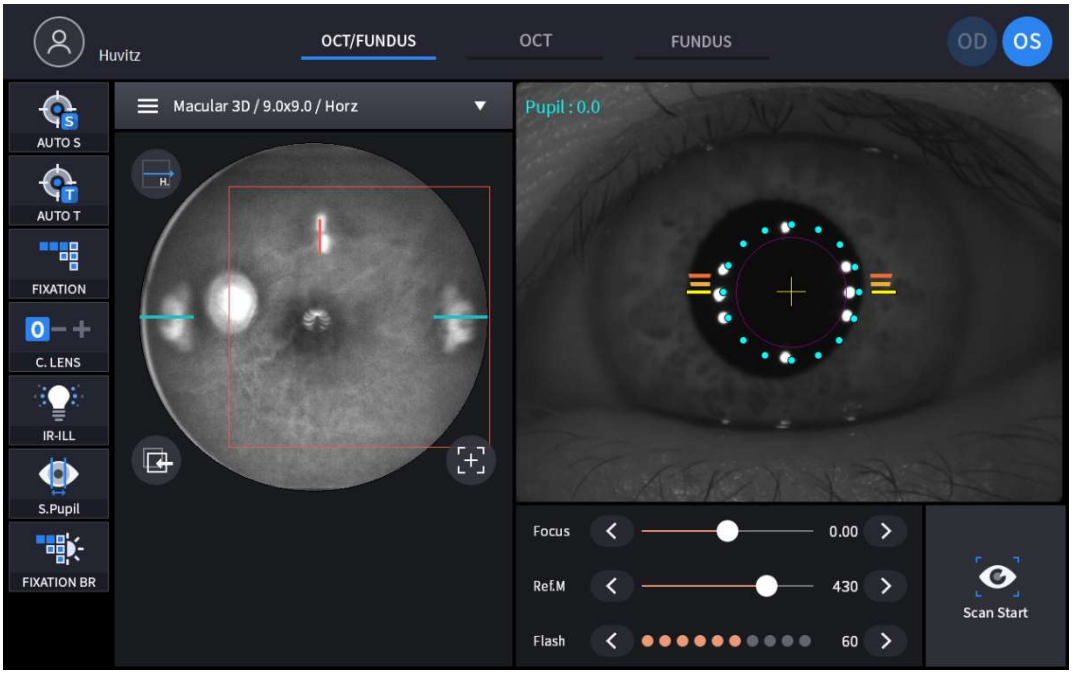
2. Align left/right index mark (B) and front index mark (A) of body and base with joystick.

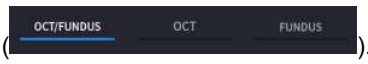


3. Let the patient sit in front of instrument.



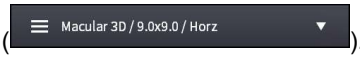
4. Set the mode and environment as following.



(1) Set capture mode with the capture mode tabs (

).

OCT/Fundus (HOCT-1F only)	Capture OCT and fundus image simultaneously.
OCT	Capture OCT image.
Fundus (HOCT-1F only)	Capture Fundus image.

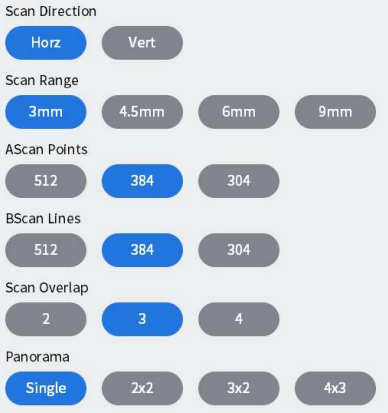
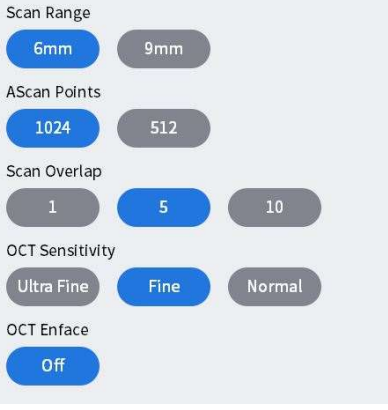
(2) Set capture region with the capture region combo box (

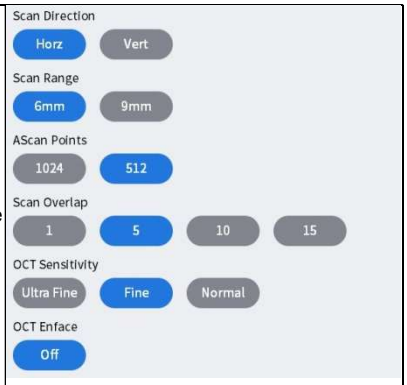
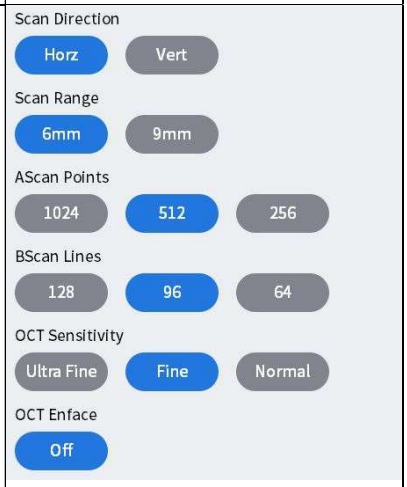
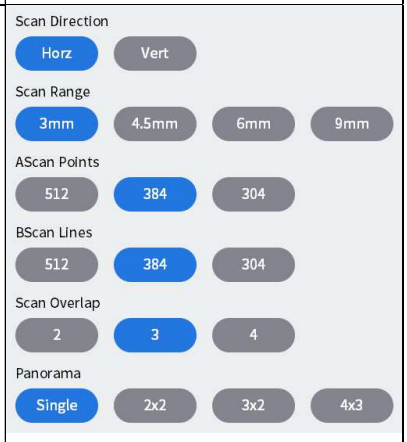
).

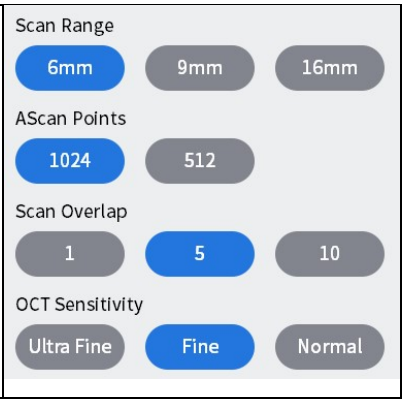
OCT/Fundus	Macular, Disc, Anterior
OCT	
Fundus	Single, Panorama

(3) In OCT or OCT/Fundus mode, set scan type and options for the selected scan region.

Scan region	Scan type	Available option
Macular	Macular Line Scan along a line for macular.	
	Macular Cross Scan along horizontal lines and vertical lines for macular.	
	Macular Radial Scan along 12 radial lines centered at macular.	

	Macular Raster Scan along 24 lines in the square area centered at macular.	
Macular	Macular 3D Scan a rectangular area closely.	
Macular	Macular Angio Scan a rectangular area.	
Disc	Disc Radial Scan along 12 radial lines centered at disc.	

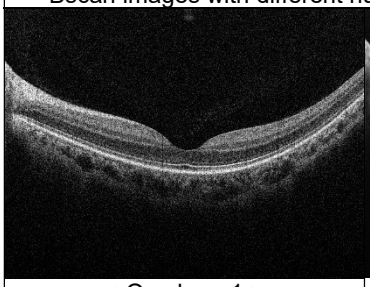
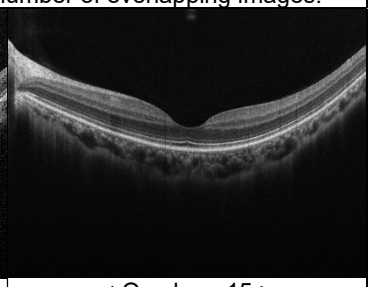
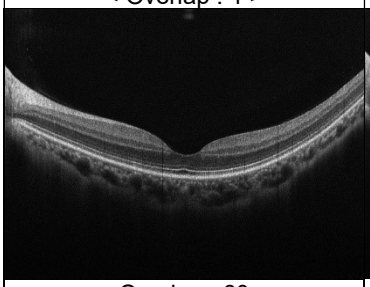
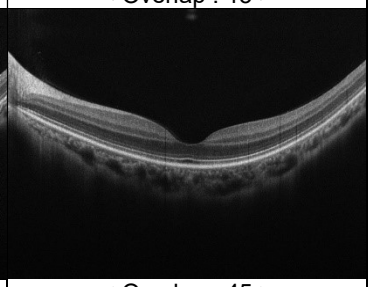
	Disc Raster Scan along 24 lines in the square area centered at disc.	
Disc	Disc 3D Scan a rectangular area closely.	
	Disc Circle Scan along a circle centered at optic disc.	
Disc	Disc Angio Scan a rectangular area.	
Anterior	ACA Line Scan along a line for cornea.	

	 Scan along 12 lines for cornea.	

<Scan Options>

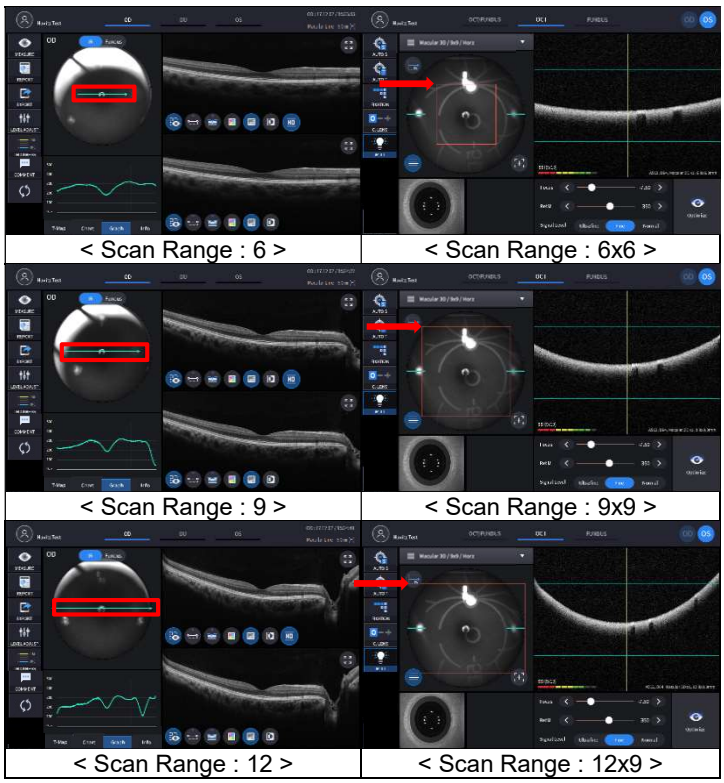
- Range: Choose scan range from 6mm, 4.5mm, 9mm, or 12mm.
- AScan Points: Choose the number of A-scans that constitute one B-scan. Possible options are 1024, 512, or 256.
- Bscan Lines: Choose the number of B-scans that constitute one measurement. Possible options depend on the number of A-scans set.
- Overlap: Choose the number of B-scans to be averaged to produce one B-scan image. Possible options are enumerated.
- Direction: Set a direction which is horizontal or vertical.
- Space: Set an interval between neighboring scan lines.
- Sensitivity: Choose scan quality from Normal, Fine, or Ultra fine. The latter produce better image but take longer.

- Scan Overlap: Increase image resolution by overlapping multiple Bscan images.

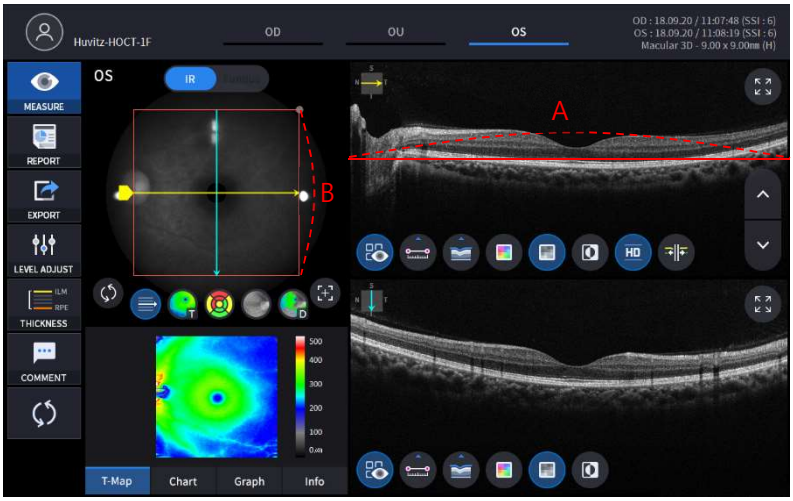
Bscan images with different number of overlapping images.	
	
< Overlap : 1 >	< Overlap : 15 >
	
< Overlap : 30 >	< Overlap : 45 >

- Scan Range: Select the size of area to be measured.

Bscan images of each Scan Ranges	
Macular Line Analysis Screen	Macular 3D Analysis Screen



- Ascan, Bscan: Number of horizontal and vertical scan points in the scan area.
  Ascan: The number of Ascans that constitute one Bscan.
  Bscan: Total number of Bscans in the scan range.



(4) Set auto shooting mode.

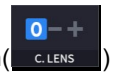
	Auto shooting is on.
	Auto shooting is off.

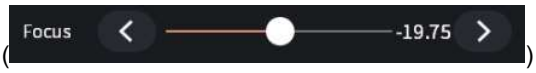
- If auto shooting mode is on, image is optimized and captured automatically when aligned and focused to the patient's eye properly.
- Auto shooting is not supported for anterior capture mode.

(5) Set auto tracking mode.

	Auto tracking is on.
	Auto tracking is off.

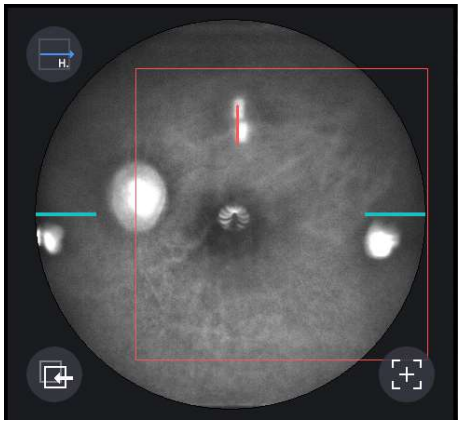
- If auto tracking is on, patient's eye is automatically tracked to center and focused when patient's eye is inside tracking region.
- Auto tracking is not supported for anterior capture mode.

(6) Set compensation lens mode on() if the eyesight of patient is out of -13 to 13 diopter. Once the compensation mode is on, you need to fit the focus with the focus slide bar.

() manually.

0	No compensation lens is used.
-	Minus compensation lens is used.
+	Plus compensation lens is used.

(7) Click the Scan Direction icon () if you want to change the scan direction.



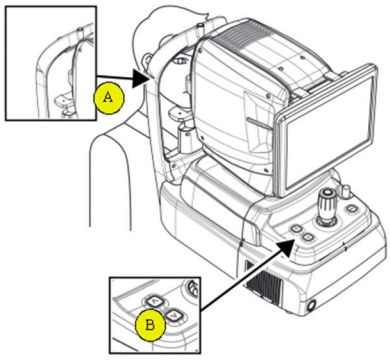
- This icon is not supported in fundus mode.

(8) Set the diopter of patient by Focus icon

() if needed.

5. Align patient's eye to eye level mark on headrest.

(1) Let the patient's chin put on the chinrest.
(2) Let the patient's forehead adhere to headrest.
(3) Move up or down chinrest with the chinrest button (B) on the body to fit the level of patient's eye to the eye level mark (A) on the headrest.

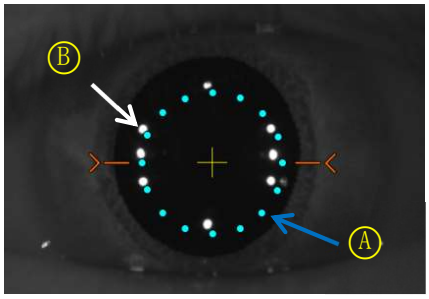


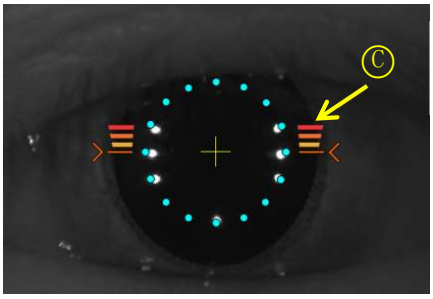
6. Instruct patient to watch internal fixation LED to fix patient eyes. Also, instruct patient to open eye widely, not to blink.

7. Move body with joystick until patient's eye appears on the screen.

8. Set the alignment and focus.

(1) Move the body up/down and left/right with joystick until ring of 16 blue align dot (A) and ring of 8 white Mire dot (B) are concentric. When two rings are concentric, focus indicator bar (C) appears. Move the body back and forth with joystick until the focus indicator bar disappears.

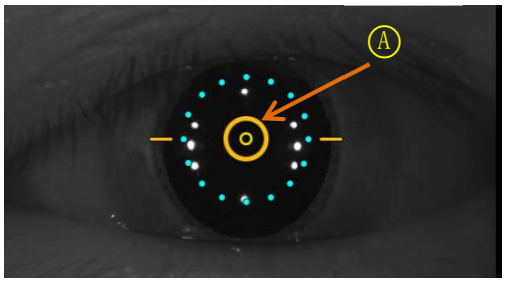




(2) If the pupil of patient is smaller than 16 blue align dot, press S-pupil icon (

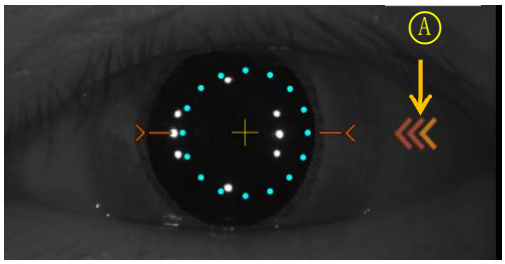
) to capture in small pupil mode. If you have set the Small Pupil Guide option to ON, small pupil icon is displayed in the upper left corner of the screen when small Pupil mode is required.

(3) Move joystick little by little until orange target mark (A) appears.



(4) If auto tracking is on, alignment and focus is automatically accomplished in tracking region.

(5) If orange arrow (A) appears during auto tracking, it means auto tracking module go to the limit of tracking region. In that case, move body to the arrowed direction with joystick.



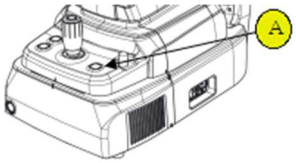
9. Capture image and check image quality (in OCT/Fundus mode).

(1) When alignment and focus is done, press scan start icon (

) to start OCT scan.
If alignment and focus is in good condition, scan start function is accomplished automatically, and scan start icon changes to optimize icon (

).

(2) Optimize OCT signal by pressing optimize icon on the screen or optimize button on the body (A).



(3) Adjust the vertical position of retina image in the screen by moving reference mirror using slide bar (

).

(4) Press the button on joystick to capture image.
If auto shooting is on, ‘9-2. Optimize’ and ‘9.4 Capture’ is accomplished automatically.

(5) Check the result and decide to store or discard and retry.



① Check previous/next OCT image by move scan position handle.

② Check continuous OCT image continuously by pressing play image icon ( ).

③ Check SSI for image quality.

SSI (Scan Signal Index) indicates level of image quality. SSI means signal to background ratio and displayed on a scale of 10 with a bar graph. SSI larger than 8 means 'Good', 5~8 means 'Normal', less than 5 means 'Poor' in general.

We recommend capture normal or good status in general. When image looks satisfactory though the SSI is low, you can ignore SSI and save the result.

④ If the image is satisfactory, press OK icon ( ) to save image.

⑤ If the image is not satisfactory, press retry icon ( ) and retry image capturing.

A. If fundus image result too bright or too dark because of lighting, regulate the flash intensity using flash icon ( ) in observation mode.

B. If fundus image is too dark because of small pupil size of patient, try small pupil mode by using small pupil icon ( ) in observation mode.

C. Try moving internal fixation target position by pressing fixation icon ( ) and changing position of green cross ( ) if needed.

When green cross position changes, the position of internal fixation target is also changed.

D. Try to change scan position by dragging scan range while scan range icon turned on. If reset scan position icon ( ) is pressed, scan position moves to the default center position.

10. Capture image and check image quality (in OCT mode).

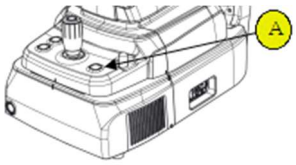
(1) When alignment and focus is done, press scan start icon ( ) to start OCT scan.

If alignment and focus is in good condition, scan start function is accomplished automatically, and scan start

icon changes to optimize icon (

).

(2) Optimize OCT signal by pressing optimize icon on the screen or optimize button on the body (A).

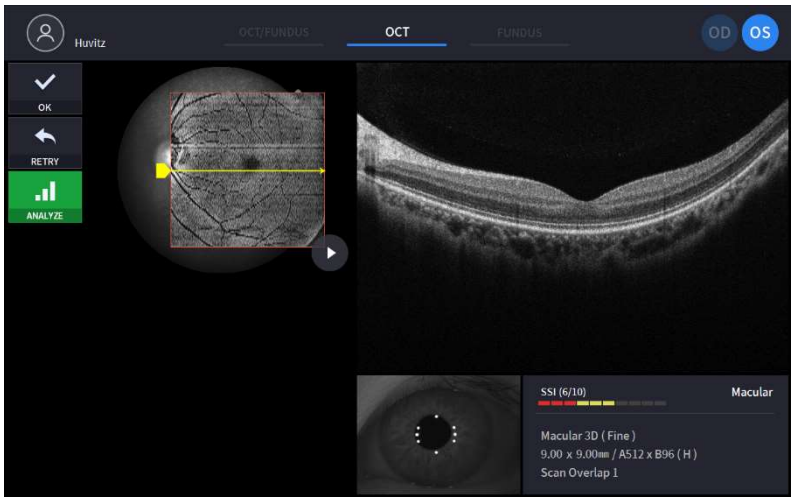


(3) Adjust the vertical position of retina image in the screen by moving reference mirror using slide bar (

).

(4) Press the button on joystick to capture image.
If auto shooting is on, '10-2. Optimize' and '10.4 Capture' is accomplished automatically.

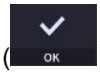
(5) Check the result and decide to store or discard and retry.



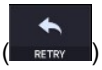
① Check previous/next OCT image by move scan position handle.

② Check continuous OCT image continuously by pressing play image icon () if needed.

③ Check SSI for image quality if needed.
SSI (Scan Signal Index) indicates level of image quality. SSI means signal to background ratio and displayed on a scale of 10 with a bar graph. SSI larger than 8 means 'Good', 5~8 means 'Normal', less than 5 means 'Poor' in general.
We recommend capture normal or good status in general. But, you don't have to retry when image is satisfactory but SSI is low, because SSI depends on patient's eye conditions.

④ If the image is satisfactory, press OK icon (

) to save image.

⑤ If the image is not satisfactory, press retry icon (

) and retry image capturing.

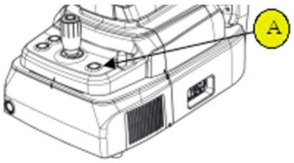
A. Try moving internal fixation target position by pressing fixation icon (

) and changing position of green cross () if needed.
When green cross position changes, the position of internal fixation target is also changed.

B. Try to change scan position by dragging scan range while scan range icon turned on. If reset scan position icon () is pressed, scan position moves to the default center position.

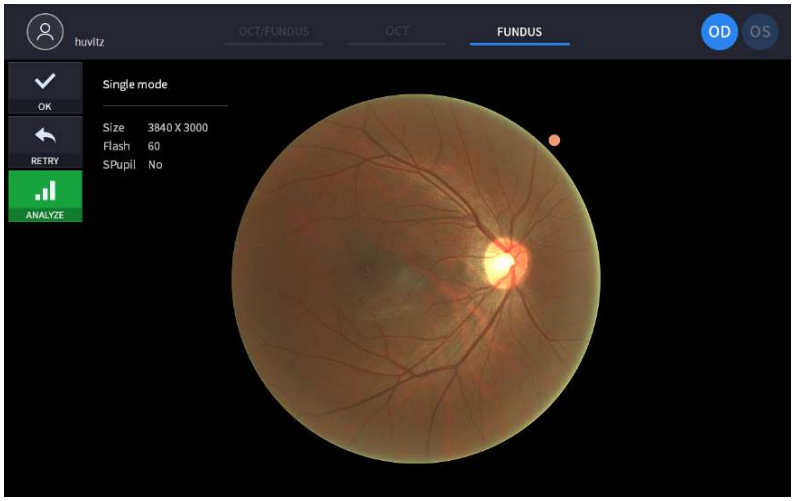
11. Capture image and check image quality (in Fundus mode).

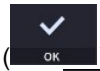
(1) Change focus position by pressing optimize icon on the screen or optimize button on the body (A).



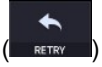
(2) Press the button on joystick to capture image.
If auto shooting is on, '11-2. Optimize' and '11.3 Capture' is accomplished automatically.

(3) Check the result and decide to store or discard and retry.



① If the image is satisfactory, press OK icon (

) to save image.

② If the image is not satisfactory, press retry icon (

) and retry image capturing.

A. If fundus image result too bright or too dark because of lighting, regulate the flash intensity using flash icon (

) in observation mode.

B. If fundus image is too dark because of small pupil size of patient, try small pupil mode by using small pupil icon (

) in observation mode.

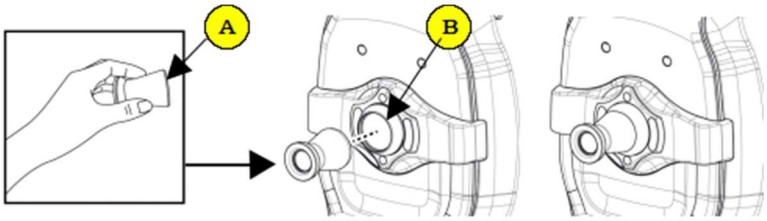
C. Try moving internal fixation target position by pressing fixation icon (

) and changing position of green cross () if needed.
When green cross position changes, the position of internal fixation target is also changed.

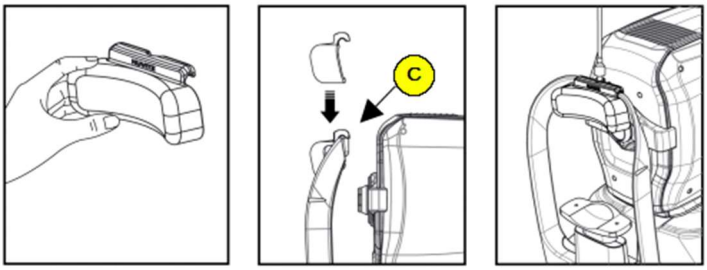
6.5. Anterior segment image operation (optional)

Preparation for anterior segment operation

1. Check the lens surface of anterior segment adapter is clean.
2. Thread anterior segment adapter (A) to objective lens holder (B), and check there is no tilting or misalignment of adopter. Don’t lock it too hard.



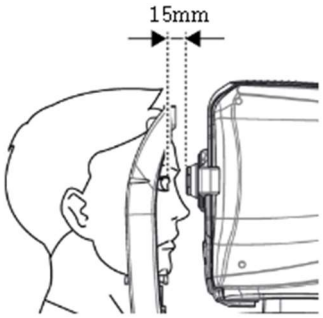
3. Check anterior headrest rubber is clean.
4. Hang anterior headrest rubber to headrest of instrument (C) first, then press anterior headrest rubber to be fixed firmly.
5. Check the mounted anterior headrest rubber does not incline.



Capturing curvature of cornea

1. The first procedure is same as ‘6.4 General Operation: procedure 2 ~ 7’.
   - On the anterior mode, function of auto shooting and auto tracking is not available.

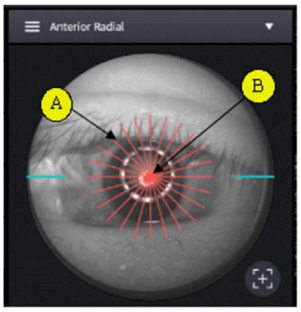
2. Move the body to align patient’s eye. Move the body slowly while watching patient’s eye and body, because working distance is just 15mm that the front lens is very close to patient's eye.



3. Capture image and check image quality (in anterior radial mode).

(1) Alignment and focus.

① Move body with joystick slowly to align anterior scan line (A) and center of patient's eye (B).



② Start OCT scan by pressing scan start icon (

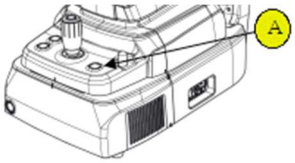
).

③ Move body with joystick slowly until section of cornea appears on the screen.

(2) Measuring curvature of cornea

① Optimize OCT signal by pressing optimize icon on the screen (

) or optimize button on the body (A).



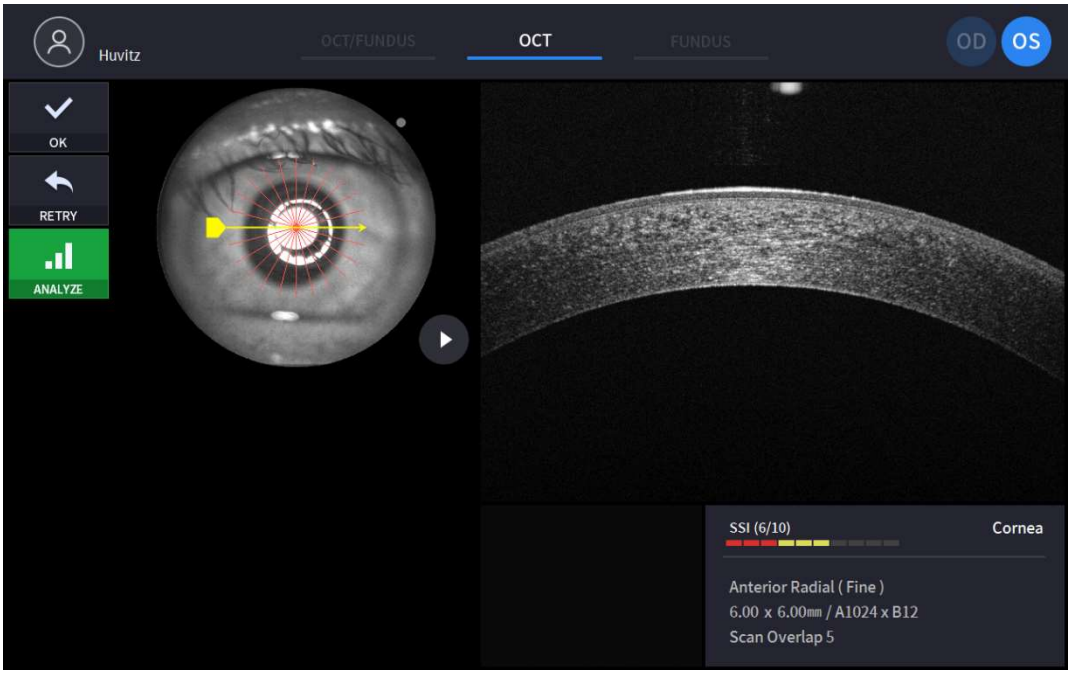
② For enhancing OCT signal, move position of reference mirror by pressing arrow of REF.M icon (

) if needed.

③ This function available on OCT/Fundus mode.

④ Press the button on joystick to capture image.

(3) Check image quality.



① Check previous/next OCT image by move scan position handle.

② Check continuous OCT image continuously by pressing play image icon ( ) if needed.

③ Check SSI for image quality if needed.

SSI (Scan Signal Index) indicates level of image quality. SSI means signal to background ratio and displayed on a scale of 10 with a bar graph. SSI larger than 8 means 'Good', 5~8 means 'Normal', less than 5 means 'Poor' in general.

We recommend capture normal or good status in general. But, you don't have to retry when image is satisfactory but SSI is low, because SSI depends on patient's eye conditions.

④ If the image is satisfactory, press OK icon ( ) to save image.

⑤ If the image is not satisfactory, press retry icon ( ) and retry image capturing.

A. If fundus image result too bright or too dark because of lighting, regulate the flash intensity using flash icon ( ) in observation mode.

B. Try moving internal fixation target position by pressing fixation icon ( ) and changing position of green cross ( ) if needed.

When green cross position changes, the position of internal fixation target is also changed.

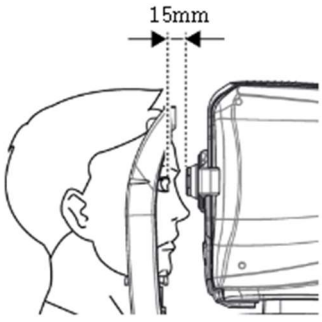
C. Try to change scan position by dragging scan range while scan range icon turned on. If reset scan position icon ( ) is pressed, scan position moves to the default center position.

4. Repeat procedure for the other eye if needed.
5. When capturing anterior segment is done, remove anterior segment adapter and anterior headrest rubber. Store in a designated case to prevent loss and scratch.

Capturing Anterior Chamber Angle

1. The first procedure is same as '6.4 General Operation: procedure 2 ~ 7'.
   - On the anterior mode, function of auto shooting and auto tracking is not available.

2. Move the body to align patient's eye. Move the body slowly while watching patient's eye and body, because working distance is just 15mm that the front lens is very close to patient's eye.

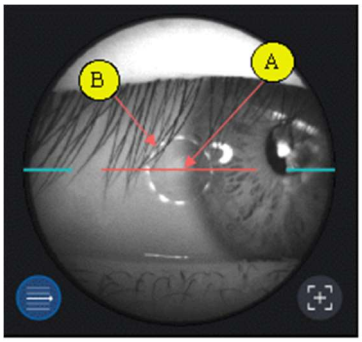


3. Capture anterior chamber angle image and check image quality (in ACA line mode).

(1) Alignment and focus.

① Guide patient to gaze left-hand side or right-hand side according to the interested part.

② Move body with joystick slowly to align anterior scan line (A) and objective area of capturing (B).

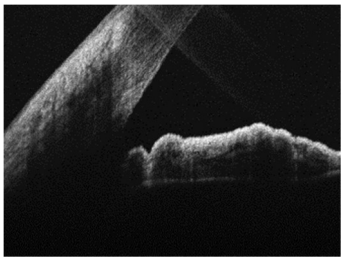


③ Start OCT scan by pressing scan start icon (

).

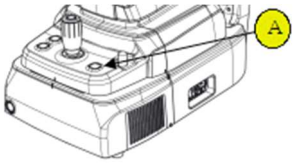
④ Move body with joystick slowly until anterior chamber appears on the screen.

(2) Measuring anterior chamber angle.



① Optimize OCT signal by pressing optimize icon on the screen (

) or optimize button on the body (A).



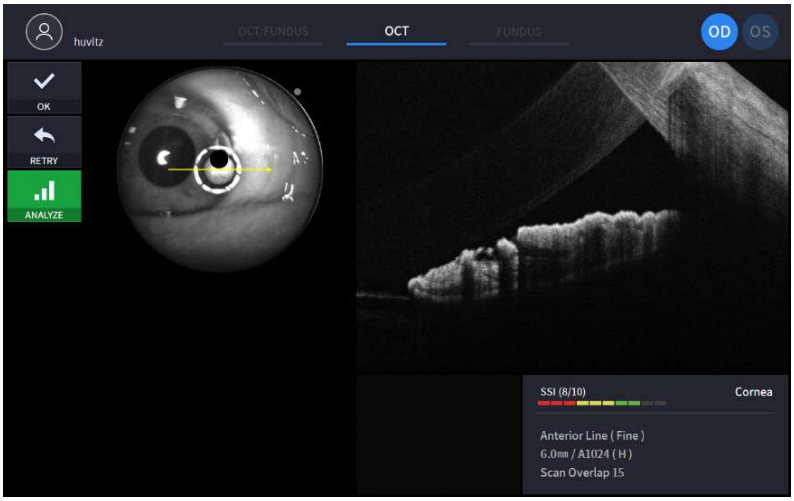
② For enhancing OCT signal, move position of reference mirror by pressing arrow of REF.M icon (

) if needed.

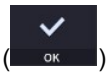
- This function available on OCT/Fundus mode.

③ Press the button on joystick to capture image.

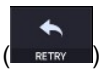
(3) Check image quality



① Check SSI for image quality if needed.
SSI (Scan Signal Index) indicates level of image quality. SSI means signal to background ratio and displayed on a scale of 10 with a bar graph. SSI larger than 8 means 'Good', 5~8 means 'Normal', less than 5 means 'Poor' in general.
We recommend capture normal or good status in general. But, you don't have to retry when image is satisfactory but SSI is low, because SSI depends on patient's eye conditions.

② If the image is satisfactory, press OK icon (

) to save image.

③ If the image is not satisfactory, press retry icon (

) and retry image capturing.

A. If fundus image result too bright or too dark because of lighting, regulate the flash intensity using flash icon (

) in observation mode.

B. If fundus image is too dark because of small pupil size of patient, try small pupil mode by using small pupil icon (

) in observation mode.

C. Try moving internal fixation target position by pressing fixation icon (

) and changing position of green cross (
) if needed.
When green cross position changes, the position of internal fixation target is also changed.

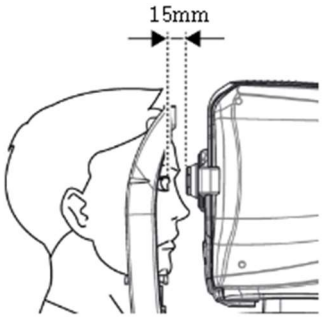
D. Try to change scan position by dragging scan range while scan range icon turned on. If reset scan position icon (
) is pressed, scan position moves to the default center position.

4. Repeat procedure for the other eye if needed.
5. When capturing anterior segment is done, remove anterior segment adapter and anterior headrest rubber. Store in a designated case to prevent loss and scratch.

Capturing Anterior Wide

1. The first procedure is same as '6.4 General Operation: procedure 2 ~ 7'.
   - On the anterior mode, function of auto shooting and auto tracking is not available.
   - On the anterior wide mode, anterior wide adapter is required.

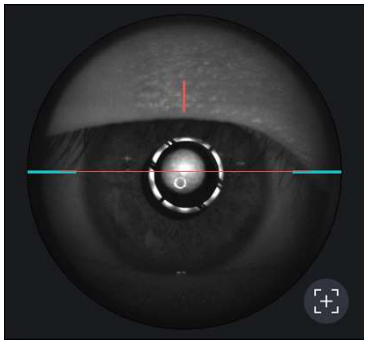
2. Move the body to align patient's eye. Move the body slowly while watching patient's eye and body, because working distance is just 15mm that the front lens is very close to patient's eye.



3. Capture image and check image quality (in anterior radial mode).

(1) Alignment and focus.

① Move body with joystick slowly to align anterior scan line and center of patient's eye.



② Start OCT scan by pressing scan start icon (

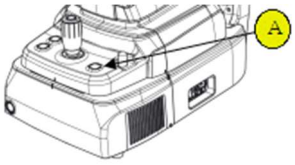
).

③ Move body with joystick slowly until section of cornea appears on the screen.

(2) Measuring anterior wide

① Optimize OCT signal by pressing optimize icon on the screen (

) or optimize button on the body (A).

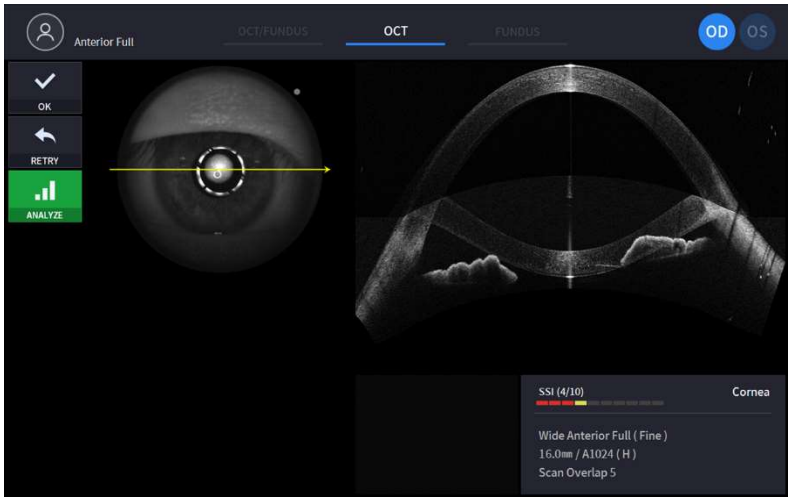


② For enhancing OCT signal, move position of reference mirror by pressing arrow of REF.M icon (

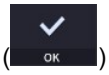
) if needed.

③ Press the button on joystick to capture image.

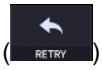
(3) Check image quality.



① Check SSI for image quality if needed.
SSI (Scan Signal Index) indicates level of image quality. SSI means signal to background ratio and displayed on a scale of 10 with a bar graph. SSI larger than 8 means 'Good', 5~8 means 'Normal', less than 5 means 'Poor' in general.
We recommend capture normal or good status in general. But, you don't have to retry when image is satisfactory but SSI is low, because SSI depends on patient's eye conditions.

② If the image is satisfactory, press OK icon (

) to save image.

③ If the image is not satisfactory, press retry icon (

) and retry image capturing.

A. If fundus image result too bright or too dark because of lighting, regulate the flash intensity using flash icon (

) in observation mode.

B. If fundus image is too dark because of small pupil size of patient, try small pupil mode by using small pupil icon (

) in observation mode.

C. Try moving internal fixation target position by pressing fixation icon (

) and changing position of green cross (
) if needed.
When green cross position changes, the position of internal fixation target is also changed.

D. Try to change scan position by dragging scan range while scan range icon turned on. If reset scan position icon (
) is pressed, scan position moves to the default center position.

4. Repeat procedure for the other eye if needed.
5. When capturing anterior segment is done, remove anterior segment adapter and anterior headrest rubber. Store in a designated case to prevent loss and scratch.

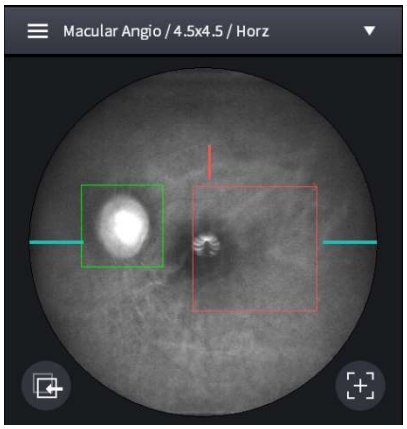
6.6. Angiography image operation (optional)

1. The first procedure is same as '6.4 General Operation: procedure 2 ~ 7'.
   - On the angio mode, function of auto tracking is additionally available while scanning.

2. Capture image and check image quality (in angiography mode).

(1) Alignment and focus.

① Move body with joystick and detect disc with disc tracking box. And Check the scan region box.



② Start OCT scan by pressing scan start icon (

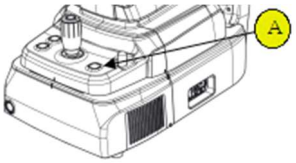
).

③ Move body with joystick slowly until disc is clearly recognized on the screen.

(2) Capturing angiography image

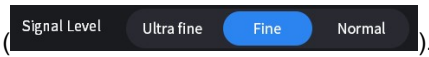
① Optimize OCT signal by pressing optimize icon on the screen (

) or optimize button on the body (A).

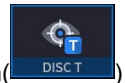


② For enhancing OCT signal, move position of reference mirror by pressing arrow of REF.M icon (

) if needed.

③ If signal is still weak, change the Signal Level (

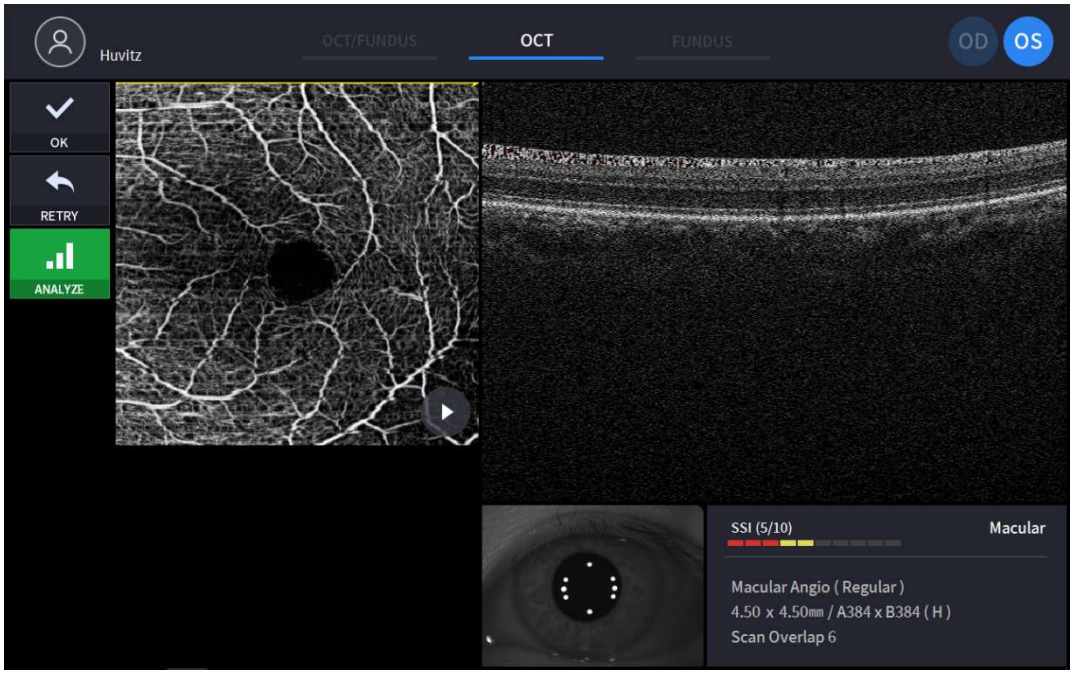
).

④ To prevent signal degradation and scanning errors that caused by focus shifting, use Auto tracking mode by pressing the Disc Tracking icon(

) at the bottom if needed.

⑤ Press the button on joystick to capture image.

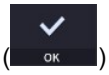
(3) Check image quality.



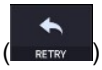
① Check previous/next OCT image by move scan position handle.

② Check continuous OCT image continuously by pressing play image icon () if needed.

③ Check SSI for image quality if needed.
SSI (Scan Signal Index) indicates level of image quality. SSI means signal to background ratio and displayed on a scale of 10 with a bar graph. SSI larger than 8 means 'Good', 5~8 means 'Normal', less than 5 means 'Poor' in general.
We recommend capture normal or good status in general. But, you don't have to retry when image is satisfactory but SSI is low, because SSI depends on patient's eye conditions.

④ If the image is satisfactory, press OK icon (

) to save image.

⑤ If the image is not satisfactory, press retry icon (

) and retry image capturing.

⑥ To analyze directly, press analyze icon(

) and start analyze data.

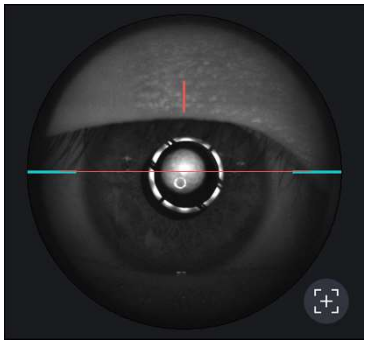
6.7. Biometry image operation (optional)

Capturing Axial Length

1. The first procedure is same as '6.4 General Operation: procedure 1 ~ 8'
2. Select Auto mode or Manual mode, on the Auto mode HOCT searches macular and cornea automatically and measures the set number of times.
3. Do not move the HOCT after starting measurements.
4. For manual mode, touch the Bscan screen or use the REF.M left and right buttons to move the Bscan image onto the Bscan screen
5. Capture image and check image quality (Axial Length mode).

(1) Alignment and focus.

① Move body with joystick slowly to align anterior scan line and center of patient's eye.



② Start OCT scan by pressing scan start icon (

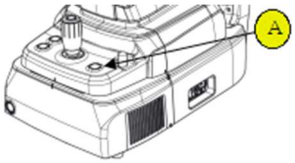
).

③ Move body with joystick slowly until section of cornea appears on the screen.

(2) Measuring axial length

① Optimize OCT signal by pressing optimize icon on the screen (

) or optimize button on the body (A).



② For enhancing OCT signal, move position of reference mirror by pressing arrow of REF.M icon (

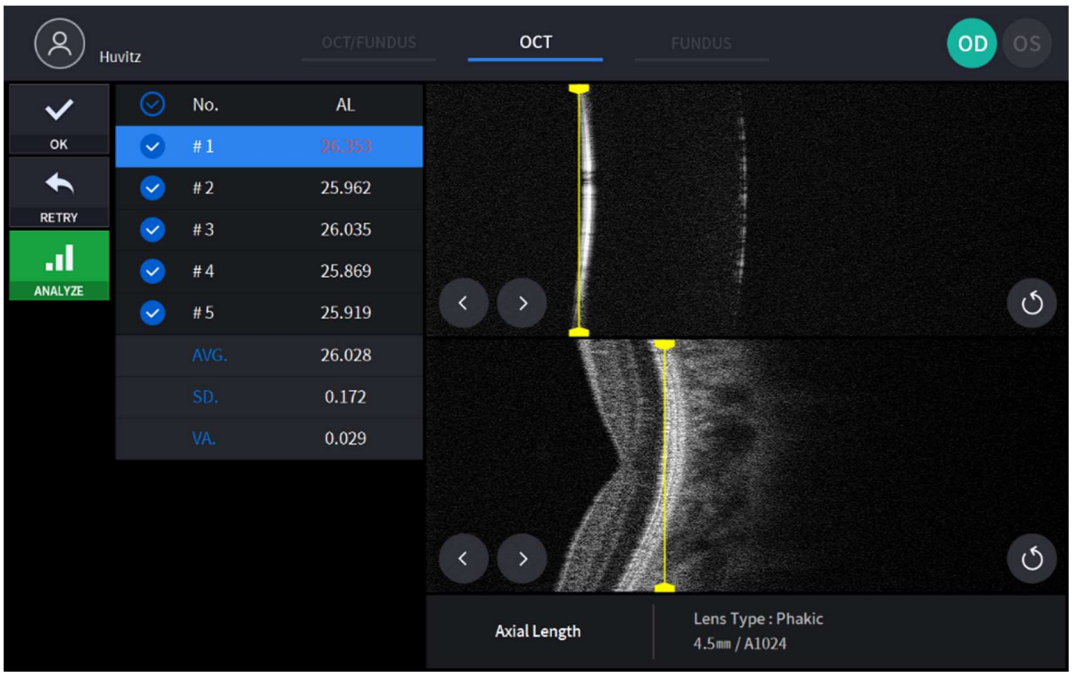
) if needed.

③ Press the button on joystick to capture image.

④ HOCT searches macular and cornea automatically. If not, touch the Bscan screen or use the REF.M left and right buttons to move the Bscan image onto the Bscan screen

⑤ For manual mode, Press the button on joystick when the macular and cornea areas are displayed correctly on the Bscan screen

(3) Check image quality.



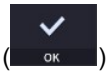
① Check the measured result

② Use the check button to select the measurement to be saved.

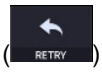
③ Modify the measurement value by dragging the segmentation line.

④ Use the Next, Prev button to move the segmentation line.

⑤ Use the Reposition button to reset the segmentation line's position.

⑥ If the image is satisfactory, press OK icon (

) to save image.

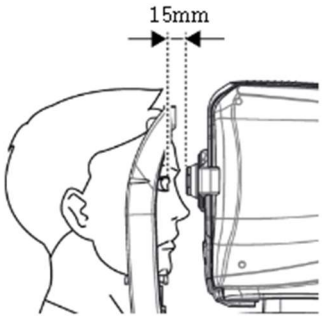
⑦ If the image is not satisfactory, press retry icon (

) and retry image capturing.

6. Repeat procedure for the other eye if needed.

Capturing Lens Thickness

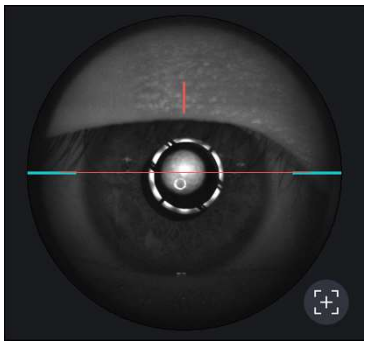
1. The first procedure is same as '6.4 General Operation: procedure 2 ~ 7'.
   - On the anterior mode, function of auto shooting and auto tracking is not available.
2. Move the body to align patient's eye. Move the body slowly while watching patient's eye and body, because working distance is just 15mm that the front lens is very close to patient's eye.



3. Select Auto mode or Manual mode, on the Auto mode HOCT searches Cornea, front of lens and back of lens and measures the set number of times.
4. Do not move the HOCT after starting measurements.
5. For manual mode, touch the Bscan screen or use the REF.M left and right buttons to move the Bscan image onto the Bscan screen.
6. Caputre image and check image quality (Lens Thickness)

(1) Alignment and focus.

① Move body with joystick slowly to align anterior scan line and center of patient's eye.



② Start OCT scan by pressing scan start icon (

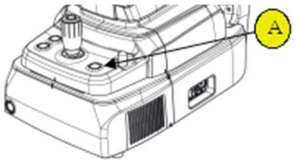
).

③ Move body with joystick slowly until section of cornea appears on the screen.

(2) Measuring axial length

① Optimize OCT signal by pressing optimize icon on the screen (

) or optimize button on the body (A).



② For enhancing OCT signal, move position of reference mirror by pressing arrow of REF.M icon (

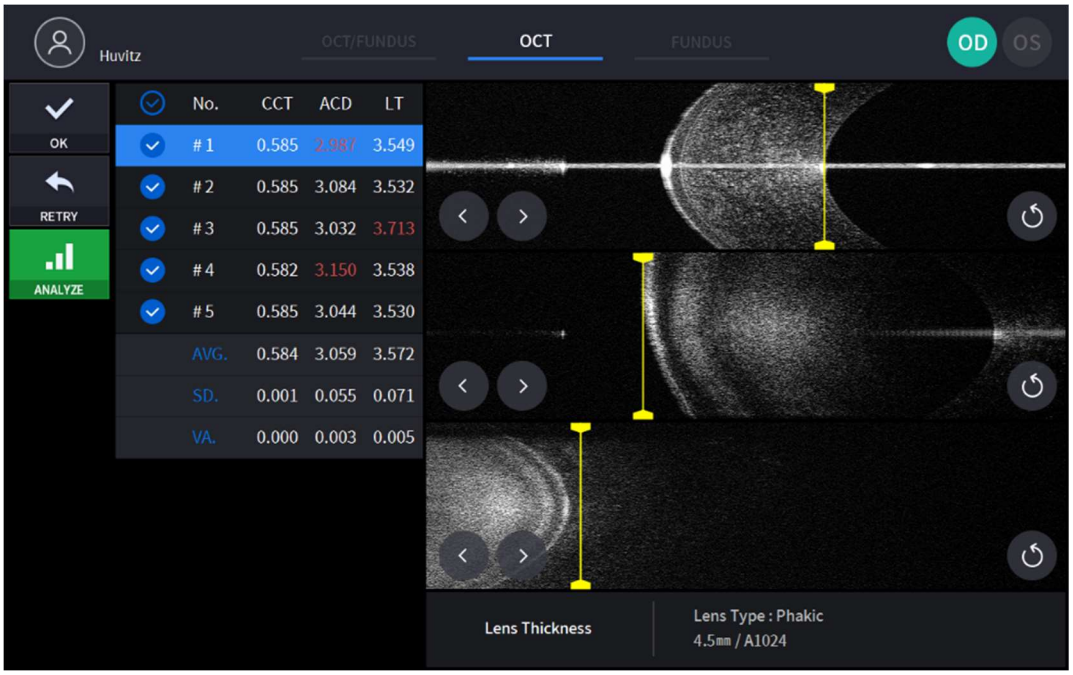
) if needed.

③ Press the button on joystick to capture image.

④ HOCT searches cornea, front of lens and back of lens automatically. If not, touch the Bscan screen or use the REF.M left and right buttons to move the Bscan image onto the Bscan screen

⑤ For manual mode, Press the button on joystick when the cornea, front of lens and back of lens areas are displayed correctly on the Bscan screen

(3) Check image quality.



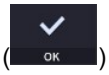
① Check the measured result

② Use the check button to select the measurement to be saved.

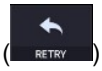
③ Modify the measurement value by dragging the segmentation line.

④ Use the Next, Prev button to move the segmentation line.

⑤ Use the Reposition button to reset the segmentation line's position.

⑥ If the image is satisfactory, press OK icon (

) to save image.

⑦ If the image is not satisfactory, press retry icon (

) and retry image capturing.

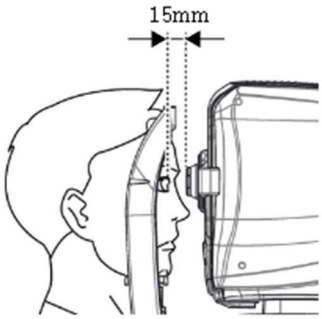
7. Repeat procedure of the other eye if needed

8. When capturing anterior segment is done, remove anterior segment adapter and anterior headrest rubber. Store in a designated case to prevent loss and scratch.

6.8. Topography image operation (optional)

1. The first procedure is same as '6.4 General Operation: procedure 2 ~ 7'.
   - On the anterior mode, function of auto shooting and auto tracking is not available.

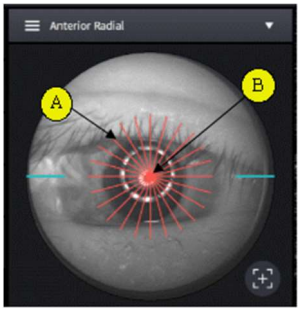
2. Move the body to align patient's eye. Move the body slowly while watching patient's eye and body, because working distance is just 15mm that the front lens is very close to patient's eye.



3. Capture image and check image quality (in Topography mode).

(1) Alignment and focus.

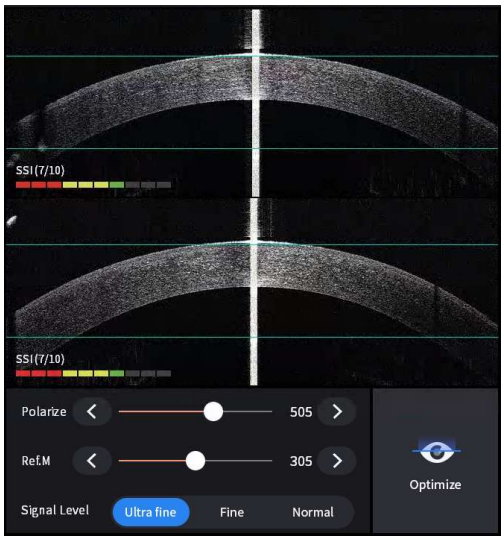
① Move body with joystick slowly to align anterior scan line (A) and center of patient's eye (B).



② Start OCT scan by pressing scan start icon (

).

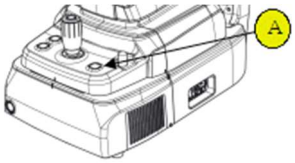
③ Adjust the joystick so that corneal vertex reflections are displayed in the center of the horizontal BScan image and the vertical BScan image.



(2) Measuring curvature of cornea

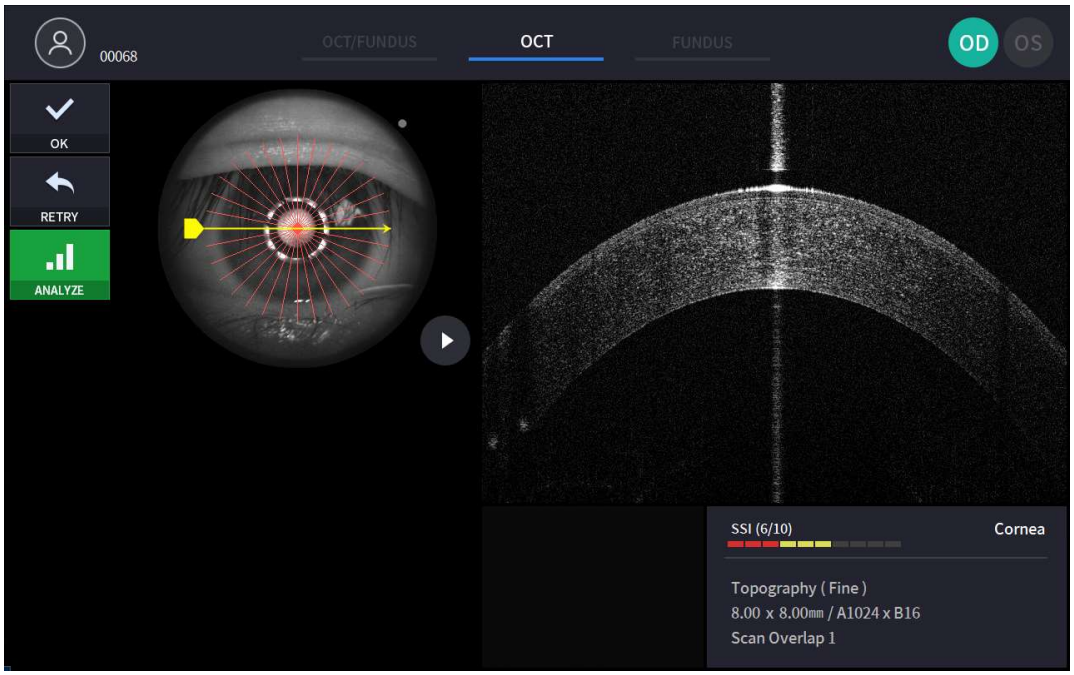
① Optimize OCT signal by pressing optimize icon on the screen (

) or optimize button on the body (A).



② Press the button on joystick to capture image.

(3) Check image quality.



① Check previous/next OCT image by move scan position handle.

② Check continuous OCT image continuously by pressing play image icon ( ) if needed.

③ Check SSI for image quality if needed.

SSI (Scan Signal Index) indicates level of image quality. SSI means signal to background ratio and displayed on a scale of 10 with a bar graph. SSI larger than 8 means 'Good', 5~8 means 'Normal', less than 5 means 'Poor' in general.

We recommend capture normal or good status in general. But, you don't have to retry when image is satisfactory but SSI is low, because SSI depends on patient's eye conditions.

④ If the image is satisfactory, press OK icon ( ) to save image.

⑤ If the image is not satisfactory, press retry icon ( ) and retry image capturing.

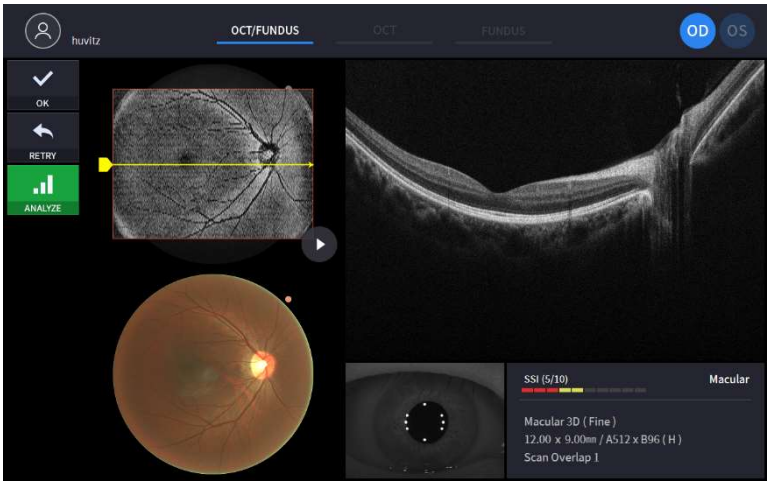
6.9. Analyze

Entering Analysis screen

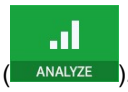
1. Analysis immediately after scanning.

   To enter analyze mode from measurement confirm screen, press the analyze icon (

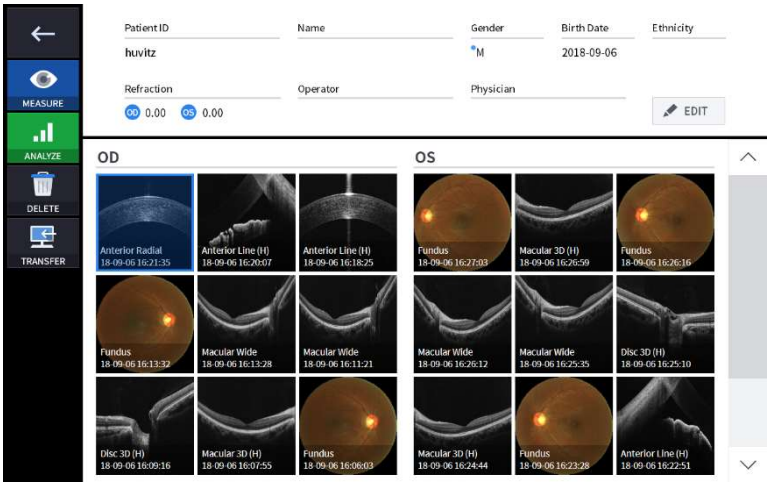
) from the captured image screen.



2. Analysis from measurement list.

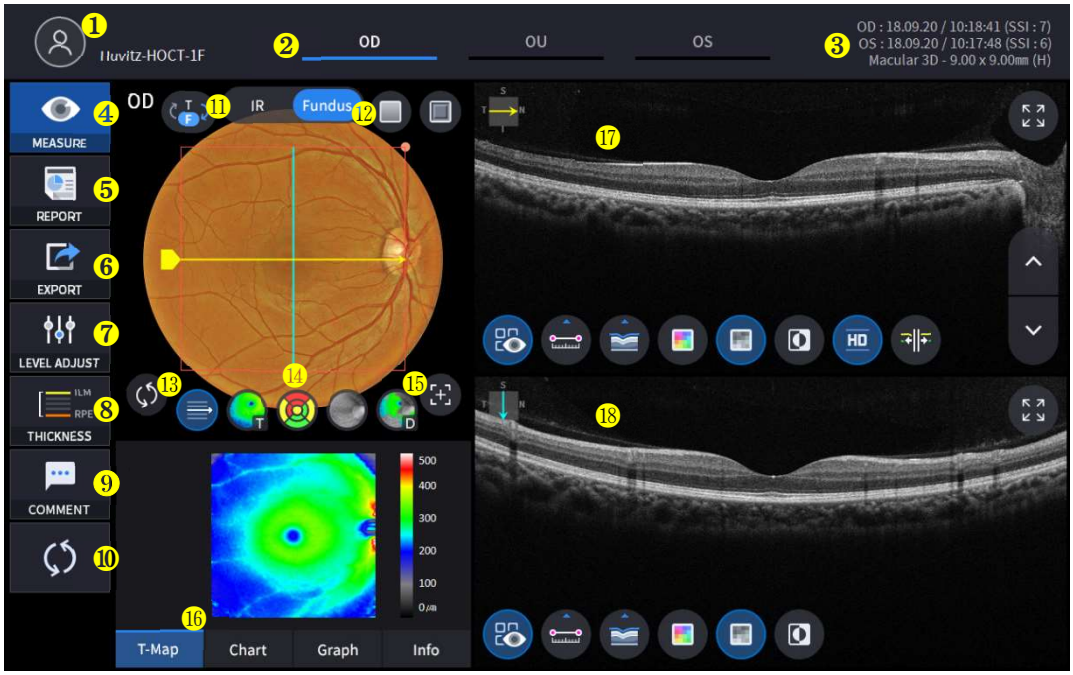
   Select a measurement to analyze by clicking and press the analyze icon (

).



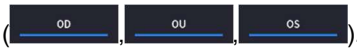
OCT Macular 3D Analysis screen

1. Composition of screen.



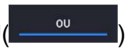
No	Name	Function
1	Patient information	Shows the information of patient ID and name. Go back to patient list by clicking the icon.
2	OD / OU / OS	Indicates which side of eye is showing. You can move to the measurement of the other side or the both sides by selecting unhighlighted tabs. - OD: right eye, OS: left eye, OU: both eyes.
3	Date	Displays the date and information that the measurement was taken.
4	MEASURE	Moves to capture screen after finishing analysis.
5	REPORT	Moves to report screen of the current measurement.
6	EXPORT	If an external storage device is connected, you can store the data that you want to on an external storage device.
7	LEVEL ADJUST	Adjust contrast of Bscan.
8	THICKNESS	Select the analysis range between ILM <-> IPL / ILM <-> RPE.
9	COMMENT	Leave a brief comment on the patient or measurement.
10	RECALCULATION	Update the information.
11	IR / Fundus	Select between IR Fundus/Color Fundus.
12	Red Fee, Embossing	Apply a red free or embossing effect to the Fundus image.
13	Pattern Center	Moves ETDRS or GCC Chart center to the center of pattern domain.
14	Overlay Control	Displays Scan direction and position, Enface, Thickness Map, ETDRS or GCC Chart range on IR Fundus / Color Fundus.

15	Auto Position	Moves ETDRS or GCC Chart center to the Macular position.
16	Analyze Control	Shows Thickness Map, ETDRS or GCC Chart, Graph, Info.
17	Bscan-1	Bscan screen.
18	Bscan-2	Another Bscan screen to display position different from Bscan-1.

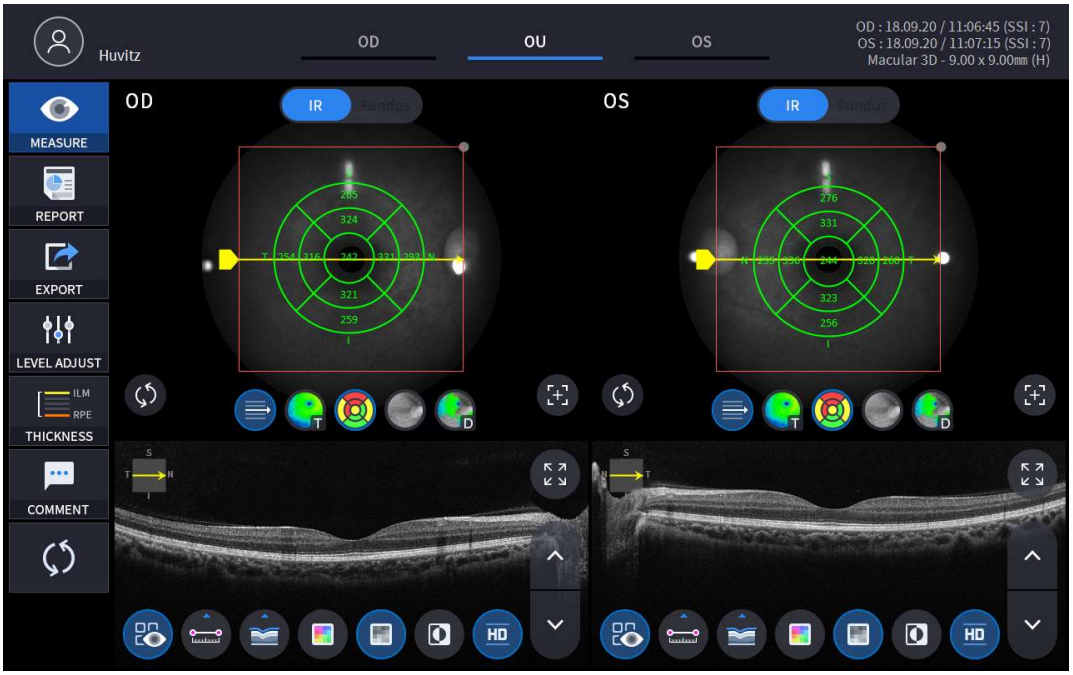
2. Select analyze mode choosing OD / OU / OS icon (

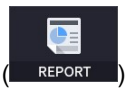
).

OD	Right eye Analysis
OU	Both eyes Analysis
OS	Left eye Analysis

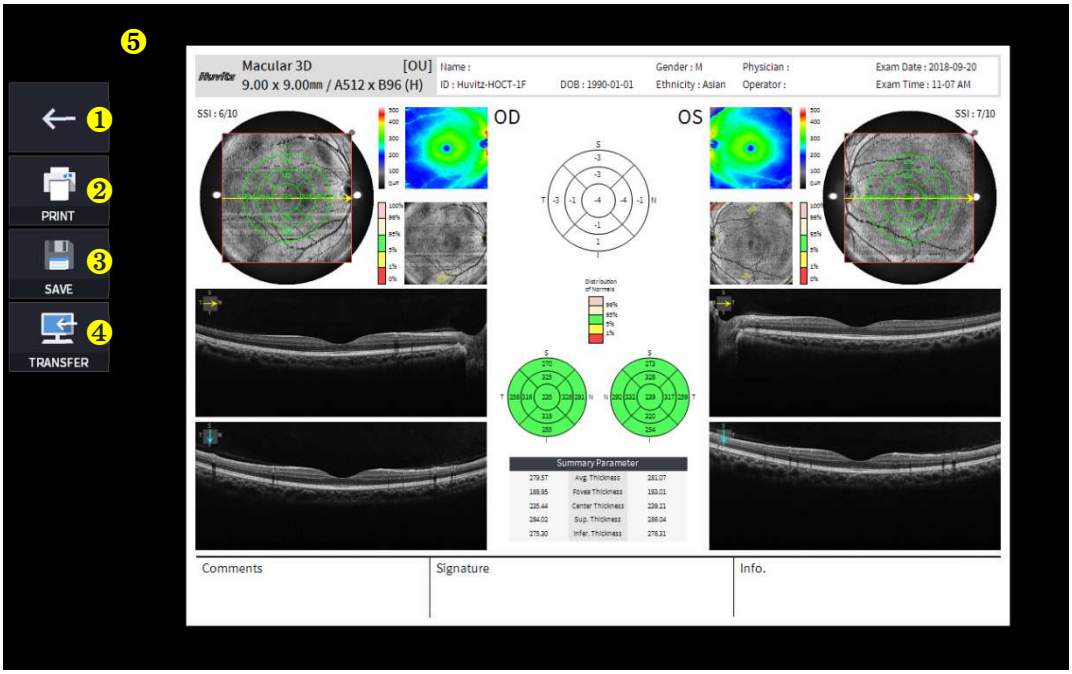
When selecting OU(

) among OD / OU / OS, screen changes to OU analysis screen shown below.

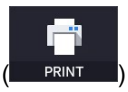


3. Select REPORT icon (

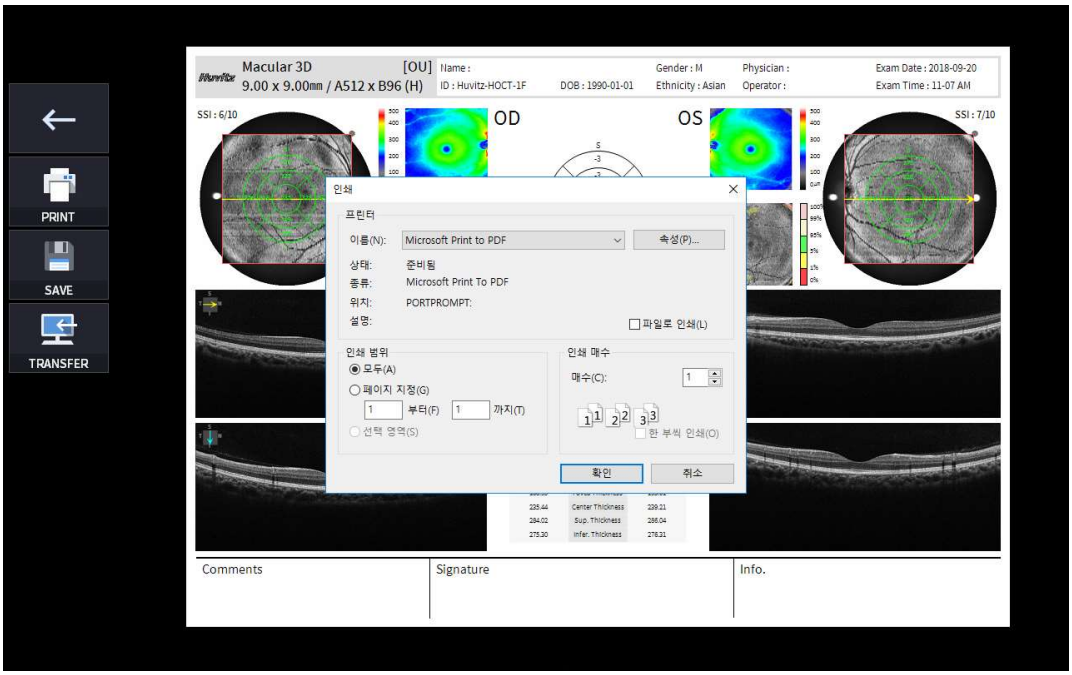
) shows REPORT screen shown below.

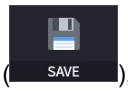


No	Name	Function
1	Previous screen	Go back to analysis screen.
2	PRINT	Save the current report showing as PDF file or print to a connected printer.
3	SAVE	Save the report as a JPG image if you have an external storage device connected to it.
4	TRANSFER	Sends the report to the DICOM Server if you are using the DICOM feature.
5	Report Preview	Preview of generated report.

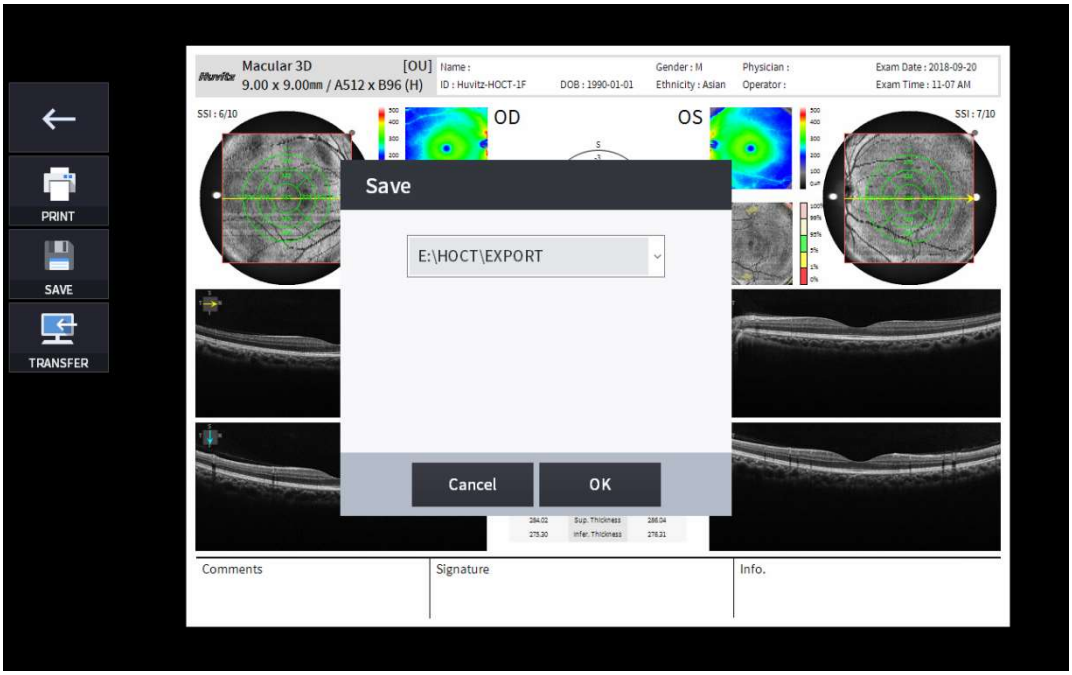
(1) Selecting PRINT icon (

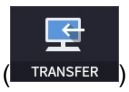
) shows printer option window.



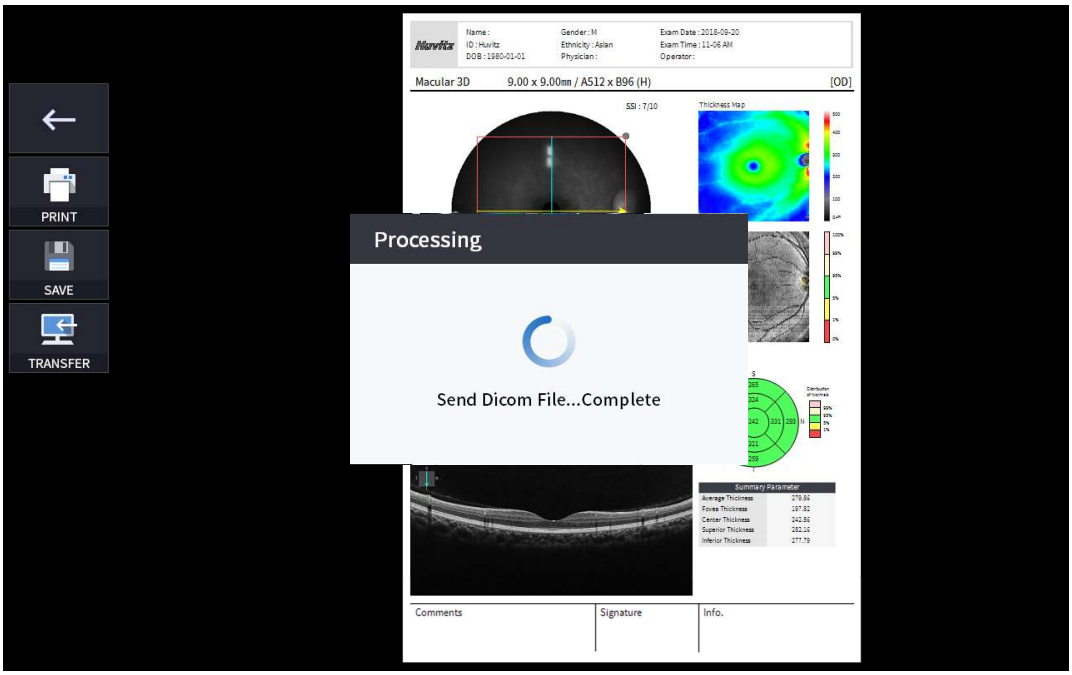
(2) Select the Save icon (

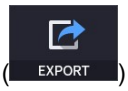
), the Select Storage Location window appears.



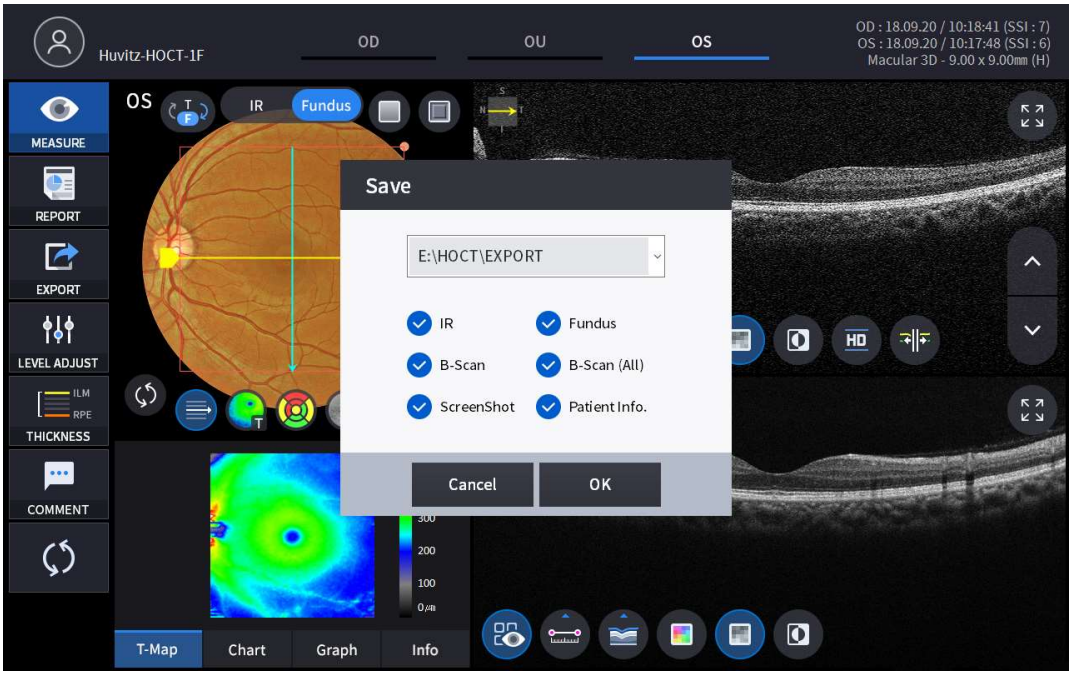
(3) Select the TRANSFER icon (

) to send the report to the DICOM server.



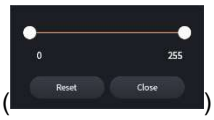
4. External storage device is connected, you can select TRANSFER icon (

) to save the desired data to the external storage device.



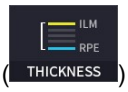
5. Selecting LEVEL ADJUST icon (

) shows an adjustable pop-up window shown below.



- Use Slide Bar (
) to control Bscan Contrast.



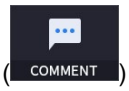
6. Selecting THICKNESS icon (

) shows a pop-up window shown below.



ILM <-> IPL	Set Analysis criteria to ILM ~ IPL.
ILM <-> RPE	Set Analysis criteria to ILM ~ RPE.

- Analysis results will be displayed according to each setting value.

7. Select the COMMENT icon (

) to leave a brief comment on the patient or measurement.



8. Fundus image can be chosen from monochromatic IR fundus image or color fundus image.
(

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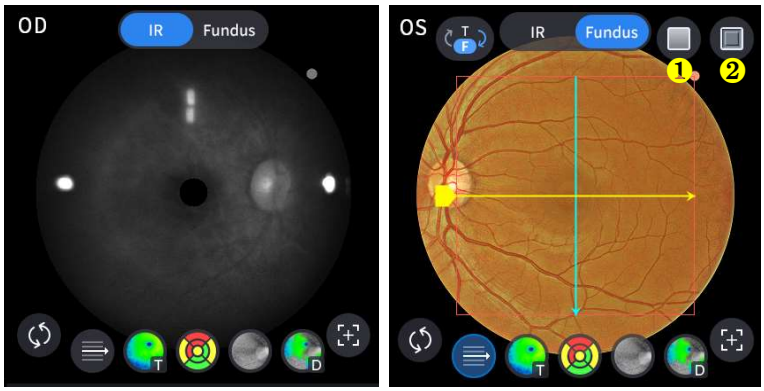
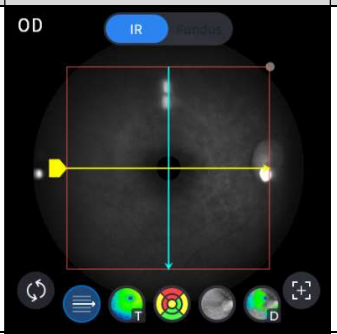
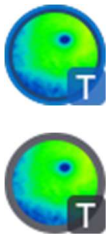
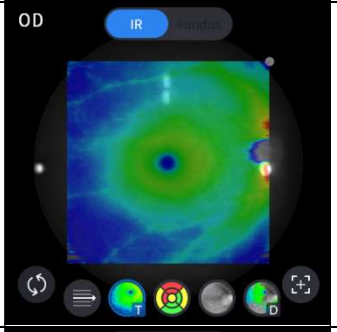
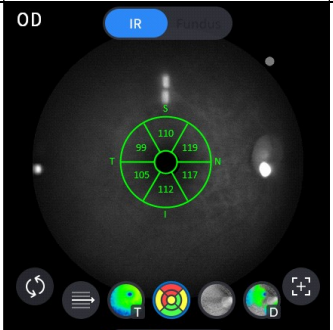
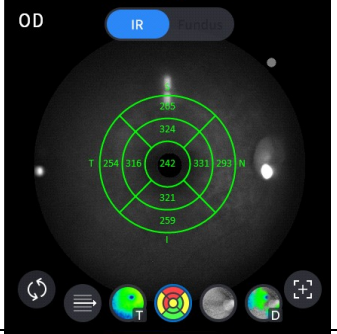
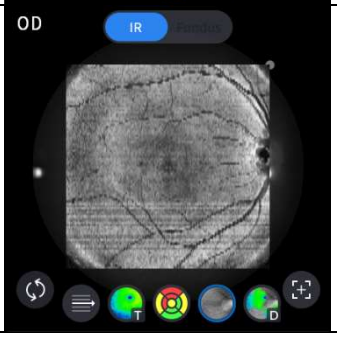
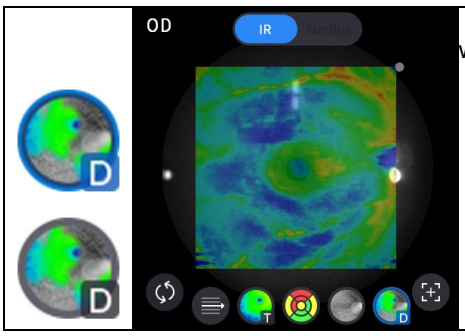


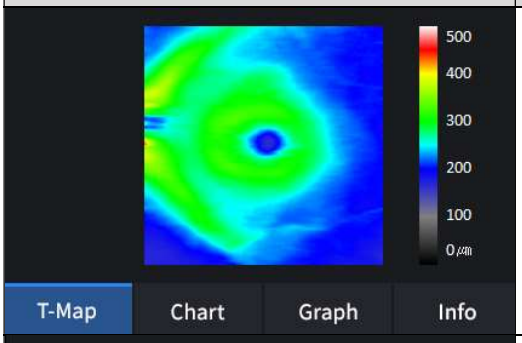
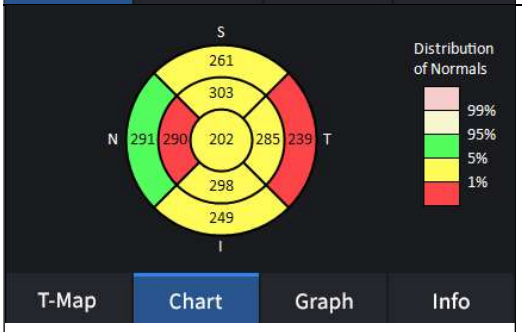
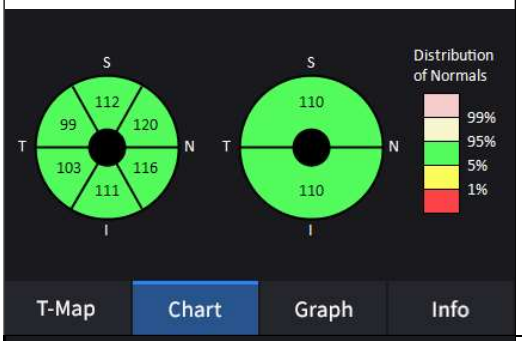
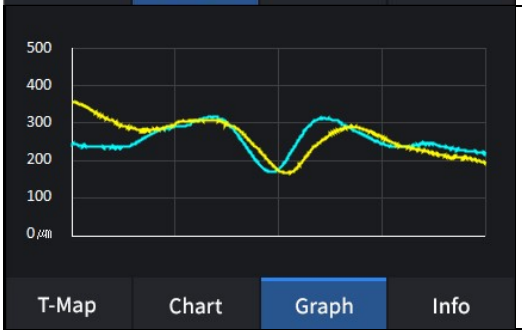
No	Name	Function
1	Red Free	Apply a red free effect to the Fundus image.
2	Embossing	Apply a embossing effect to the Fundus image.

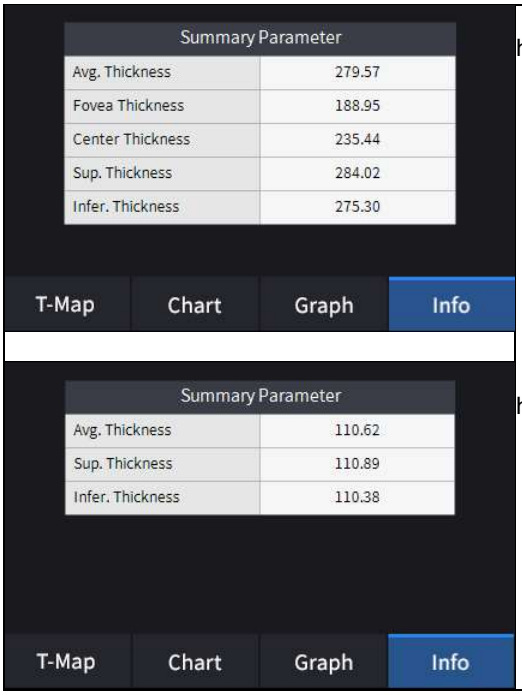
9. Select Overlay Control icon () to make the analysis result overlayed on Macular image.

Icon ON / OFF	ON screen	Function
		- Displays Scan Domain. - Displays Scan Direction.
		- Displays thickness map image.
		- Displays GCC Chart.
		- Displays ETDRS Chart Range.
		- Displays enface image.

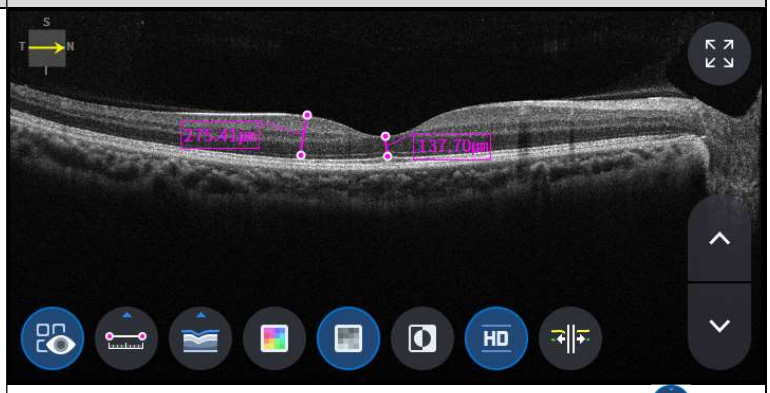
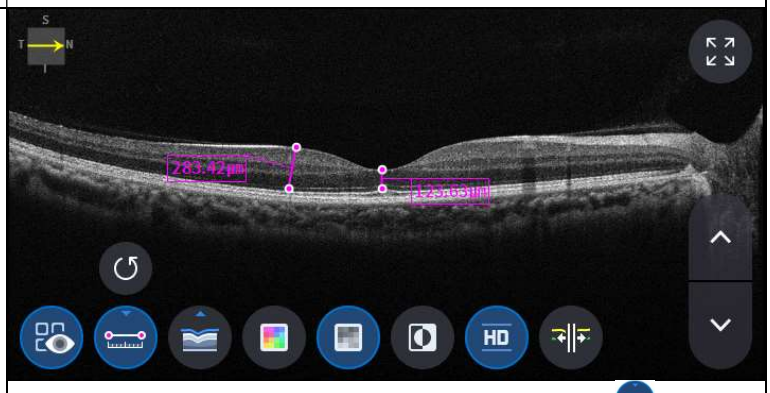
	- Displays deviation map or normative map of which option can be set at User Setup menu.

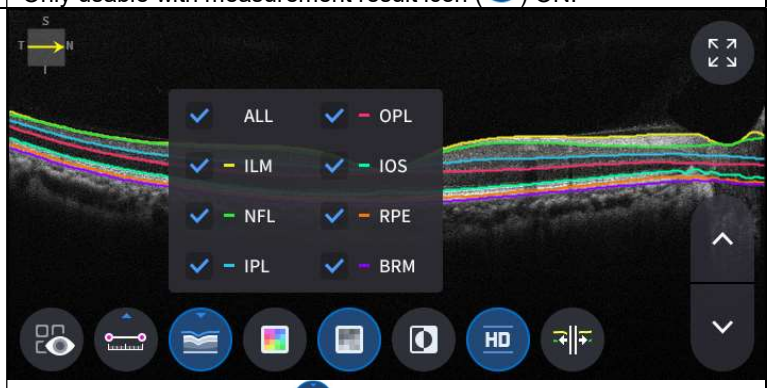
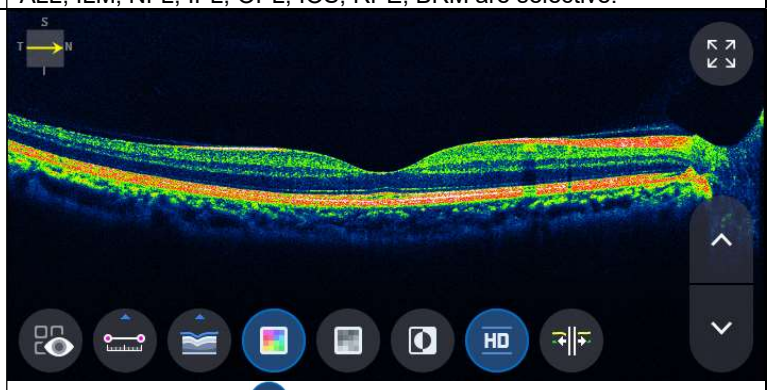
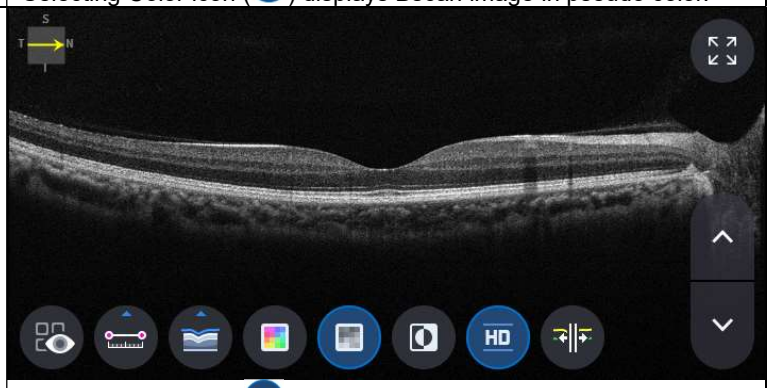
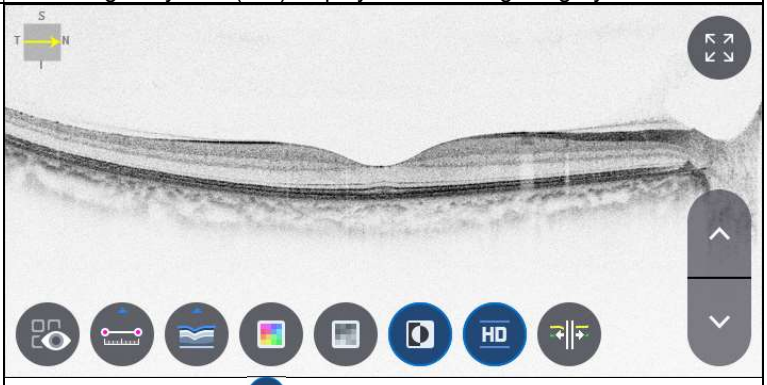
10. Select analysis tool icon(T-Map , Chart , Graph , Info) to show the analysis result.

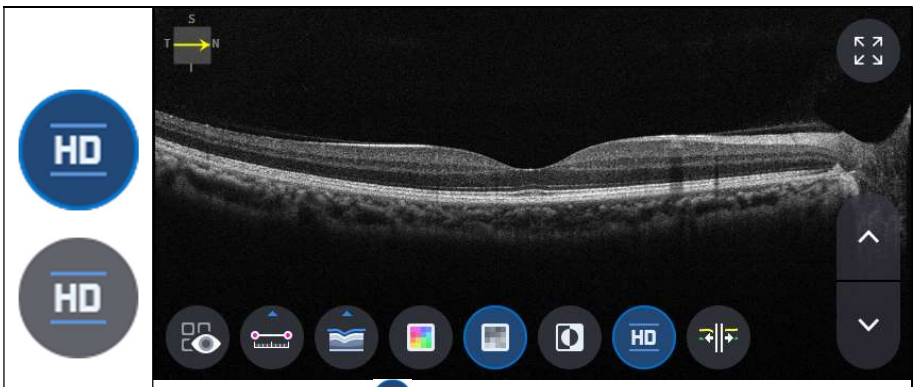
Analyze Screen	Function
	- Displays thickness map in pseudo color.
	- Displays ETDRS Chart if you have set the thickness option to ILM-RPE.
	- Displays GCC Chart if you have set the thickness option to ILM-IPL.
	- Displays thickness based on the previously set Thickness Layer. (ILM <-> RPE / ILM <-> IPL)

	- Displays following measured values if you have set the thickness option to ILM-RPE. Average Thickness. Fovea Thickness. Center Thickness. Superior Thickness. Inferior Thickness. - Displays following measured values if you have set the thickness option to ILM-IPL. Average Thickness. Superior Thickness. Inferior Thickness.

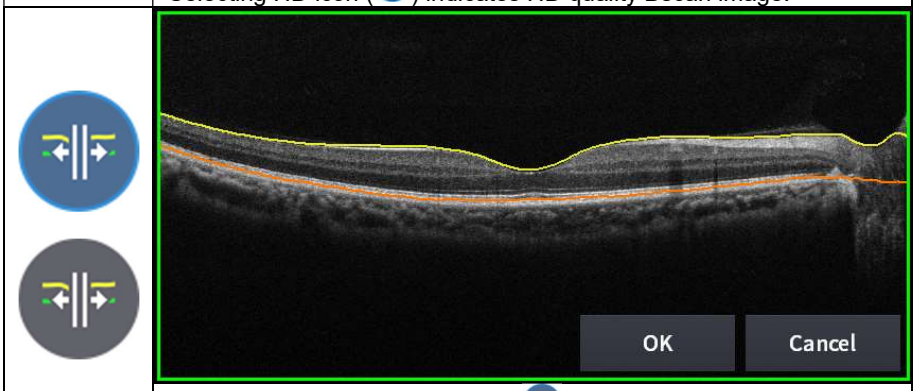
11. Select Bscan analysis tool(, , , , , , , ,) on Bscan image to analyze the Bscan currently displayed.

Icon ON / OFF	Screen and Function
	 - ON: Shows the length measured using measurement icon ( ). - OFF: Hides the measurements.
	 - Selecting two points with the length measurement icon ( ) ON on Bscan screen shows the length between the two points.

	- Latest data can be deleted by selecting Undo icon ( ). - Only usable with measurement result icon ( ) ON.
	 - Click Segmentation icon ( )to show Bscan Layer. ALL, ILM, NFL, IPL, OPL, IOS, RPE, BRM are selective.
	 - Selecting Color icon ( ) displays Bscan image in pseudo color.
	 - Selecting Gray icon ( ) displays Bscan image in grayscale.
	 - Selecting Invert icon ( ) displays Bscan image in inverted grayscale.



- Selecting HD icon ( ) indicates HD quality Bscan image.



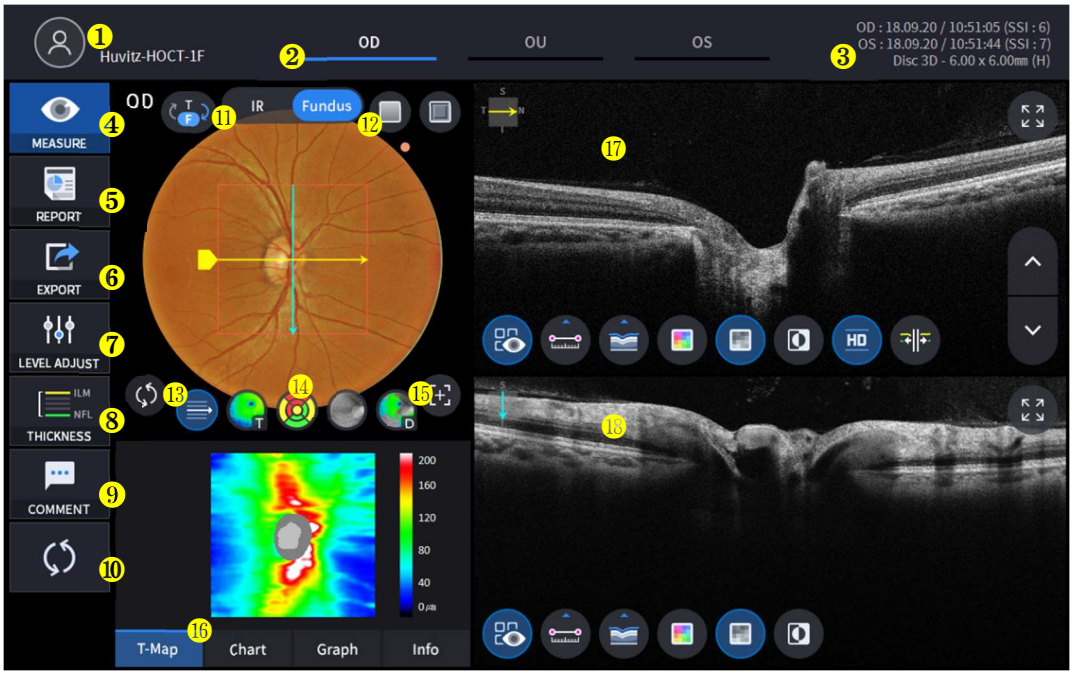
- Seleting edit_segmentation icon ( ) can edit the segmentation line. (but, it isn't able to use in HD mode.)

12. Selecting FULL Screen icon ( ) shows the current Bscan image in full screen.



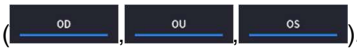
OCT Disc 3D Analysis screen

1. Composition of screen.



No	Name	Function
1	Patient information	Shows the information of patient ID and name. Go back to patient list by clicking the icon.
2	OD / OU / OS	Indicates which side of eye is showing. You can move to the measurement of the other side or the both sides by selecting unhighlighted tabs. - OD: right eye, OS: left eye, OU: both eyes.
3	Date	Displays the date and information that the measurement was taken.
4	MEASURE	Moves to capture screen after finishing analysis.
5	REPORT	Moves to report screen of the current measurement.
6	EXPORT	If an external storage device is connected, you can store the data that you want to on an external storage device.
7	LEVEL ADJUST	Adjust contrast of Bscan.
8	THICKNESS	Select the analysis range between ILM <-> NFL / ILM <-> RPE.
9	COMMENT	Leave a brief comment on the patient or measurement.
10	RECALCULATION	Update the information.
11	IR / Fundus	Select between IR Fundus/Color Fundus if color fundus result is available.
12	Red Fee, Embossing	Apply a red free or embossing effect to the Fundus image.
13	Pattern Center	Moves RNFL Chart center to the center of pattern domain.
14	Overlay Control	Displays Scan direction and position, Enface, Thickness Map, RNFL Chart range on IR Fundus / Color Fundus.

15	Auto Position	Moves RNFL Chart center to the Macular position.
16	Analyze Control	Shows Thickness Map, RNFL Chart, Graph, Info.
17	Bscan-1	Bscan screen.
18	Bscan-2	Another Bscan screen to display position different from Bscan-1.

2. Select analyze mode choosing OD / OU / OS icon (

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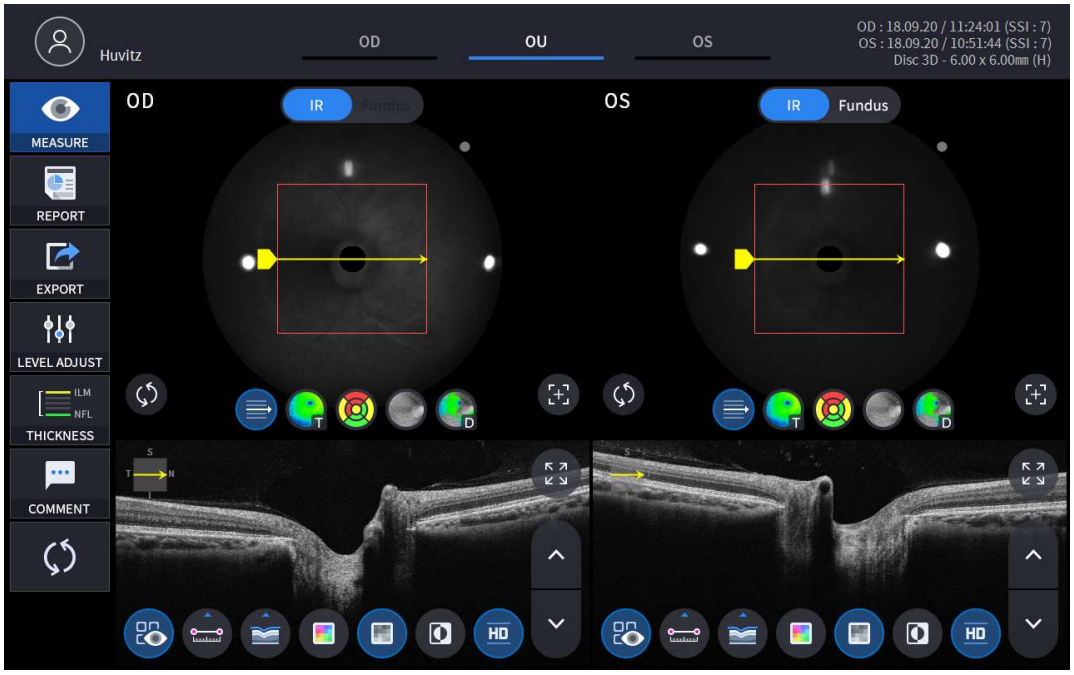
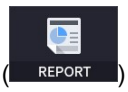
OD	Right eye Analysis
OU	Both eyes Analysis
OS	Left eye Analysis

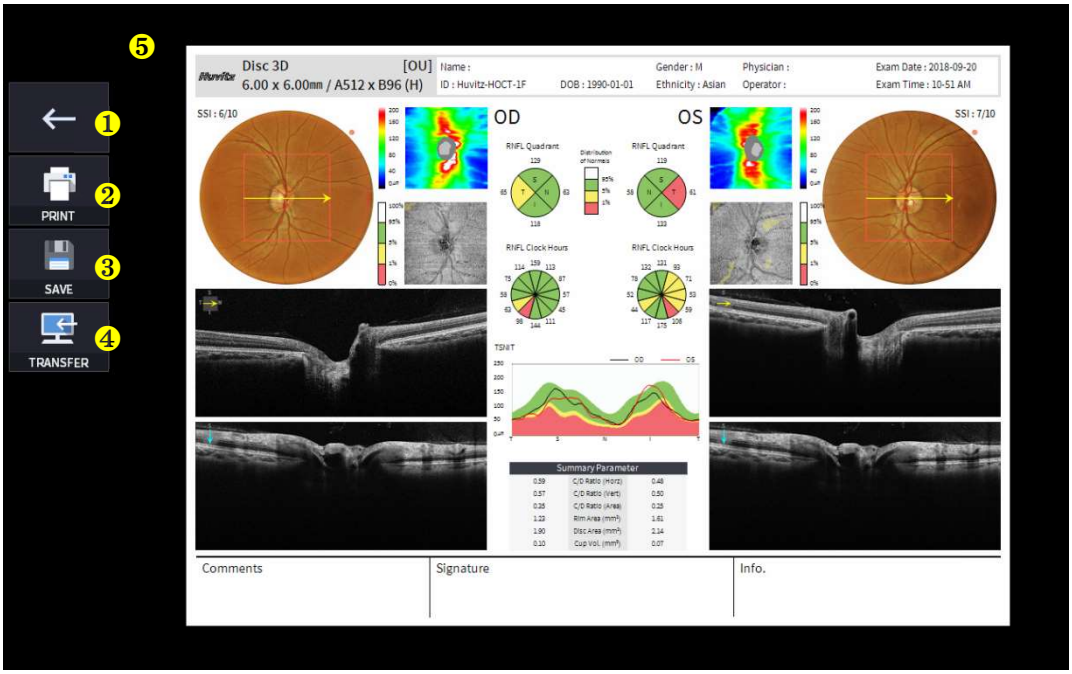
When selecting OU (

) among OD / OU / OS, screen changes to OU analysis screen shown below.

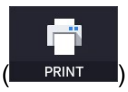


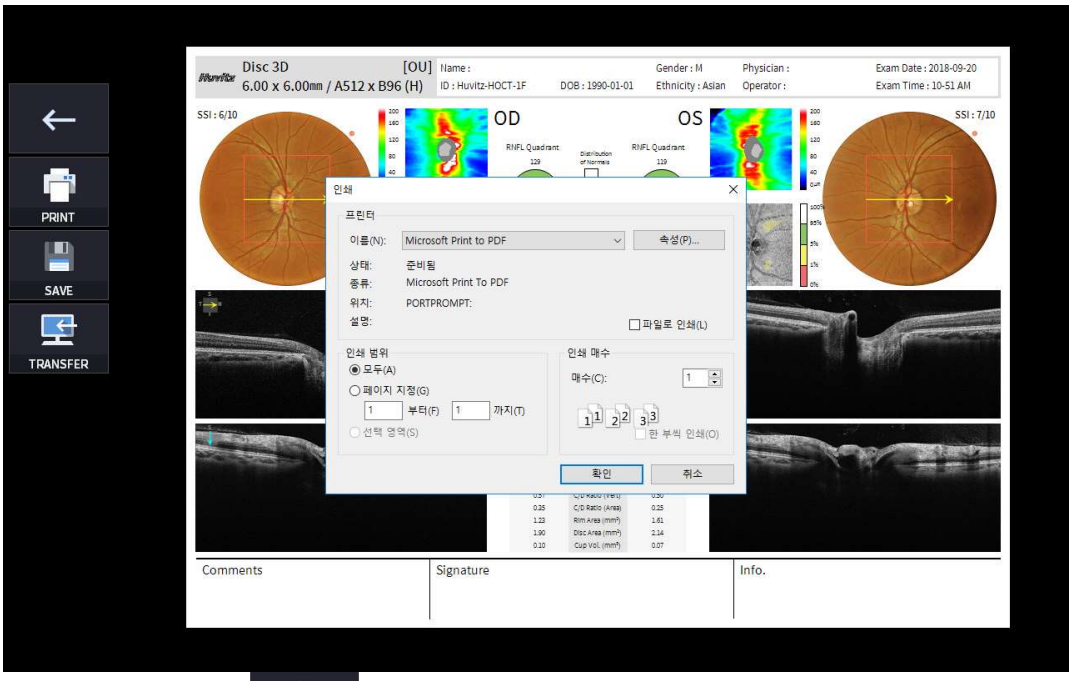
3. Select REPORT icon (

) shows REPORT screen shown below.



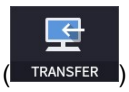
No	Name	Function
1	Previous screen	Go back to analysis screen.
2	PRINT	Save the current report showing as PDF file or print to a connected printer.
3	SAVE	Save the report as a JPG image if you have an external storage device connected to it.
4	TRANSFER	Sends the report to the DICOM Server if you are using the DICOM feature.
5	Report Preview	Preview of generated report.

(1) Selecting PRINT icon () shows printer option window.

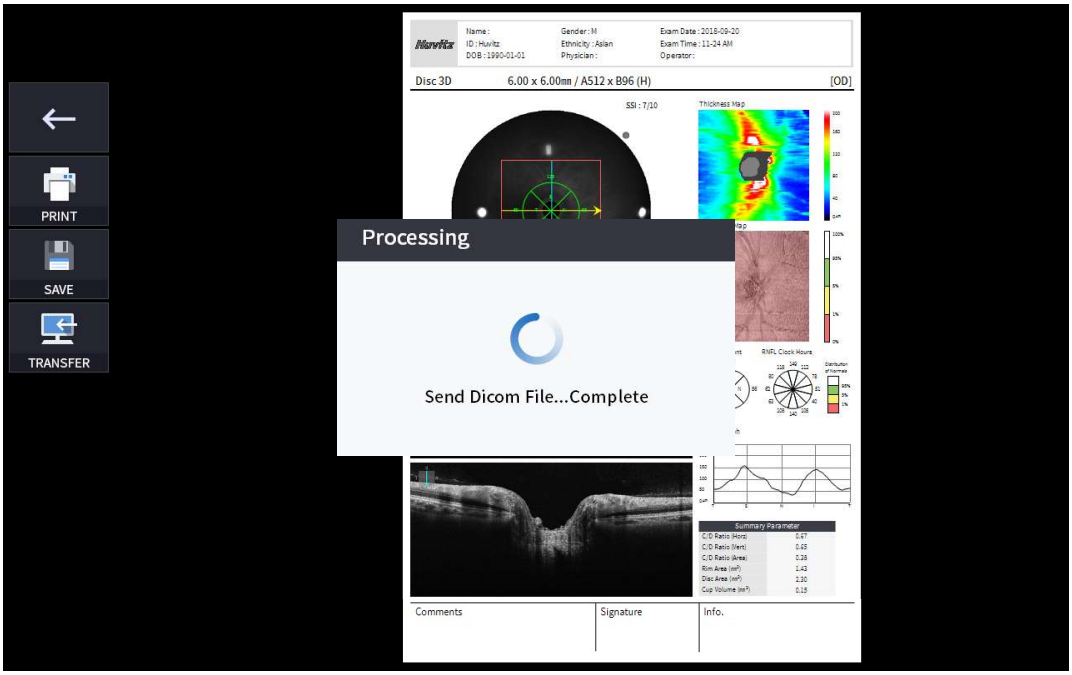


(2) Select the Save icon (), the Select Storage Location window appears.

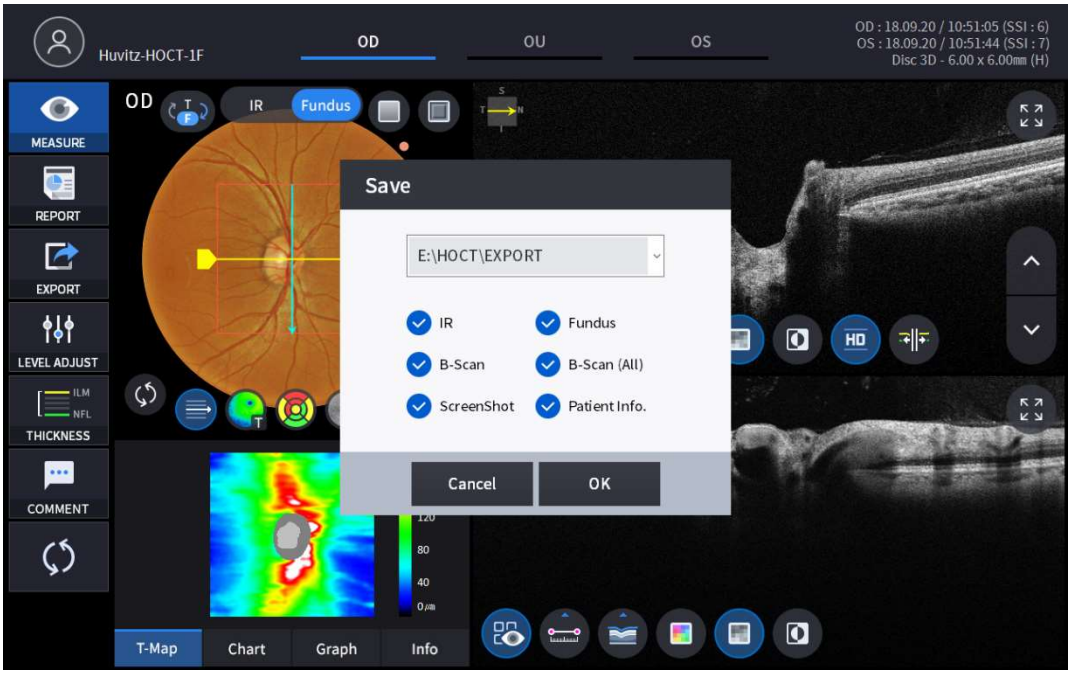


(3) Select the TRANSFER icon (

) to send the report to the DICOM server.

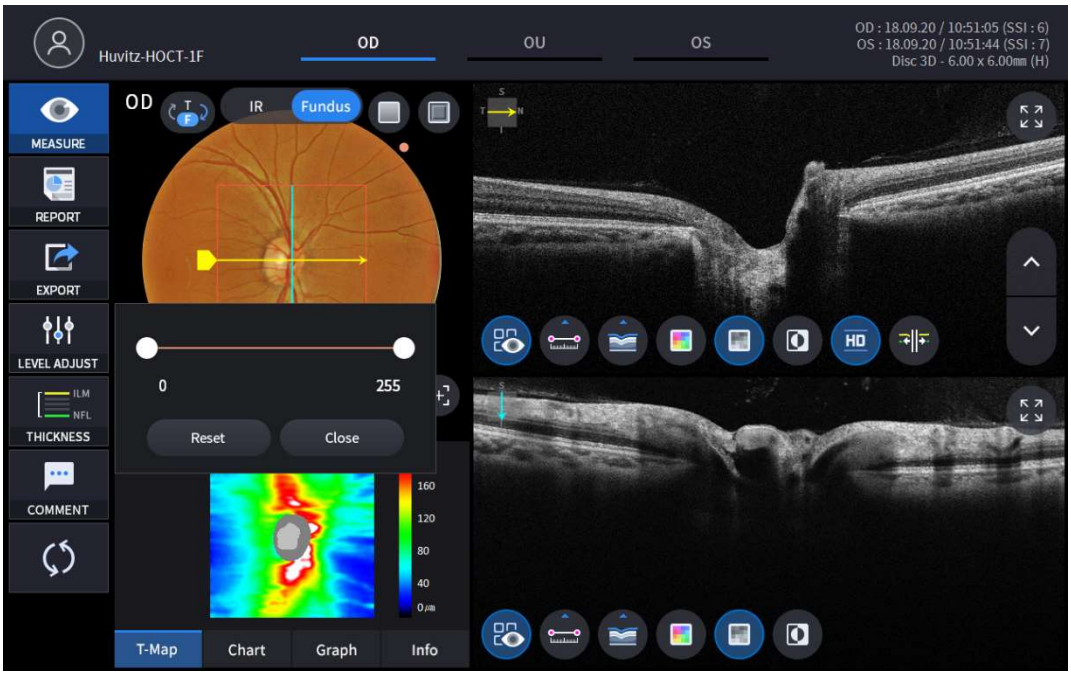


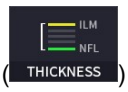
4. External storage device is connected, you can select TRANSFER icon (EXPORT) to save the desired data to the external storage device.



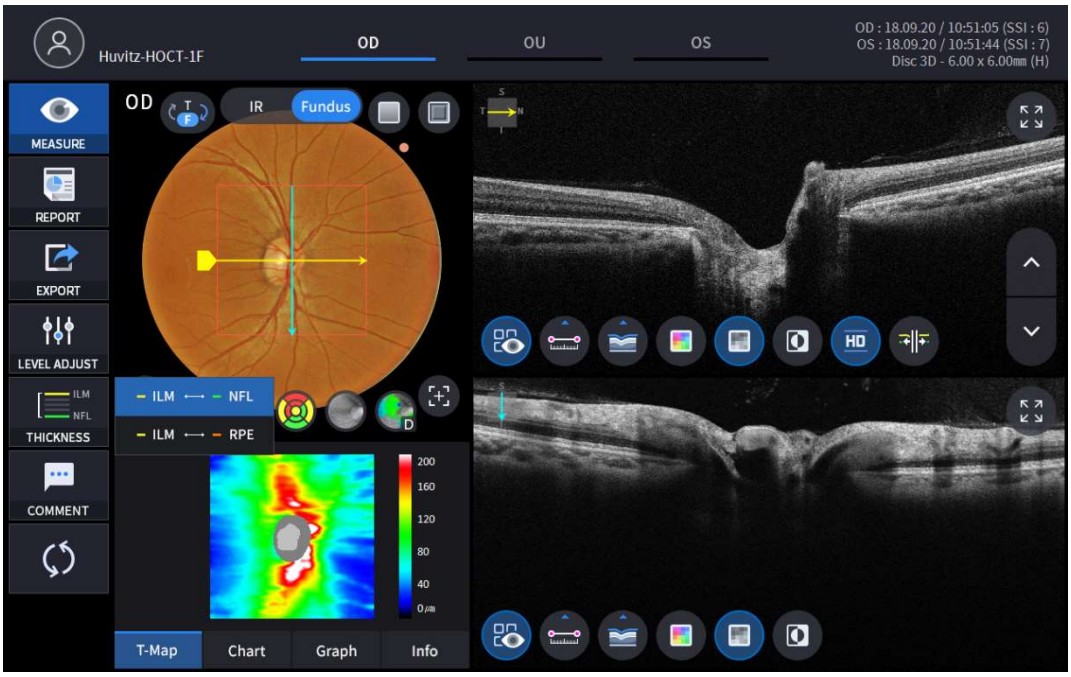
5. Selecting LEVEL ADJUST icon (LEVEL ADJUST) shows an adjustable pop-up window shown below.

- Use Slide Bar (0 255 Reset Close) to control Bscan Contrast.



6. Selecting THICKNESS icon (

) shows a pop-up window shown below.



ILM <-> NFL	Set Analysis criteria to ILM ~ NFL.
ILM <-> RPE	Set Analysis criteria to ILM ~ RPE.

- Analysis results will be displayed according to each setting value.

7. Fundus image can be chosen from monochromatic IR fundus image or color fundus image.

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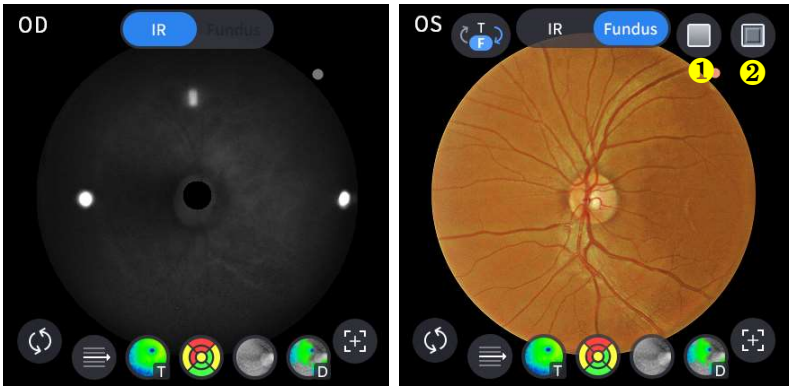
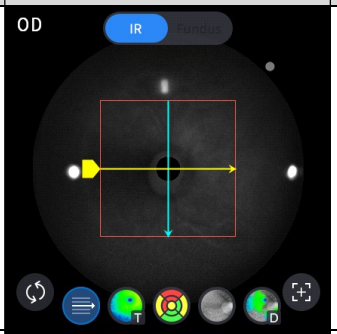
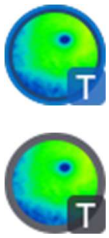
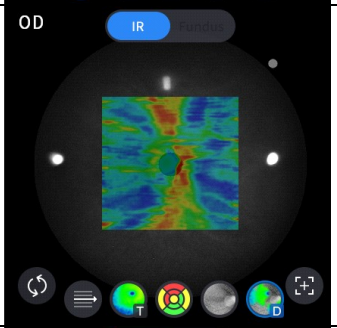
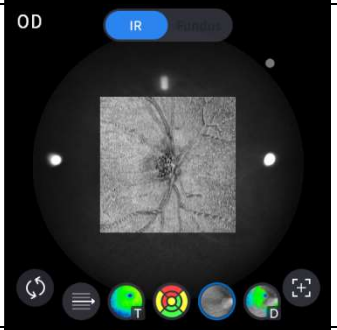
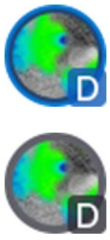
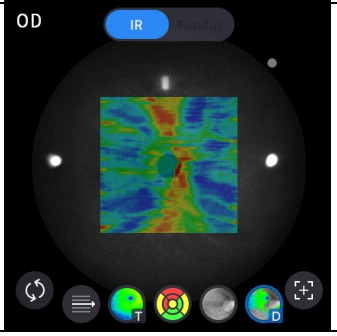
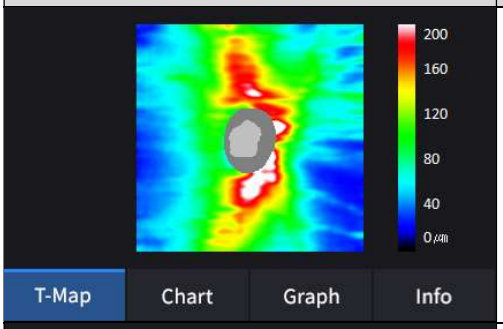
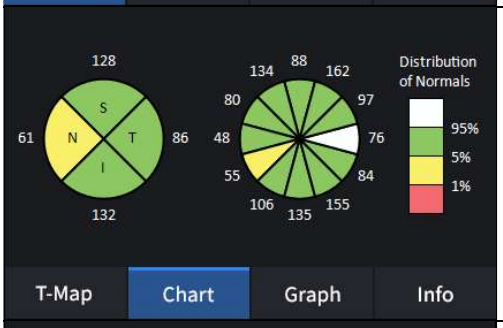
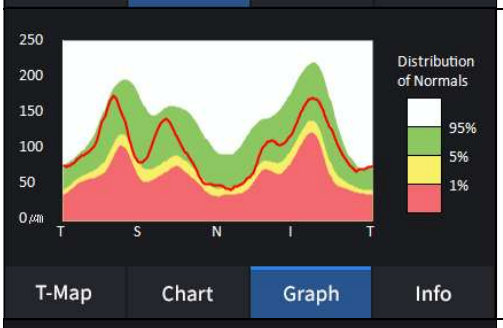
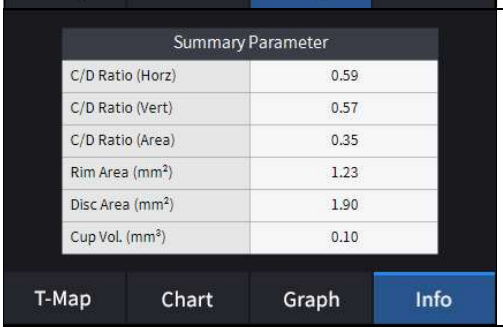


No	Name	Function
1	Red Free	Apply a red free effect to the Fundus image.
2	Embossing	Apply a embossing effect to the Fundus image.

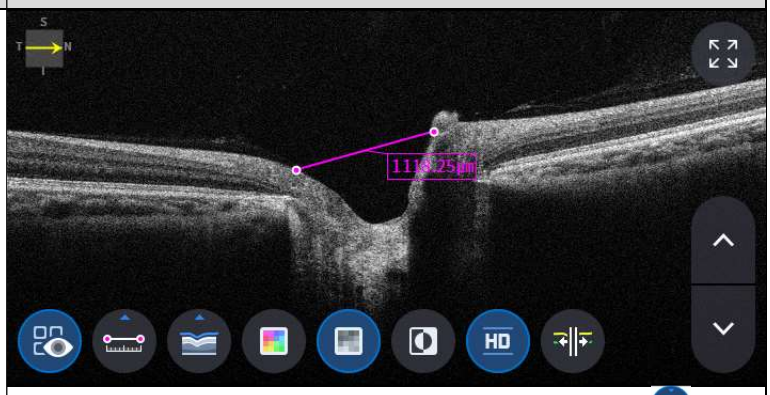
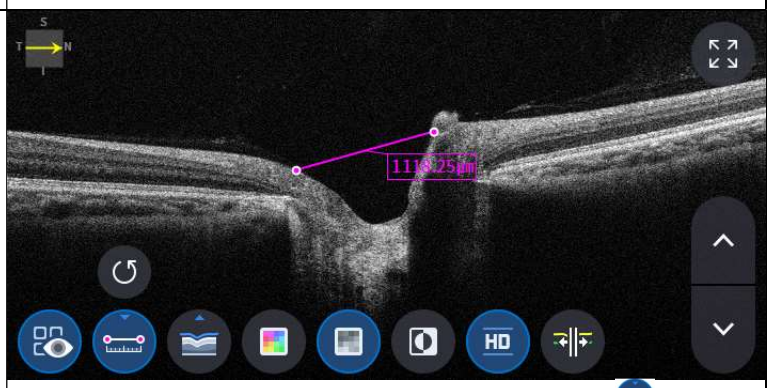
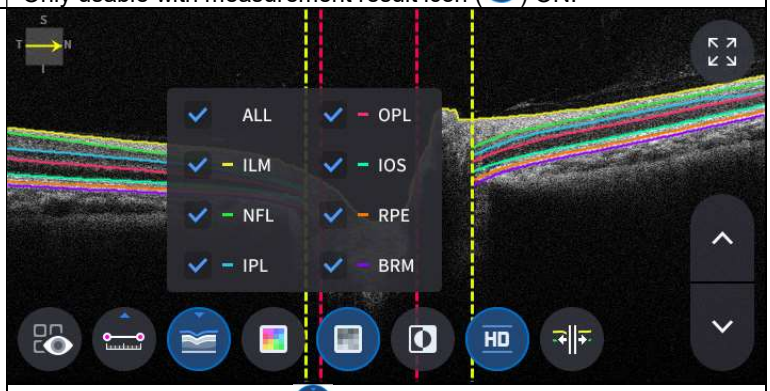
8. Select Overlay Control icon() to make the analysis result overlayed on Disc image.

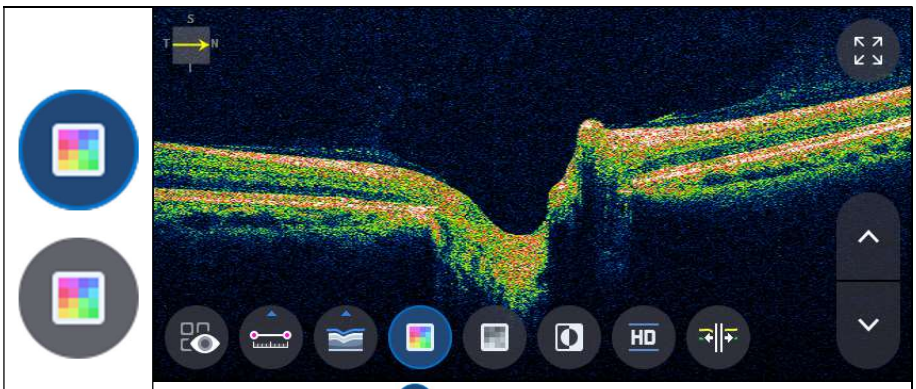
Icon ON / OFF	ON screen	Function
		- Displays Scan Domain. - Displays Scan Direction.
		- Displays thickness map image.
		- Displays RNFL Chart Range.
		- Displays enface image.
		- Displays deviation map.

9. Select analysis tool icon (T-Map , Chart , Graph , Info) to show the analysis result.

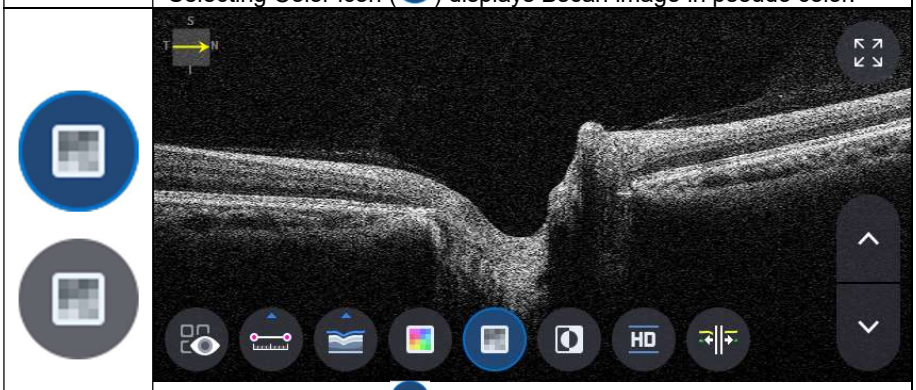
Analyze Screen	Function
	- Displays thickness map in pseudo color.
	- Displays RNFL Chart.
	- Displays TSNIT Graph.
	- Displays following measured values. C/D Ratio (Horz). C/D Ratio (Vert). C/D Ratio (Area). Rim Area. Disc Area. Cup Volume.

10. Select Bscan analysis tool (, , , , , , , ,) on Bscan image to analyze the Bscan currently displayed.

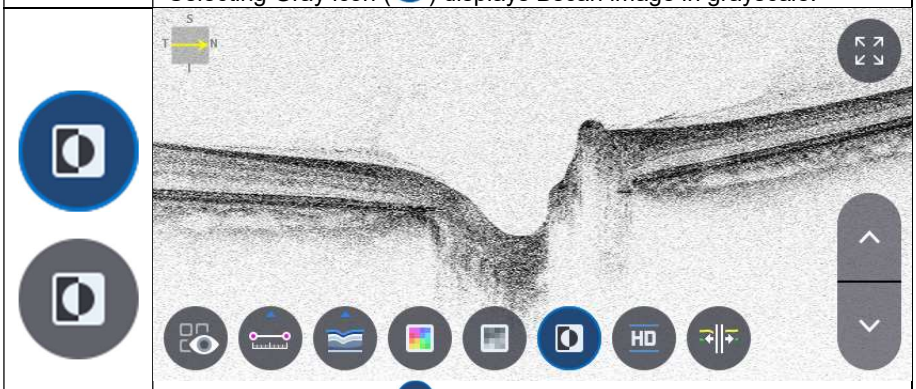
Icon ON / OFF	Screen and Function
	 - ON: Shows the length measured using measurement icon ( ). - OFF: Hides the measurements.
	 - Selecting two points with the length measurement icon ( ) ON on Bscan screen shows the length between the two points. - Latest data can be deleted by selecting Undo icon ( ). - Only usable with measurement result icon ( ) ON.
	 - Click Segmentation icon ( )to show Bscan Layer. ALL, ILM, NFL, IPL, OPL, IOS, RPE, BRM are selective.



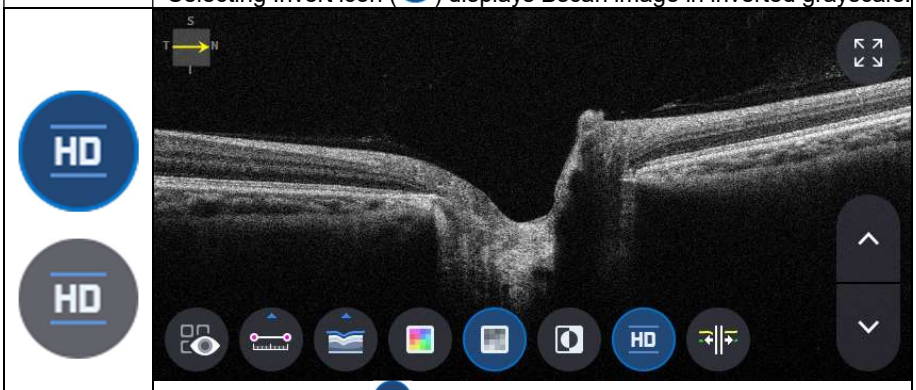
- Selecting Color icon ( ) displays Bscan image in pseudo color.



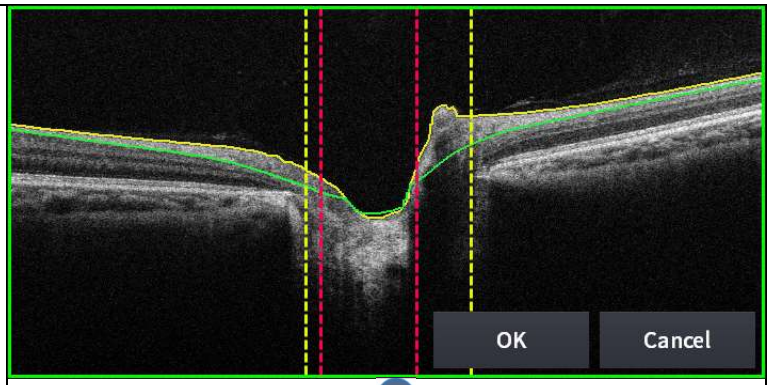
- Selecting Gray icon ( ) displays Bscan image in grayscale.



- Selecting Invert icon ( ) displays Bscan image in inverted grayscale.

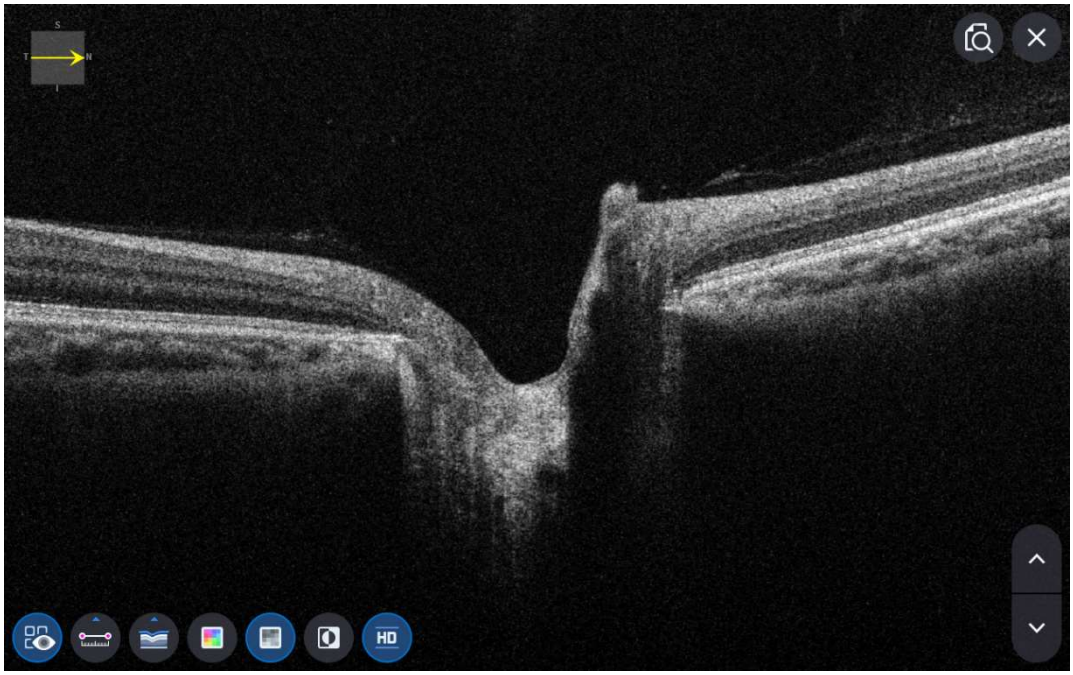


- Selecting HD icon ( ) indicates HD quality Bscan image.



- Seleting edit_segmentation icon ( ) can edit the segmentation line. (but, it isn't able to use in HD mode.)

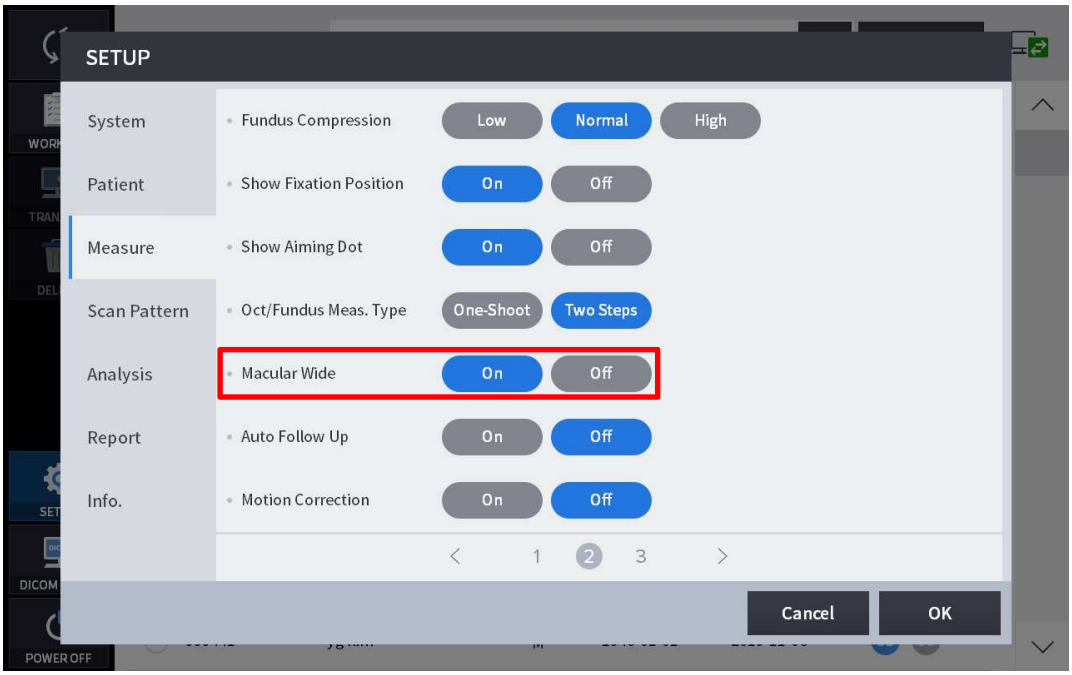
11. Selecting FULL Screen icon ( ) shows the current Bscan image in full screen.

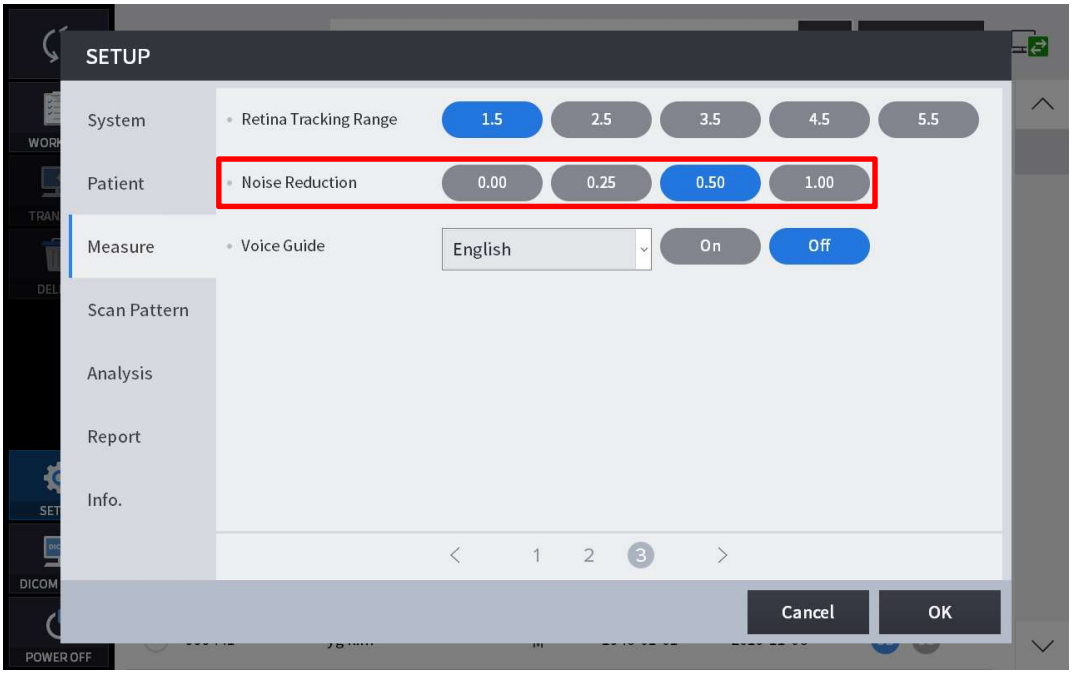


OCT Macular Wide Analysis screen

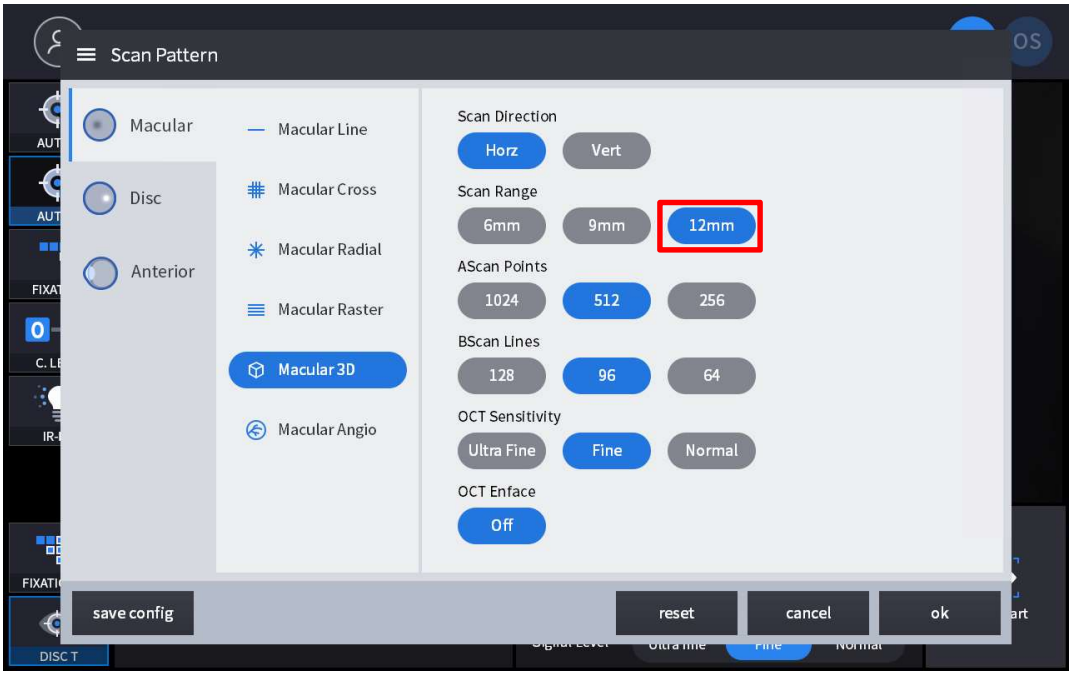
1. How to measurement of the Macular Wide mode.

(1) In Setup mode, go to Measure Tap page2 to turn the macular Wide option on.





(2) In Measure mode, move to the Scan Pattern selection screen and select Scan Range as 12mm.



2. Composition of screen.



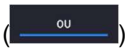
No	Name	Function
1	Patient information	Shows the information of patient ID and name. Go back to patient list by clicking the icon.
2	OD / OU / OS	Indicates which side of eye is showing. You can move to the measurement of the other side or the both sides by selecting unhighlighted tabs. - OD: right eye, OS: left eye, OU: both eyes.
3	Date	Displays the date and information that the measurement was taken.

4	MEASURE	Moves to capture screen after finishing analysis.
5	REPORT	Moves to report screen of the current measurement.
6	EXPORT	If an external storage device is connected, you can store the data that you want to on an external storage device.
7	LEVEL ADJUST	Adjust contrast of Bscan.
8	THICKNESS	Select the analysis range between ILM <-> IPL / ILM <-> RPE / ILM<->NFL.
9	COMMENT	Leave a brief comment on the patient or measurement.
10	RECALCULATION	Update the information.
11	IR / Fundus	Select between IR Fundus/Color Fundus if color fundus result is available.
12	Red Fee, Embossing	Apply a red free or embossing effect to the Fundus image.
13	Pattern Center	Moves ETDRS or GCC or RNFL Chart center to the center of pattern domain.
14	Overlay Control	Displays Scan direction and position, Enface, Thickness Map, ETDRS or GCC or RNFL Chart range on IR Fundus / Color Fundus.
15	Auto Position	Moves ETDRS or GCC or RNFL Chart center to the Macular position.
16	Analyze Control	Shows Thickness Map, ETDRS or GCC or RNFL Chart, Graph, Info.
17	Bscan-1	Bscan screen.
18	Bscan-2	Another Bscan screen to display position different from Bscan-1.

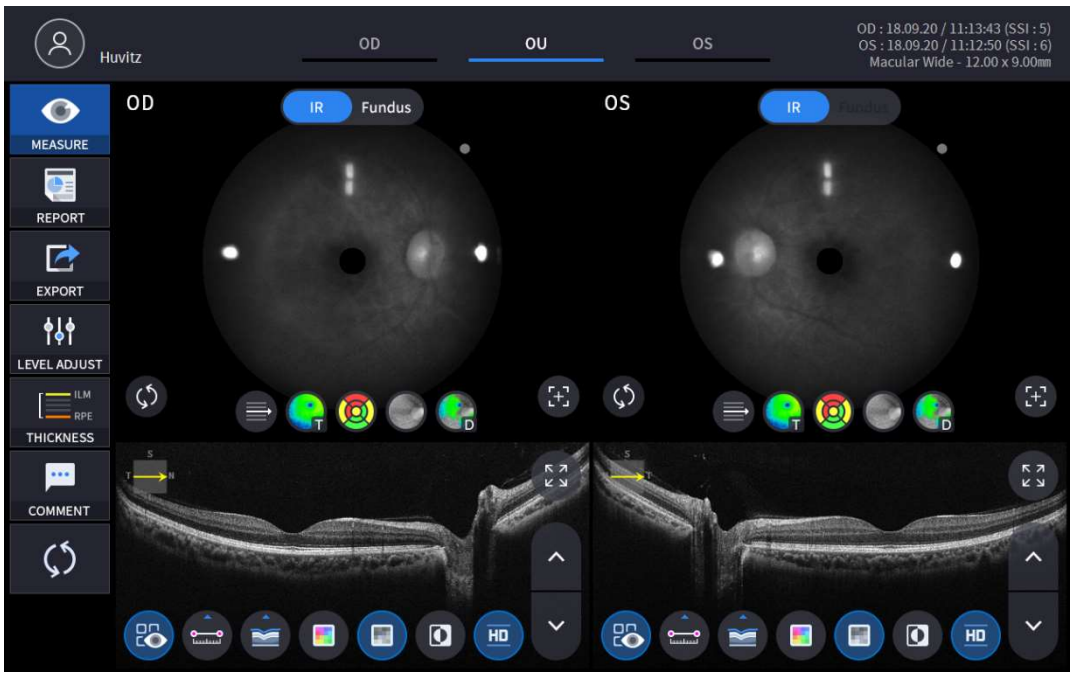
3. Select analyze mode choosing OD / OU / OS icon (

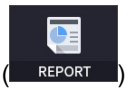
).

OD	Right eye Analysis.
OU	Both eyes Analysis.
OS	Left eye Analysis.

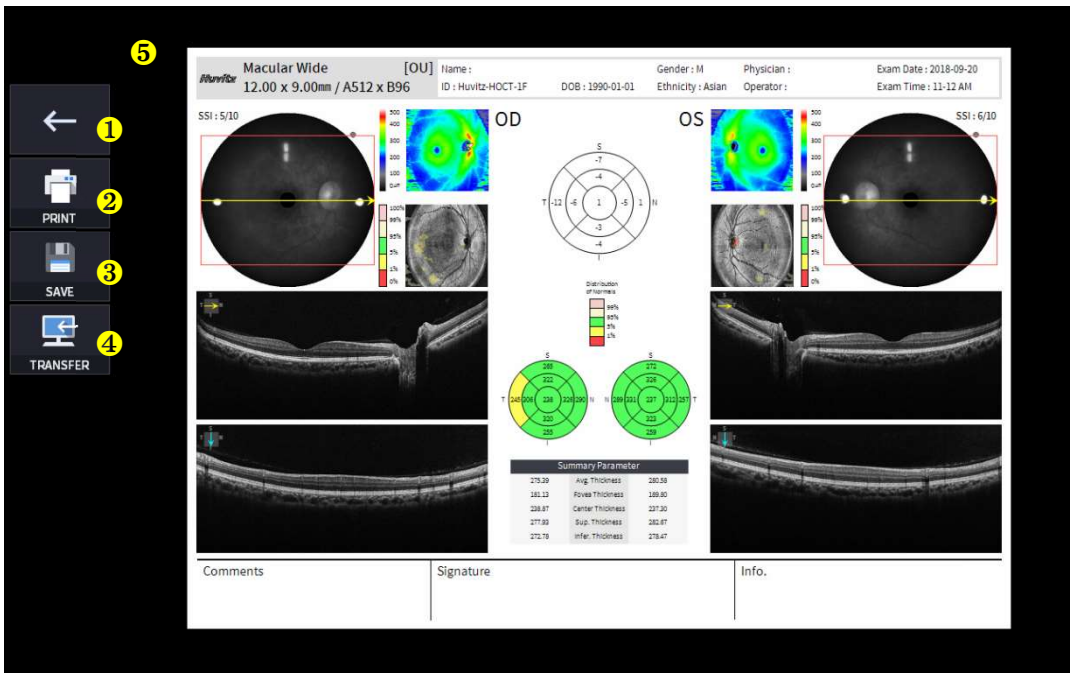
When selecting OU (

) among OD / OU / OS, screen changes to OU analysis screen shown below.



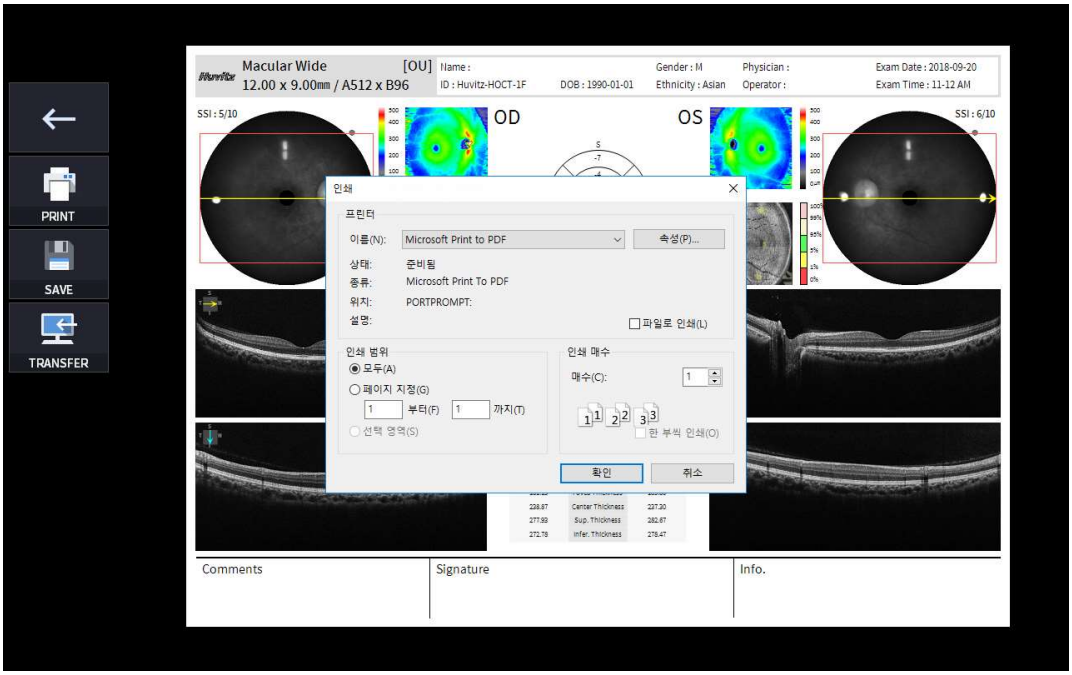
4. Select REPORT icon (

) shows REPORT screen shown below.

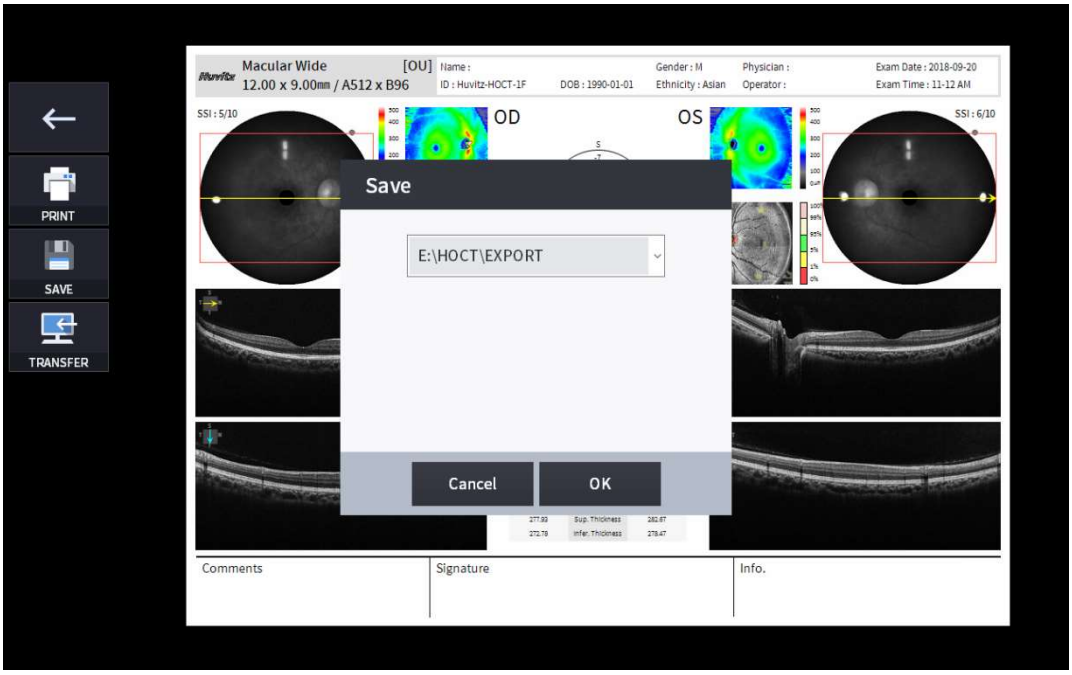


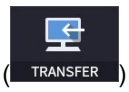
No	Name	Function
1	Previous screen	Go back to analysis screen.
2	PRINT	Save the current report showing as PDF file or print to a connected printer.
3	SAVE	Save the report as a JPG image if you have an external storage device connected to it.
4	TRANSFER	Sends the report to the DICOM Server if you are using the DICOM feature.
5	Report Preview	Preview of generated report.

(1) Selecting PRINT icon (PRINT) shows printer option window.

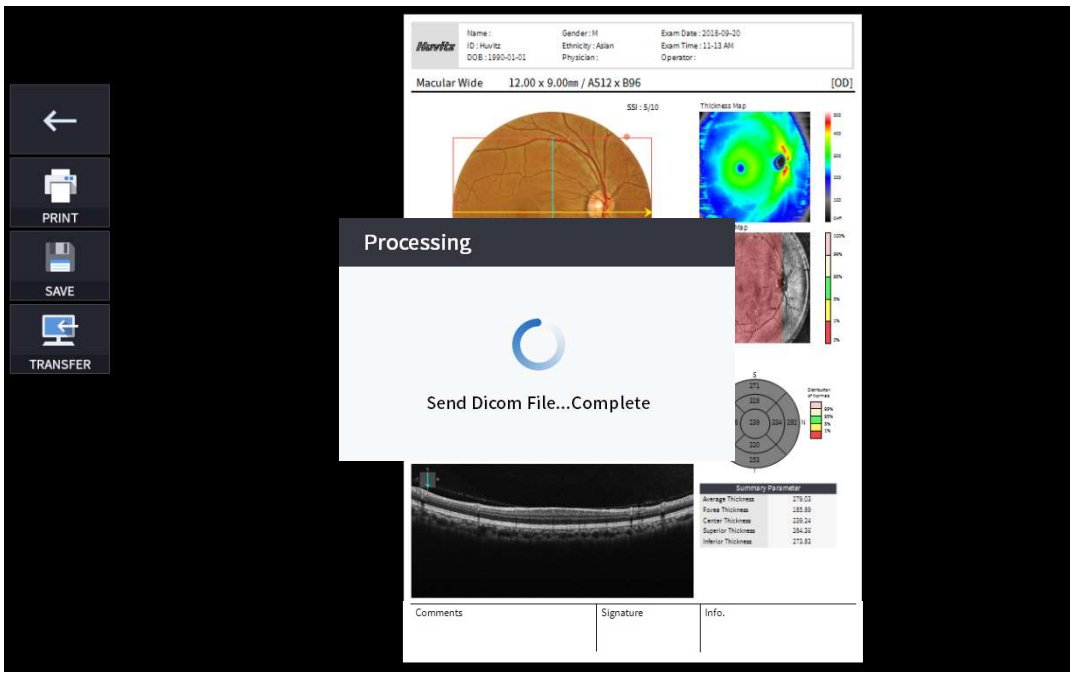


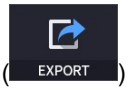
(2) Select the Save icon (SAVE), the Select Storage Location window appears.



(3) Select the TRANSFER icon (

) to send the report to the DICOM server.



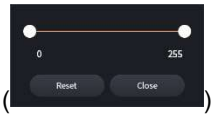
5. External storage device is connected, you can select TRANSFER icon (

) to save the desired data to the external storage device.



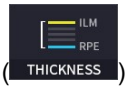
6. Selecting LEVEL ADJUST icon (

) shows an adjustable pop-up window shown below.



- Use Slide Bar (
) to control Bscan Contrast.



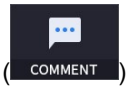
7. Selecting THICKNESS icon (

) shows a pop-up window shown below.



ILM <-> IPL	Set Analysis criteria to ILM ~ IPL.
ILM <-> RPE	Set Analysis criteria to ILM ~ RPE.
ILM <-> NFL	Set Analysis criteria to ILM ~ NFL.

- Analysis results will be displayed according to each setting value.

8. Select the COMMENT icon (

) to leave a brief comment on the patient or measurement.



9. Fundus image can be chosen from monochromatic IR fundus image or color fundus image.

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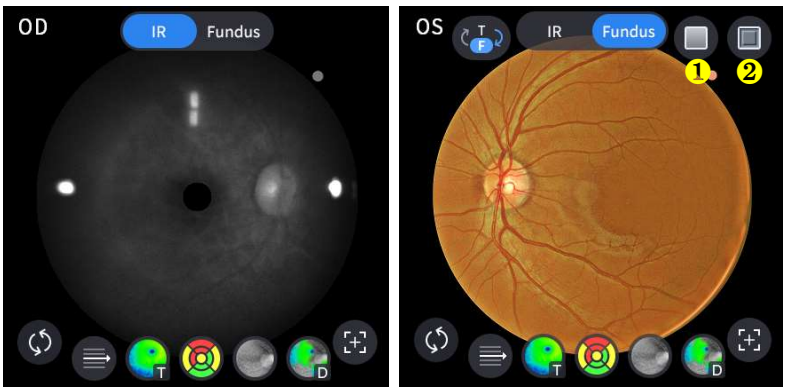
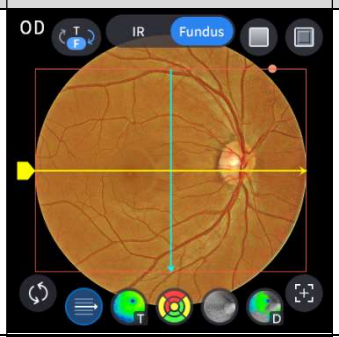
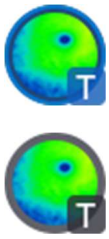
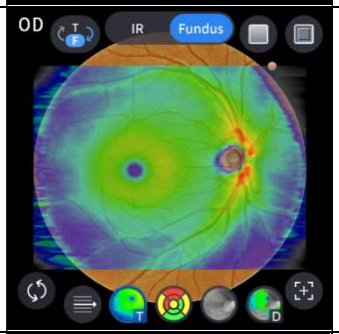
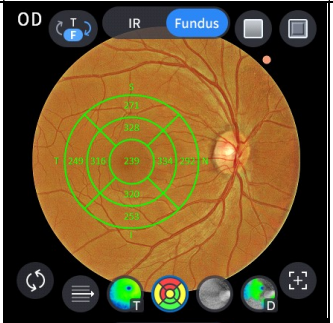
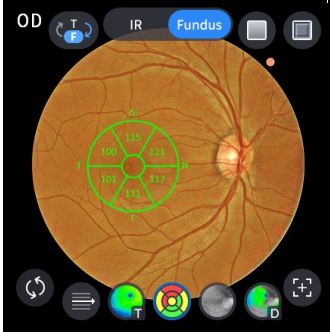
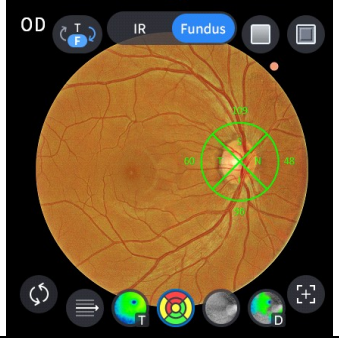
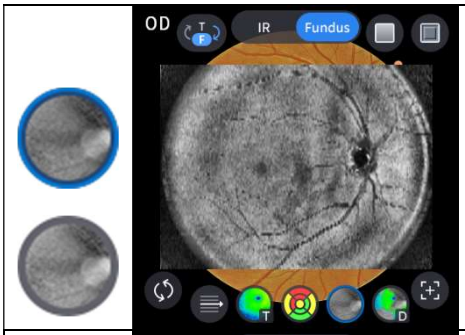
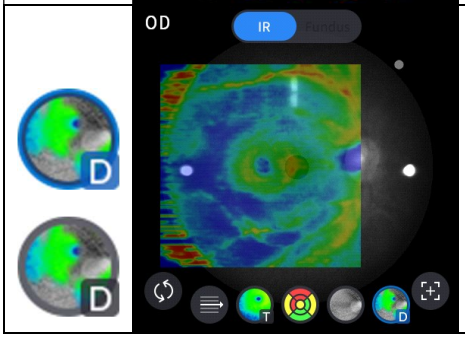


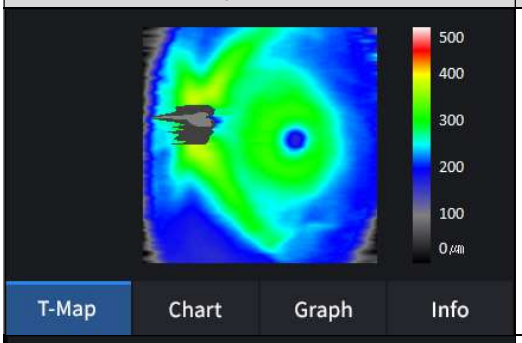
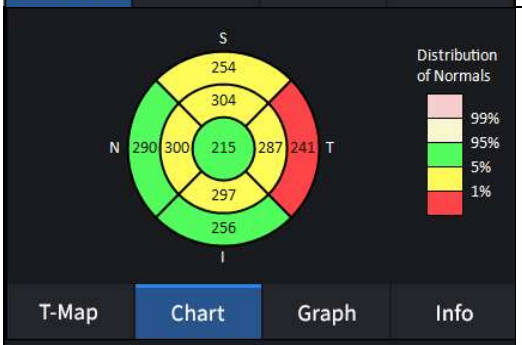
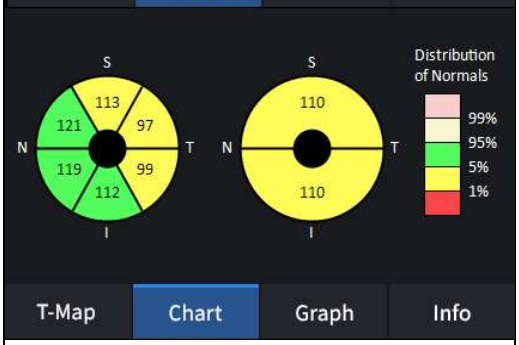
No	Name	Function
1	Red Free	Apply a red free effect to the Fundus image.
2	Embossing	Apply a embossing effect to the Fundus image.

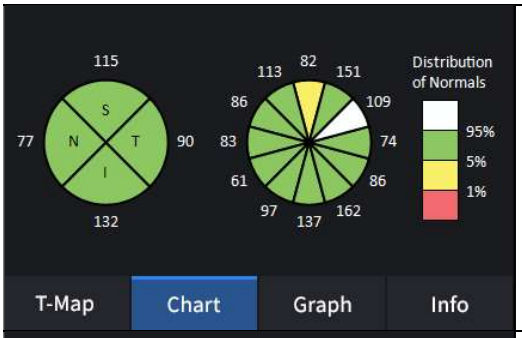
10. Select Overlay Control icon() to make the analysis result overlayed on Macular image.

Icon ON / OFF	ON screen	Function
		- Displays Scan Domain. - Displays Scan Direction.
		- Displays thickness map image.
		- Displays ETDRS Chart range if you have set the thickness option to ILM-RPE.
		- Displays GCC Chart range if you have set the thickness option to ILM-IPL.
		- Displays RNFL Chart range if you have set the thickness option to ILM-NFL.

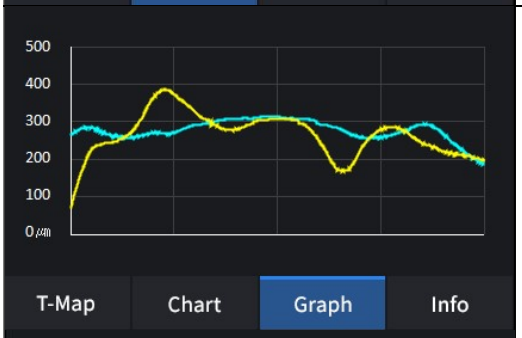
	- Displays enface image.
	- Displays deviation map.

11. Select analysis tool icon (T-Map , Chart , Graph , Info) to show the analysis result.

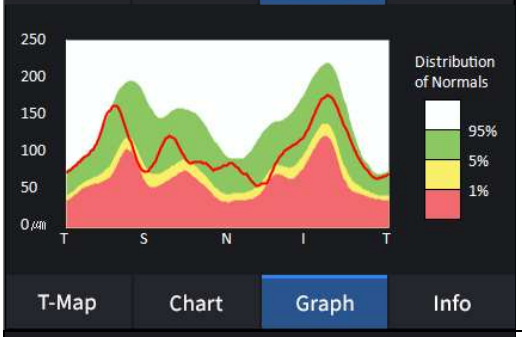
Analyze Screen	Function
	- Displays thickness map in pseudo color.
	- Displays ETDRS Chart if you have set the thickness option to ILM-RPE.
	- Displays GCC Chart if you have set the thickness option to ILM-IPL.



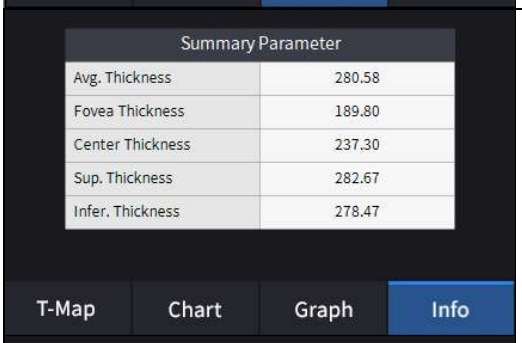
- Displays RNFL Chart if you have set the thickness option to ILM-NFL.



-Displays thickness based on the previously set Thickness Layer.
(ILM <-> RPE / ILM <-> IPL)

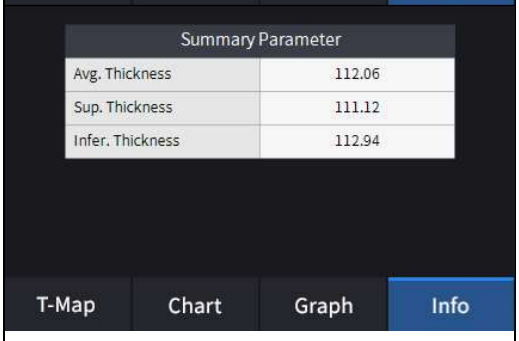


- Displays TSNIT Graph if you have set the thickness option to ILM-NFL.



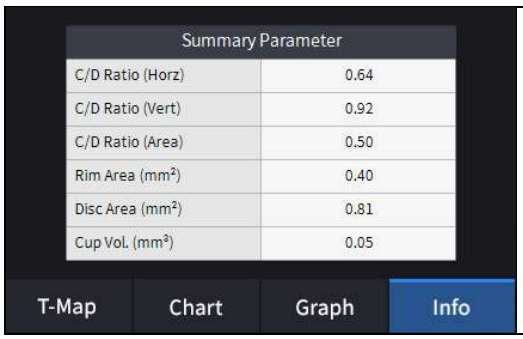
- Displays following measured values if you have set the thickness option to ILM-RPE.

Average Thickness.
Fovea Thickness.
Center Thickness.
Superior Thickness.
Inferior Thickness.



- Displays following measured values if you have set the thickness option to ILM-RPE.

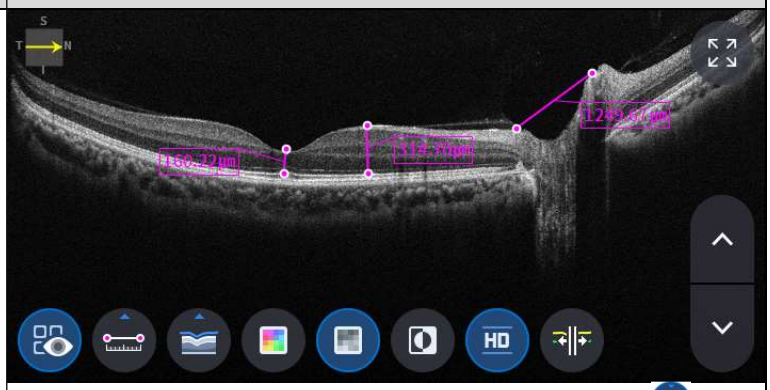
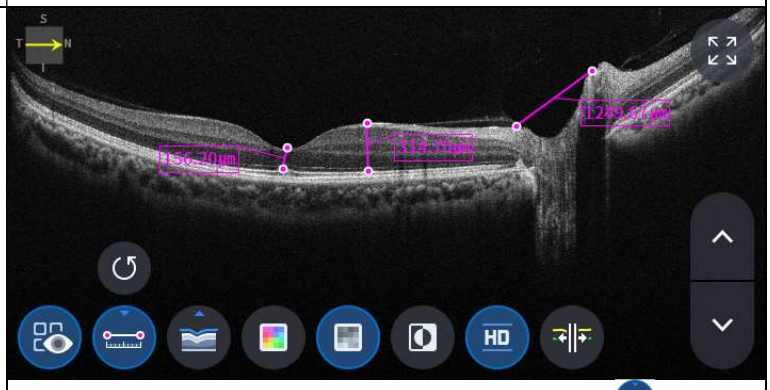
Average Thickness.
Superior Thickness.
Inferior Thickness.

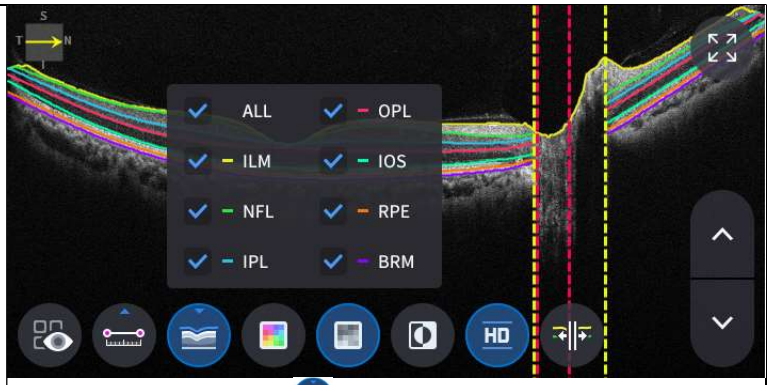


- Displays following measured values if you have set the thickness option to ILM-NFL.

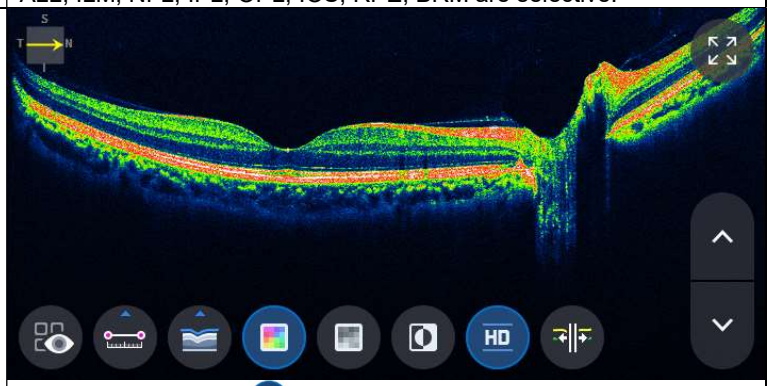
C/D Ratio (Horz).
C/D Ratio (Vert).
C/D Ratio (Area).
Rim Area.
Disc Area.
Cup Volume.

12. Select Bscan analysis tool (, , , , , , , ,) on Bscan image to analyze the Bscan currently displayed.

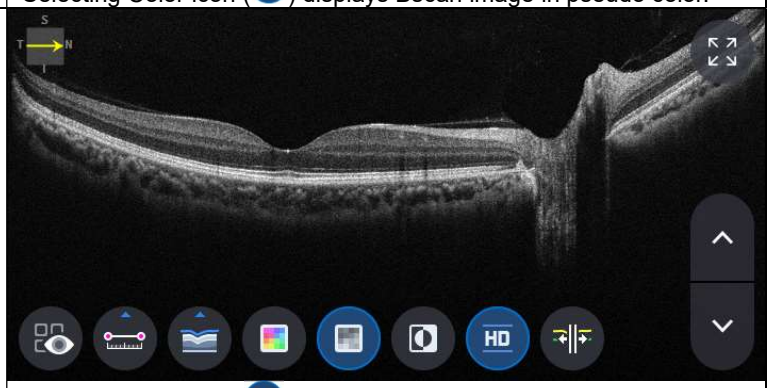
Icon ON / OFF	Screen and Function
	 - ON: Shows the length measured using measurement icon ( ). - OFF: Hides the measurements.
	 - Selecting two points with the length measurement icon ( ) ON on Bscan screen shows the length between the two points. - Latest data can be deleted by selecting Undo icon ( ). - Only usable with measurement result icon ( ) ON.



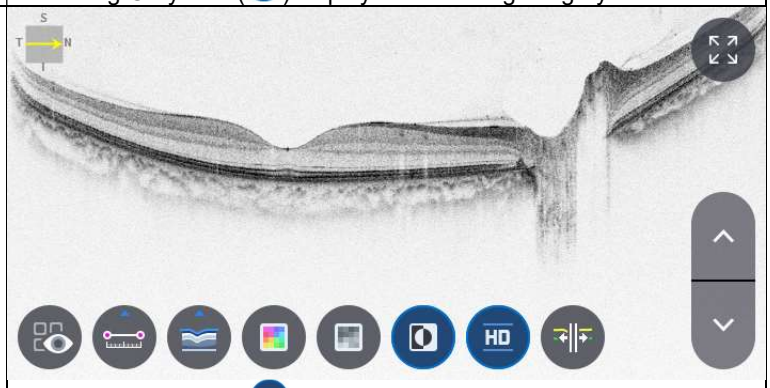
- Click Segmentation icon ( )to show Bscan Layer.
  ALL, ILM, NFL, IPL, OPL, IOS, RPE, BRM are selective.



- Selecting Color icon ( ) displays Bscan image in pseudo color.



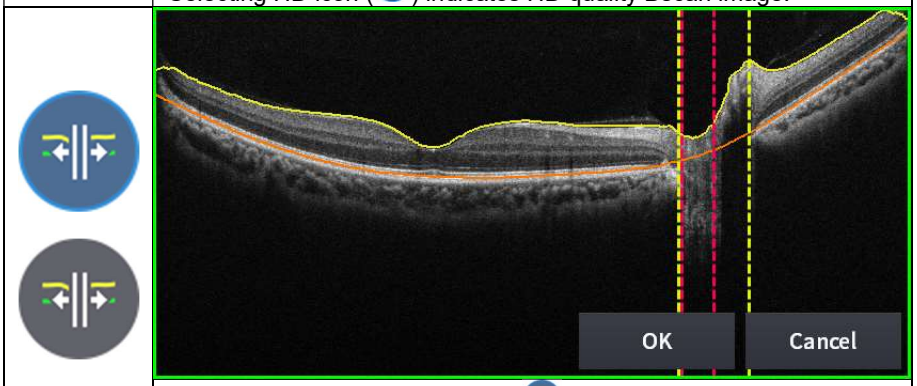
- Selecting Gray icon ( ) displays Bscan image in grayscale.



- Selecting Invert icon ( ) displays Bscan image in inverted grayscale.

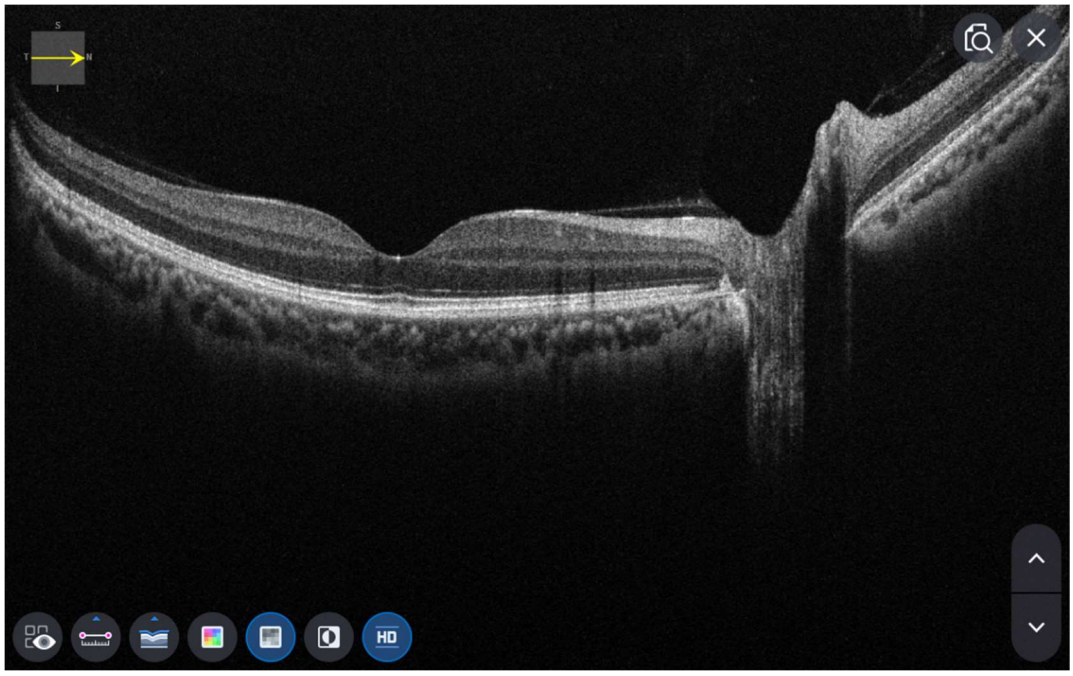


- Selecting HD icon ( ) indicates HD quality Bscan image.



- Seleting edit_segmentation icon ( ) can edit the segmentation line. (but, it isn't able to use in HD mode.)

13. Selecting FULL Screen icon ( ) shows the current Bscan image in full screen.



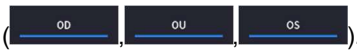
OCT Anterior Radial Analysis screen

1. Composition of screen.



No	Name	Function
1	Patient information	Shows the information of patient ID and name. Go back to patient list by clicking the icon.
2	OD / OU / OS	Indicates which side of eye is showing. You can move to the measurement of the other side or the both sides by selecting unhighlighted tabs. - OD: right eye, OS: left eye, OU: both eyes.
3	Date	Displays the date and information that the measurement was taken.
4	MEASURE	Moves to capture screen after finishing analysis.
5	REPORT	Moves to report screen of the current measurement.
6	EXPORT	If an external storage device is connected, you can store the data that you want to on an external storage device.
7	LEVEL ADJUST	Adjust contrast of Bscan.
8	THICKNESS	Select the analysis range between Epi <-> Bowman's / Epi <-> Endo.
9	COMMENT	Leave a brief comment on the patient or measurement.
10	RECALCULATION	Update the information.
11	Scan position	Indicates the position of the displayed Bscan on cornea.
12	Scan position2	Indicates the position of the displayed Bscan on cornea.
13	Bscan-1	Bscan screen.

14	Full Screen	Switch Bscan image to a Full screen.
15	Overlay Control	Displays Scan direction and position, Thickness Map, Radius Map on IR Fundus / Color Fundus.
16	Bscan Tool	Tools for Bscan analysis.
17	Analyze Control	Shows Thickness Map, Radius Map, Graph, Info.
18	Bscan-2	Another Bscan screen to display position different from Bscan-1.

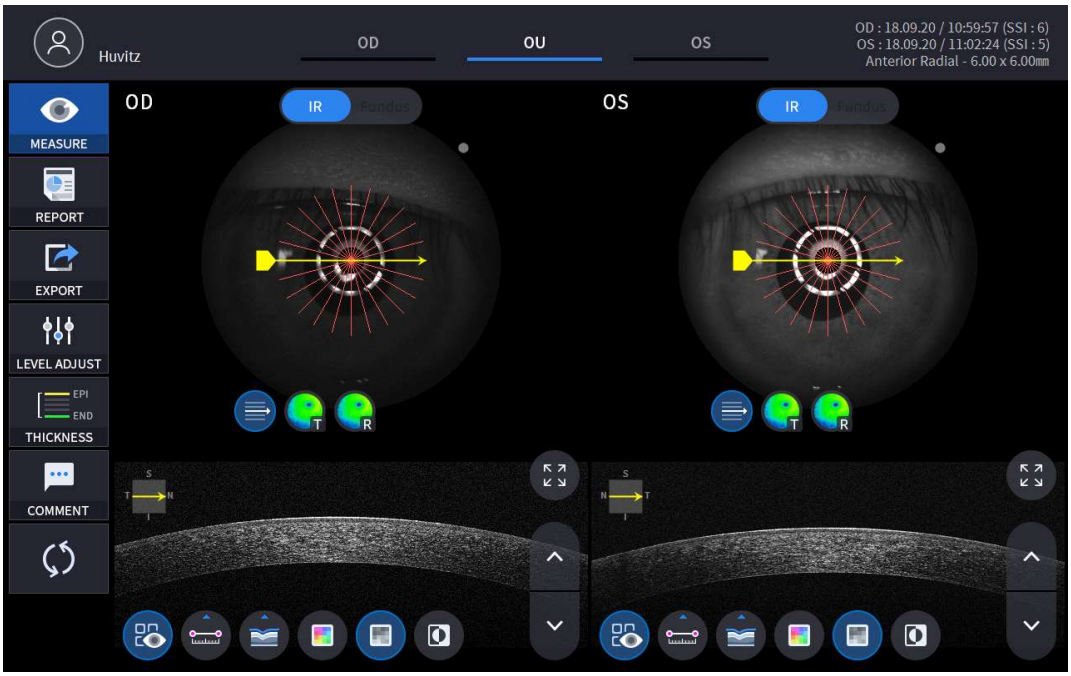
2. Select analyze mode choosing OD / OU / OS icon (

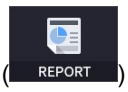
).

OD	Right eye Analysis.
OU	Both eyes Analysis.
OS	Left eye Analysis.

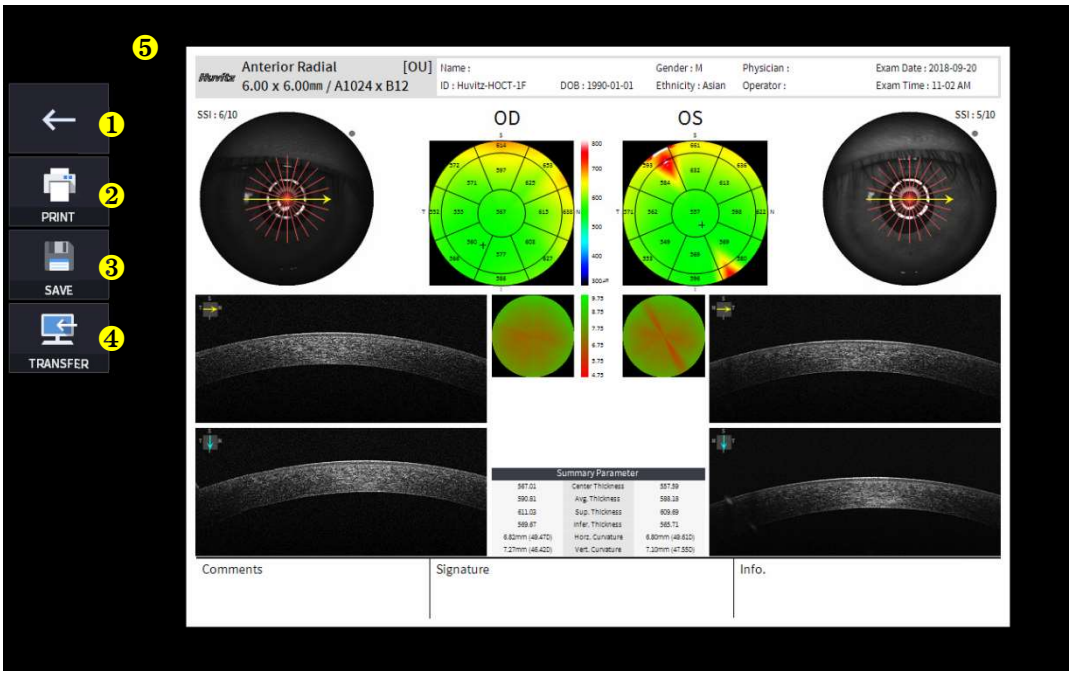
When selecting OU (

) among OD / OU / OS, screen changes to OU analysis screen shown below.

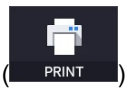


3. Select REPORT icon (

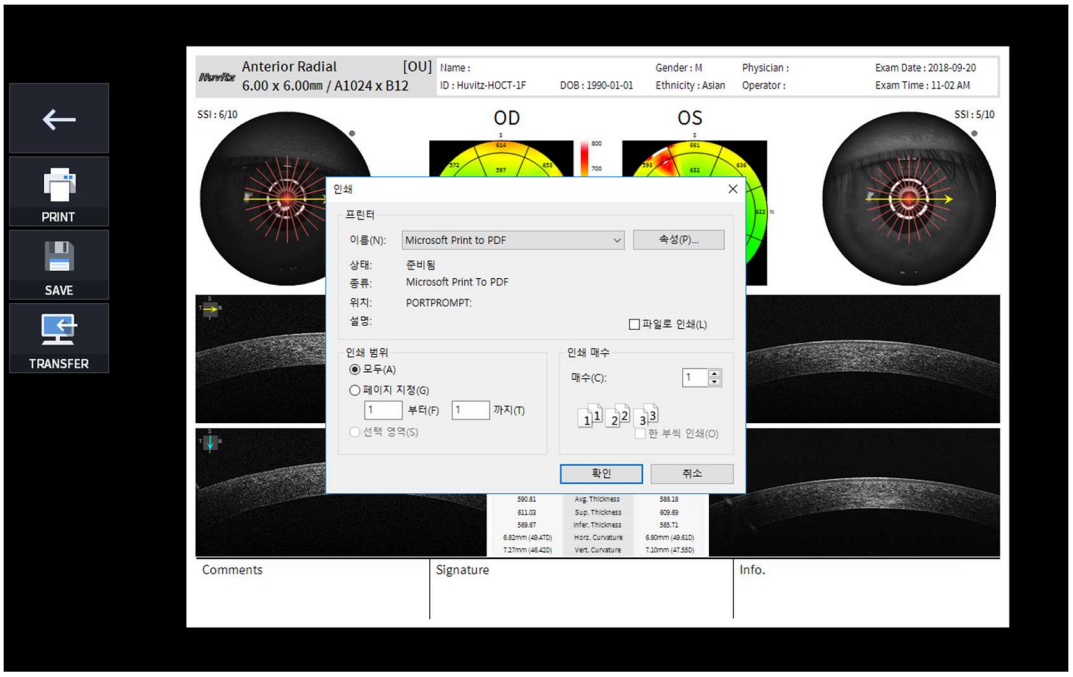
) show REPORT screen shown below.

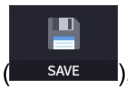


No	Name	Function
1	Previous screen	Go back to analysis screen.
2	PRINT	Save the current report showing as PDF file or print to a connected printer.
3	SAVE	Save the report as a JPG image if you have an external storage device connected to it.
4	TRANSFER	Sends the report to the DICOM Server if you are using the DICOM feature.
5	Report Preview	Preview of generated report.

(1) Selecting PRINT icon (

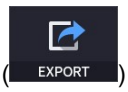
) shows printer option window.



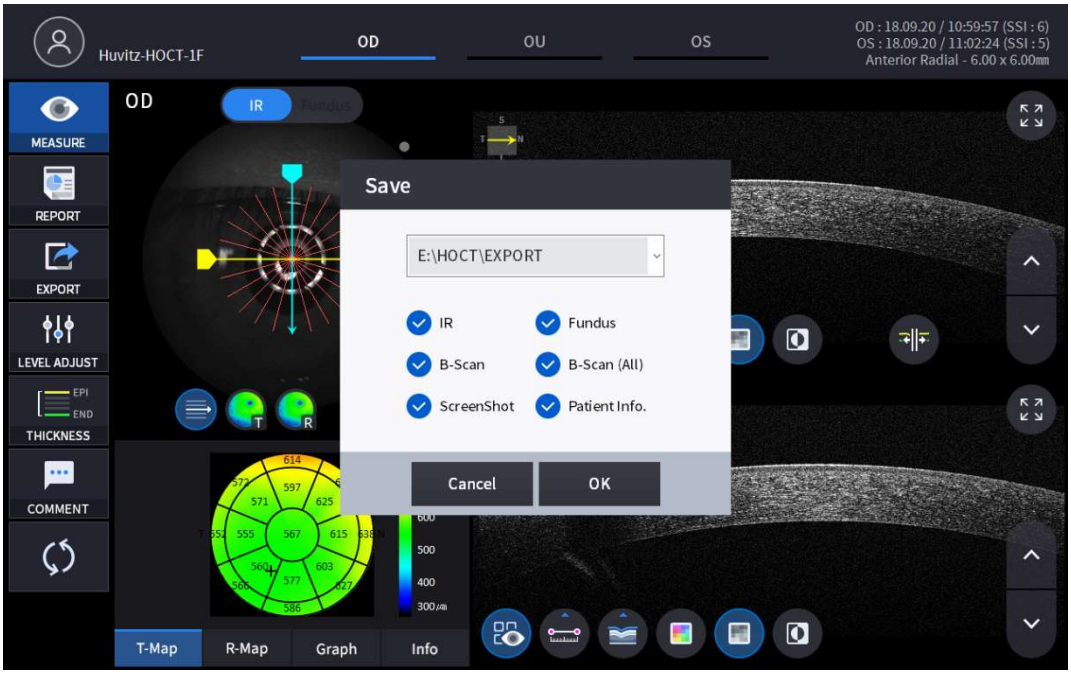
(2) Select the Save icon (

), the Select Storage Location window appears.



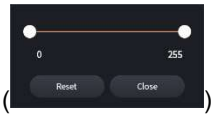
4. External storage device is connected, you can select TRANSFER icon (

) to save the desired data to the external storage device.

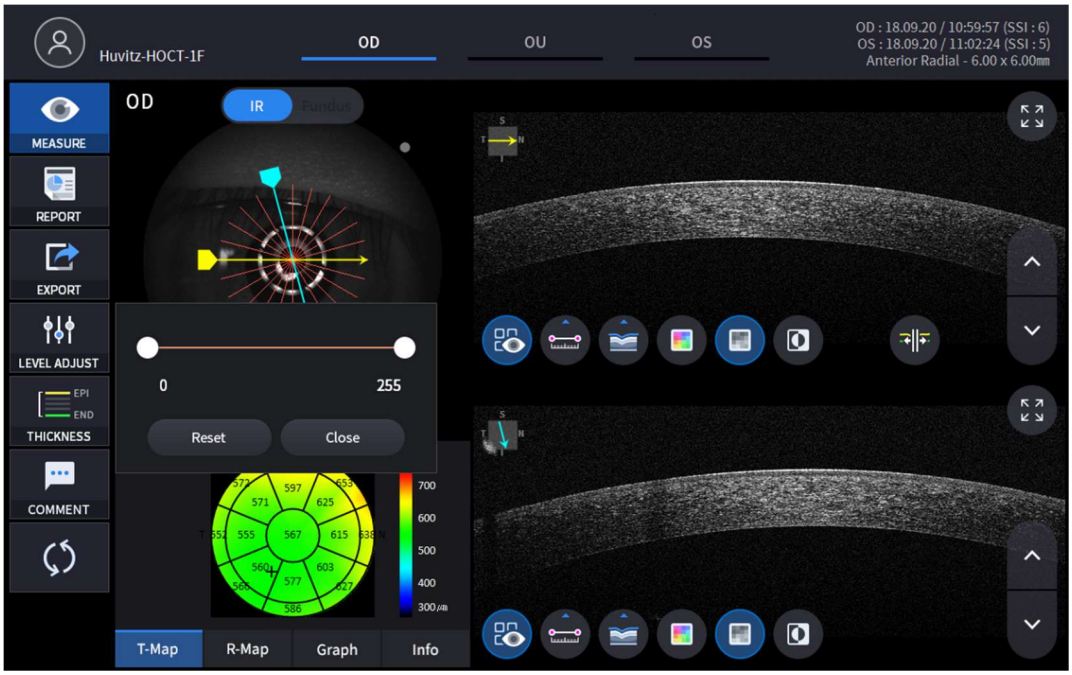


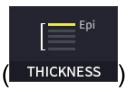
5. Selecting LEVEL ADJUST icon (

) shows an adjustable pop-up window shown below.

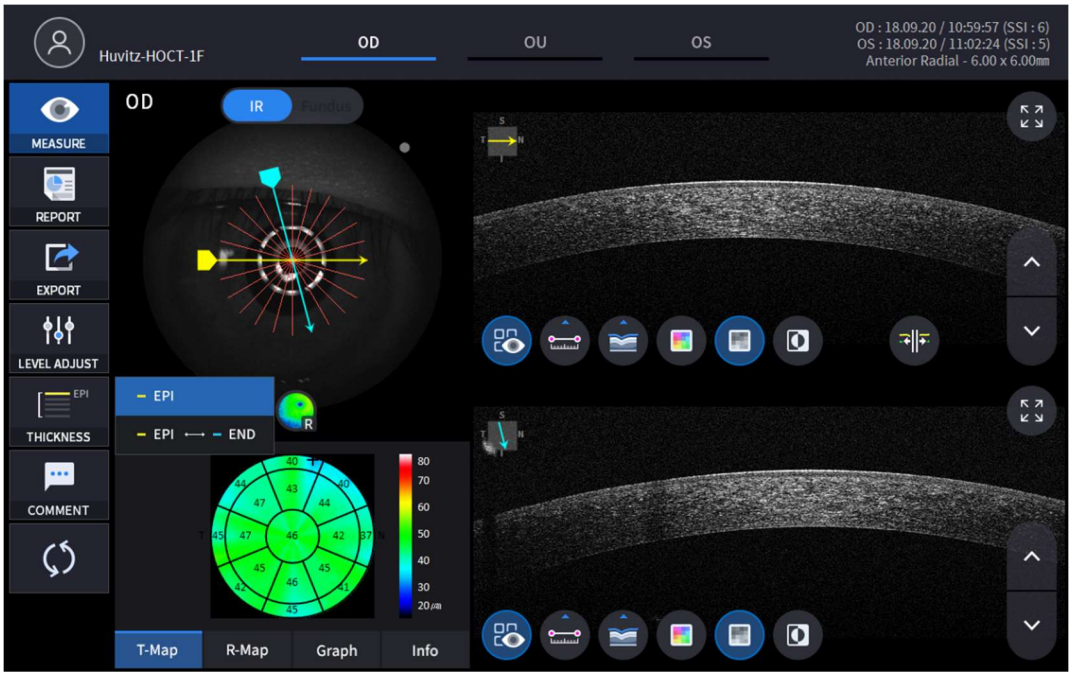


- Use Slide Bar (
) to control Bscan Contrast.



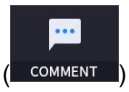
6. Selecting THICKNESS icon (

) shows a pop-up window shown below.

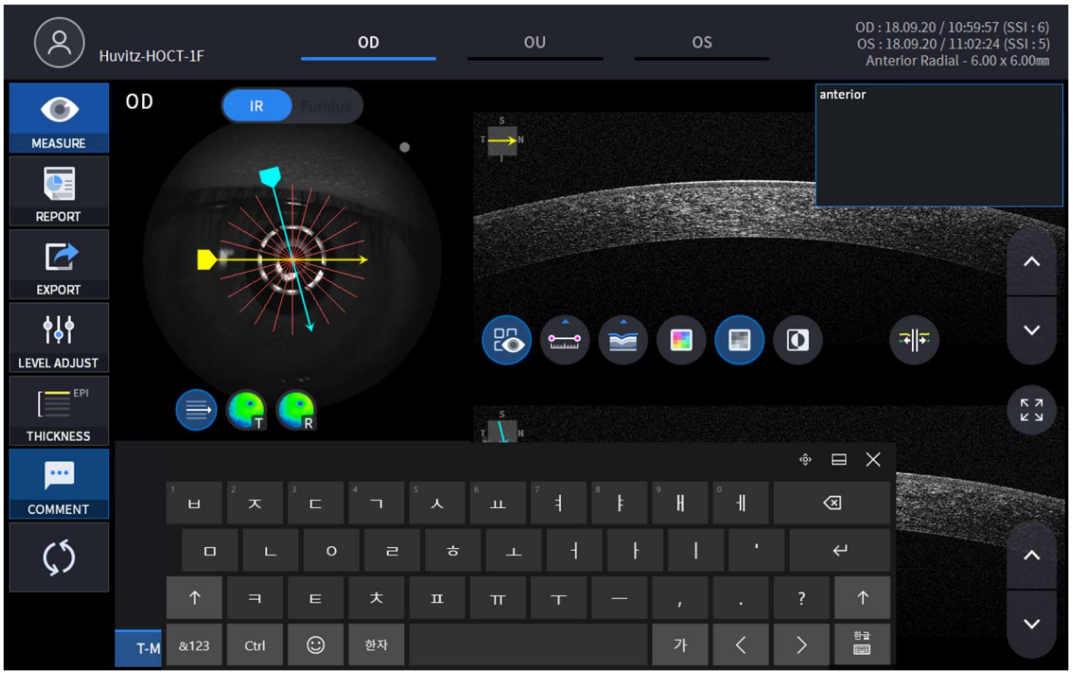


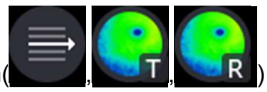
EPI	Set Analysis Criteria to EPI ~ Bowman's.
EPI <-> END	Set Analysis Criteria to EPI ~ Endo.

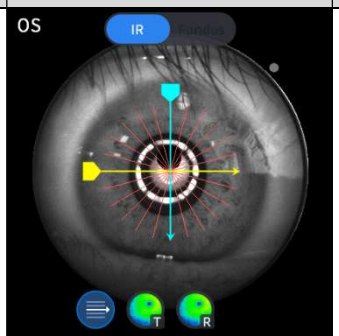
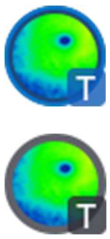
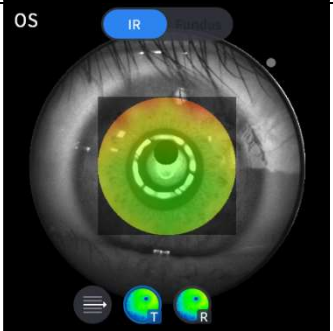
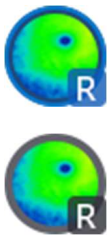
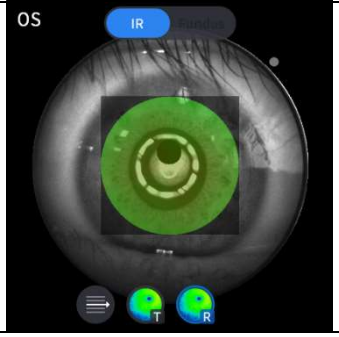
- Analysis results will be displayed according to each setting value.

7. Select the COMMENT icon (

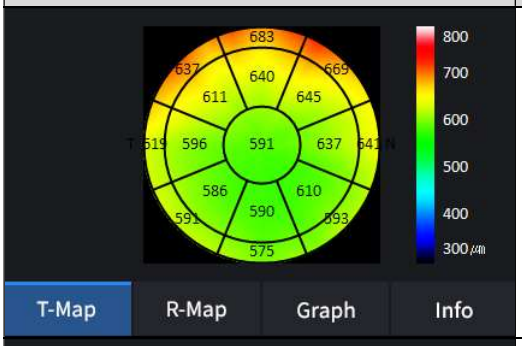
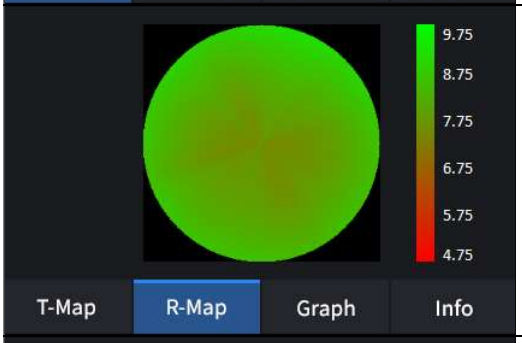
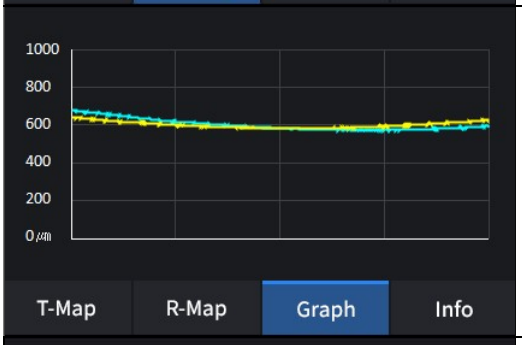
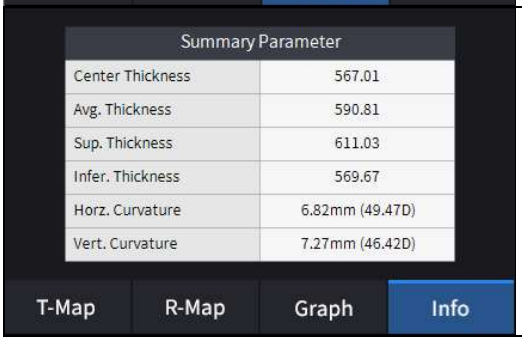
) to leave a brief comment on the patient or measurement.



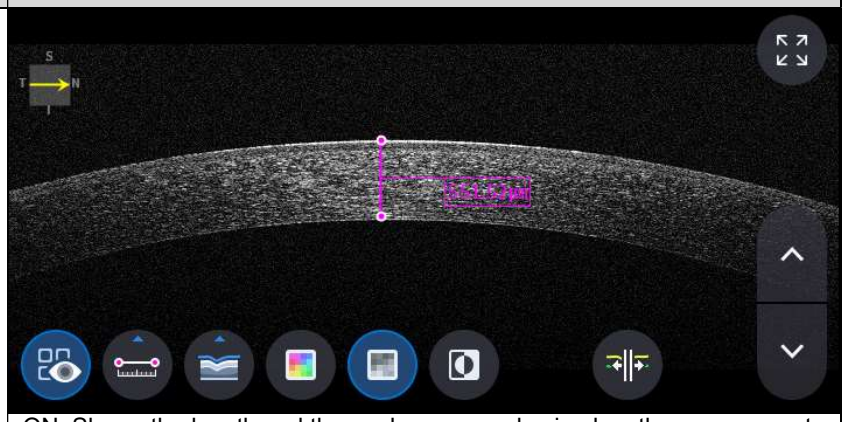
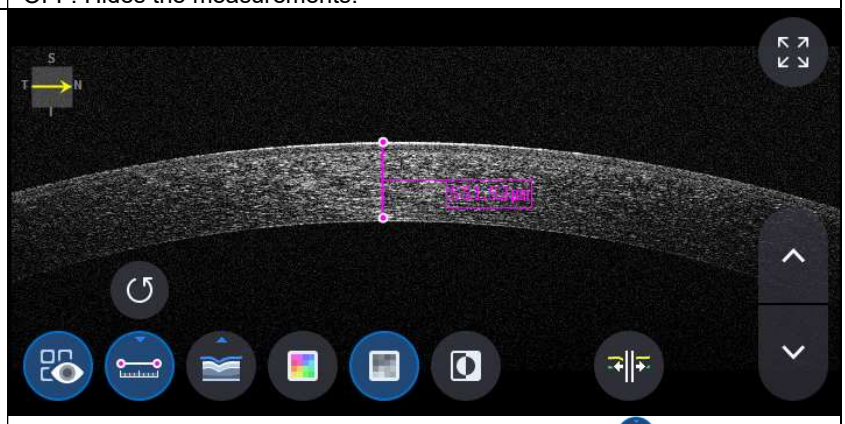
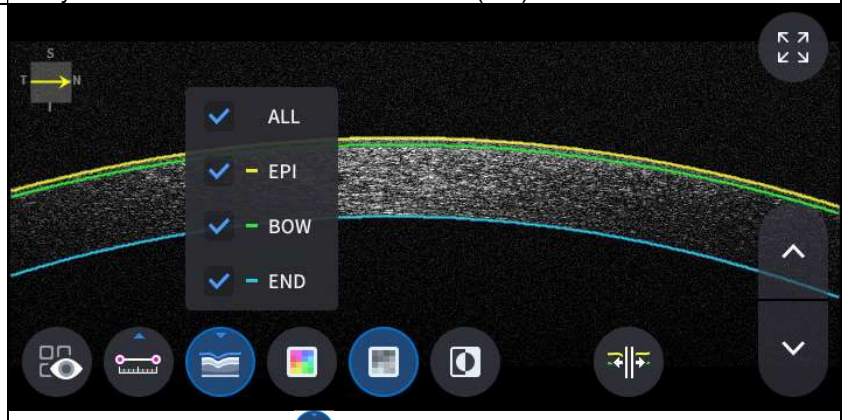
8. Select Overlay Control icon() to make the analysis result overlayed on Macular image.

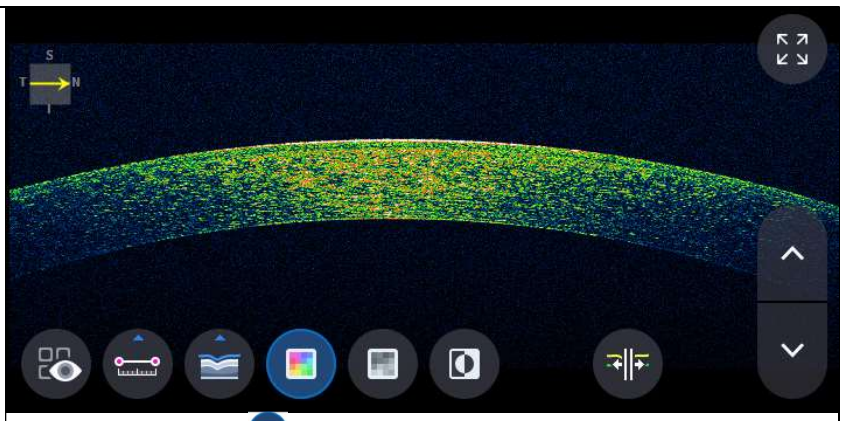
Icon ON / OFF	ON screen	Function
		- Displays Scan Domain. - Displays Scan Direction.
		- Displays thickness map image.
		- Displays radius map image.

9. Select analysis tool icon(T-Map , R-Map , Graph , Info) to show the analysis result.

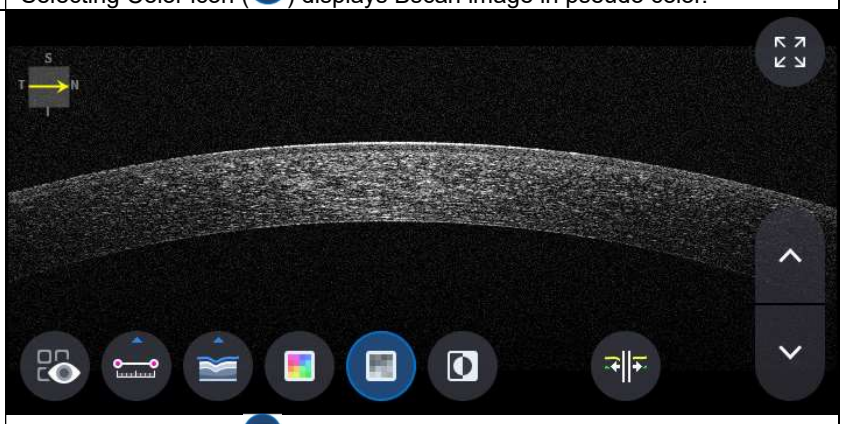
Analyze Screen	Function
	- Displays thickness map.
	- Displays radius map.
	-Displays thickness based on the previously set Thickness Layer. (EPI / EPI <-> END)
	- Displays following measured values. Center Thickness. Average Thickness. Superior Thickness. Inferior Thickness. Horizon Curvature. Vertical Curvature.

10. Select Bscan analysis tool (, , , , , ,) on Bscan image to analyze the Bscan currently displayed.

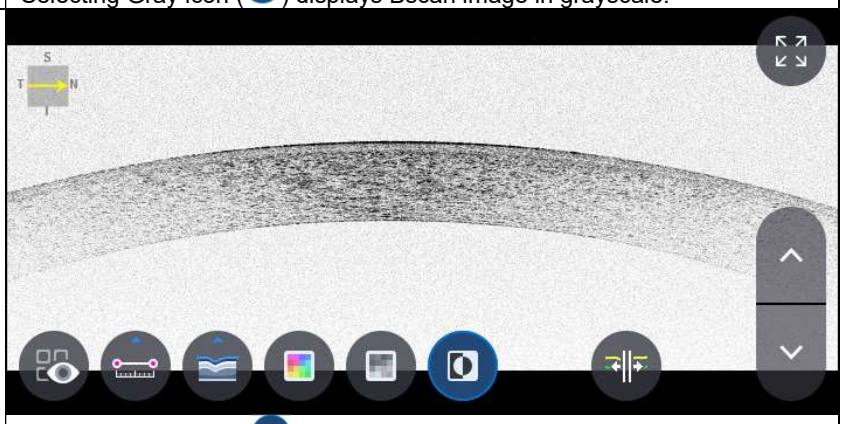
Icon ON / OFF	Screen and Function
	 - ON: Shows the length and the angle measured using length measurement icon ( ). - OFF: Hides the measurements.
	 - Selecting two points with the length measurement icon ( ) ON shows the length between the two points. - Latest data can be deleted by selecting Undo icon ( ). - Only usable with measurement result icon ( ) ON.
	 - Click Segmentation icon ( )to show Bscan Layer. ALL, EPI, BOW, END are selective. Latest data can be deleted by selecting Undo icon ( ). - Only usable with measurement result icon ( ) ON.



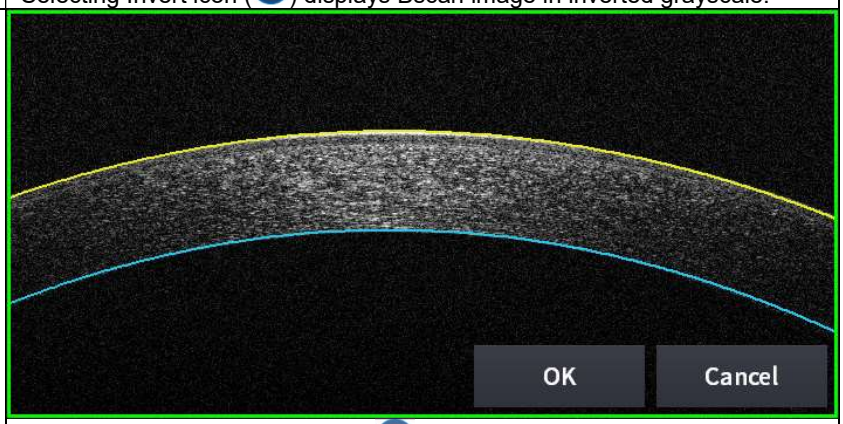
- Selecting Color icon ( ) displays Bscan image in pseudo color.



- Selecting Gray icon ( ) displays Bscan image in grayscale.

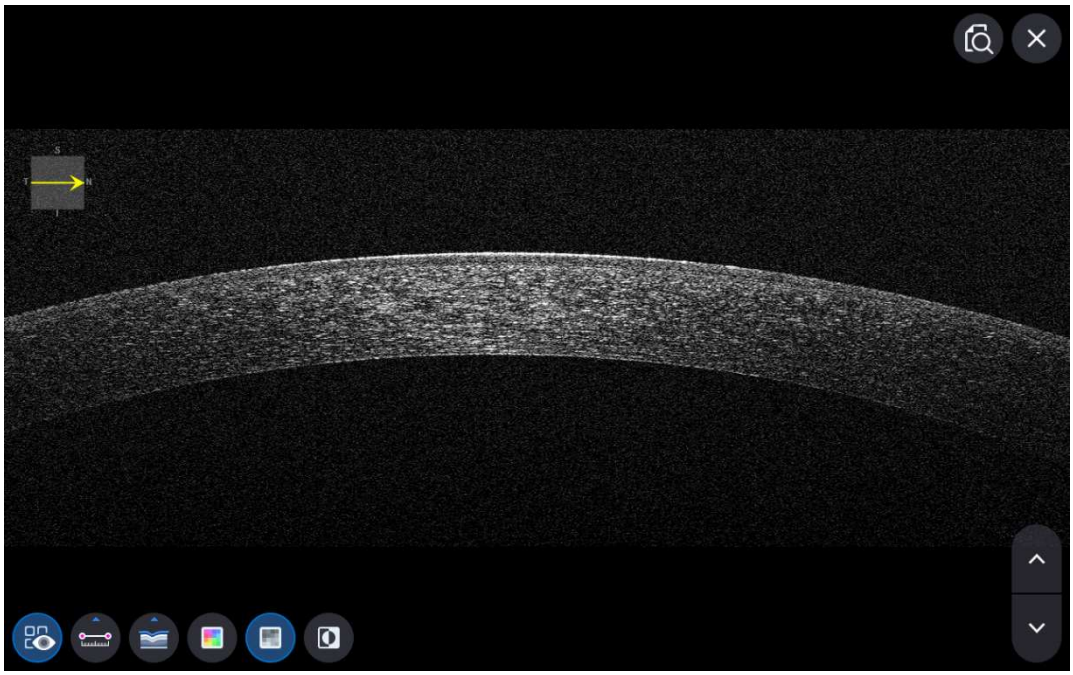


- Selecting Invert icon ( ) displays Bscan image in inverted grayscale.



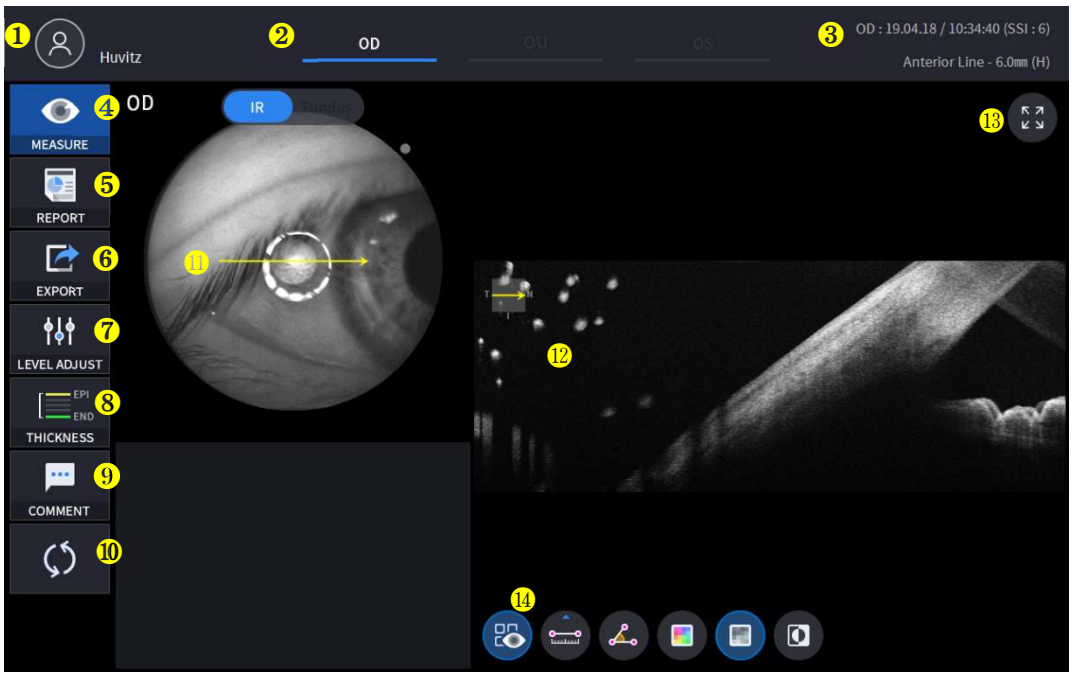
- Seleting edit_segmentation icon ( ) can edit the segmentation line.
(but, it isn't able to use in HD mode.)

11. Selecting FULL Screen icon ( ) shows the current Bscan image in full screen.



OCT Anterior Line Analysis screen

1. Composition of screen.



No	Name	Function
1	Patient information	Shows the information of patient ID and name. Go back to patient list by clicking the icon.
2	OD / OU / OS	Indicates which side of eye is showing. You can move to the measurement of the other side or the both sides by selecting unhighlighted tabs. - OD: right eye, OS: left eye, OU: both eyes.
3	Date	Displays the date and information that the measurement was taken.
4	MEASURE	Moves to capture screen after finishing analysis.
5	REPORT	Moves to report screen of the current measurement.
6	EXPORT	If an external storage device is connected, you can store the data that you want to on an external storage device.
7	LEVEL ADJUST	Adjust contrast of Bscan.
8	THICKNESS	Select the analysis range between Epi <-> Bowman's / Epi <-> Endo.
9	COMMENT	Leave a brief comment on the patient or measurement.
10	RECALCULATION	Update the information.
11	Scan position	Indicates the position of the displayed Bscan on cornea.
12	Bscan-1	Bscan screen.
13	Full Screen	Switch Bscan image to a Full screen.
14	Bscan Tool	Tools for Bscan analysis.

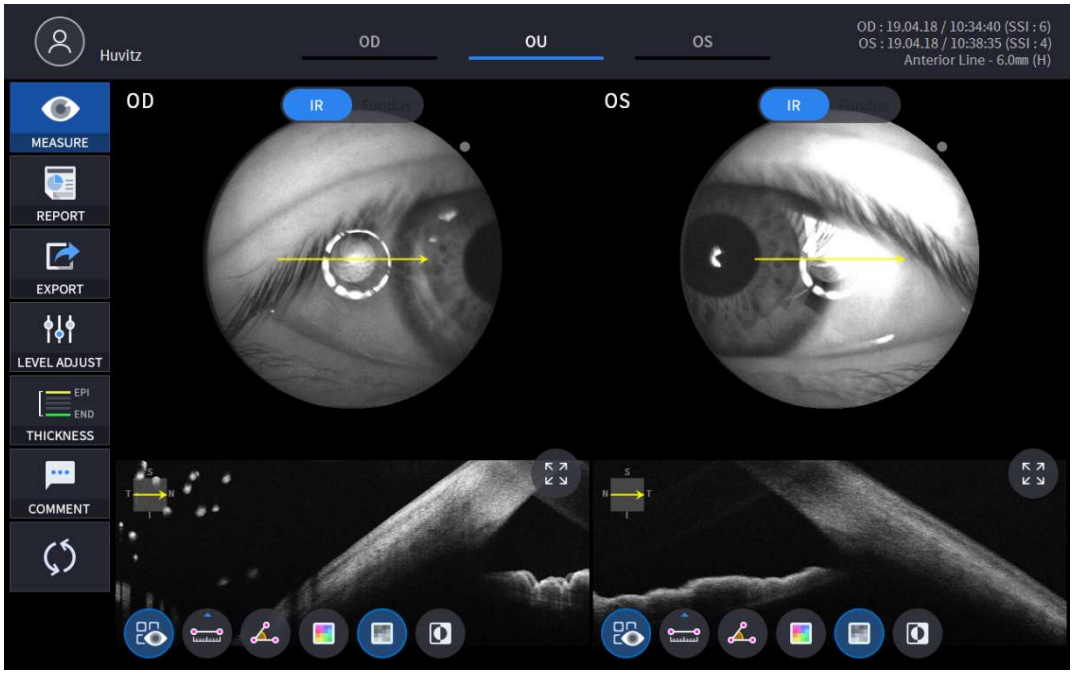
2. Select analyze mode choosing OD / OU / OS icon (

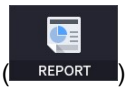
).

OD	Right eye Analysis.
OU	Both eyes Analysis.
OS	Left eye Analysis.

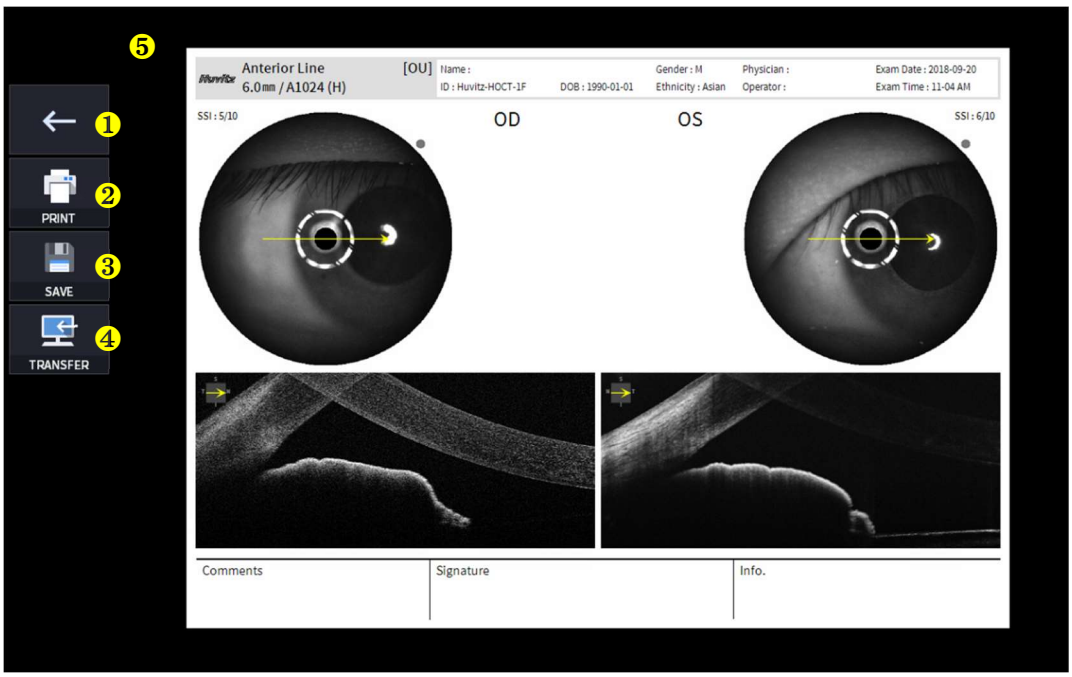
When selecting OU (

) among OD / OU / OS, screen changes to OU analysis screen shown below.

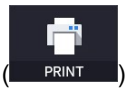


3. Select REPORT icon (

) show REPORT screen shown below.

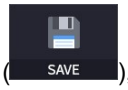


No	Name	Function
1	Previous screen	Go back to analysis screen.
2	PRINT	Save the current report showing as PDF file or print to a connected printer.
3	SAVE	Save the report as a JPG image if you have an external storage device connected to it.
4	TRANSFER	Sends the report to the DICOM Server if you are using the DICOM feature.
5	Report Preview	Preview of generated report.

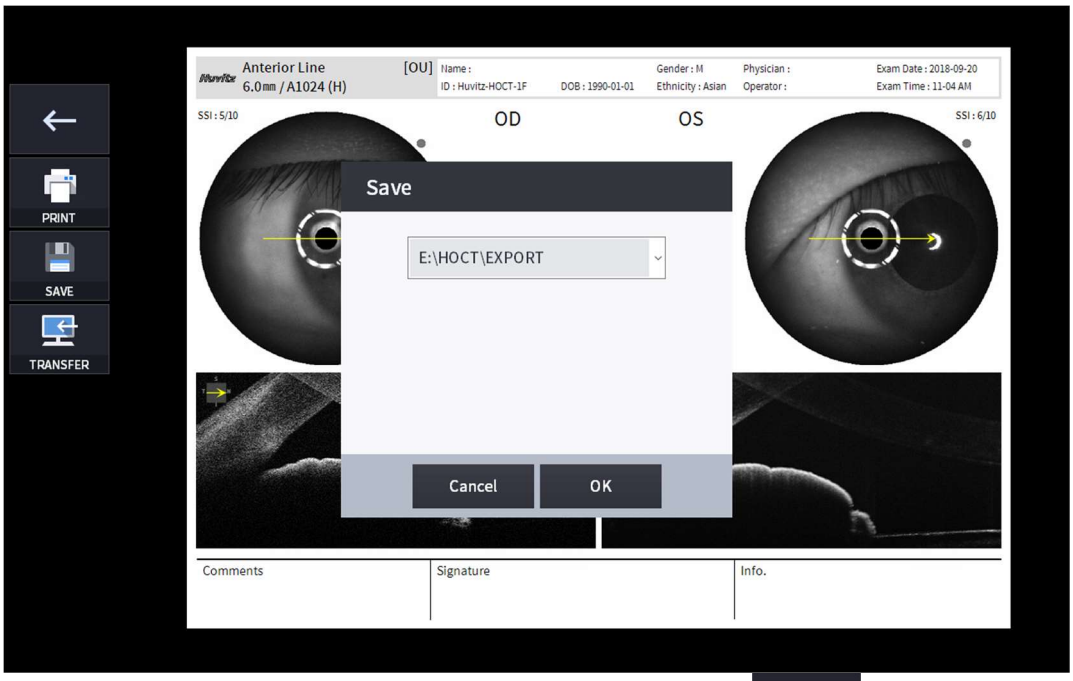
(1) Selecting PRINT icon (

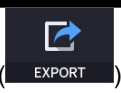
) shows printer option window.



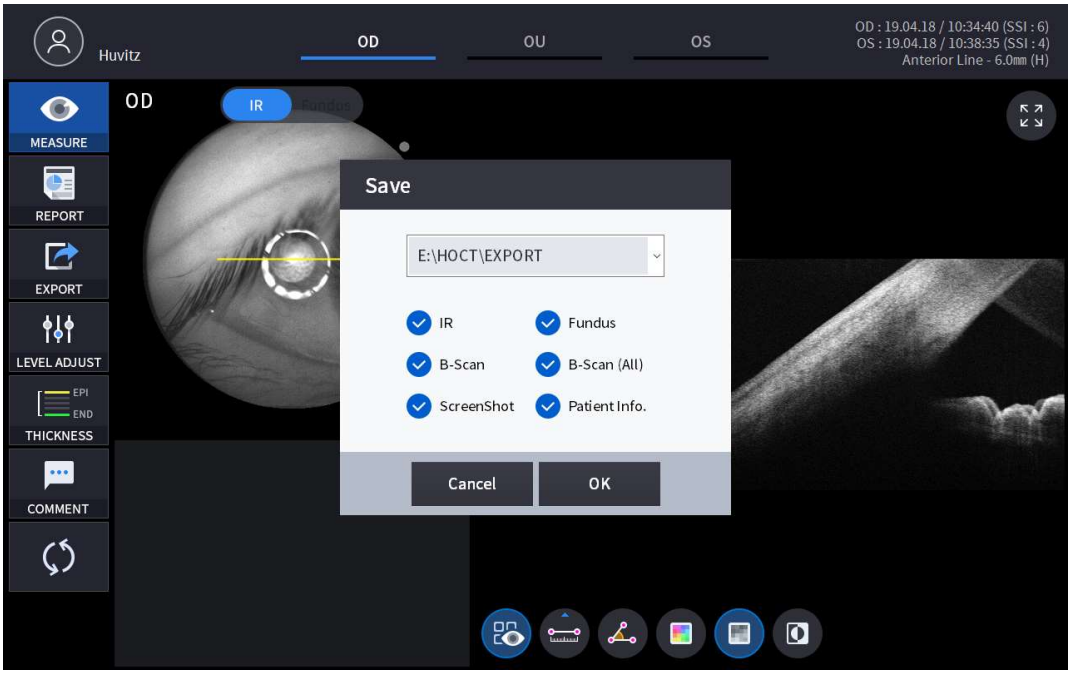
(2) Select the Save icon (

), the Select Storage Location window appears.



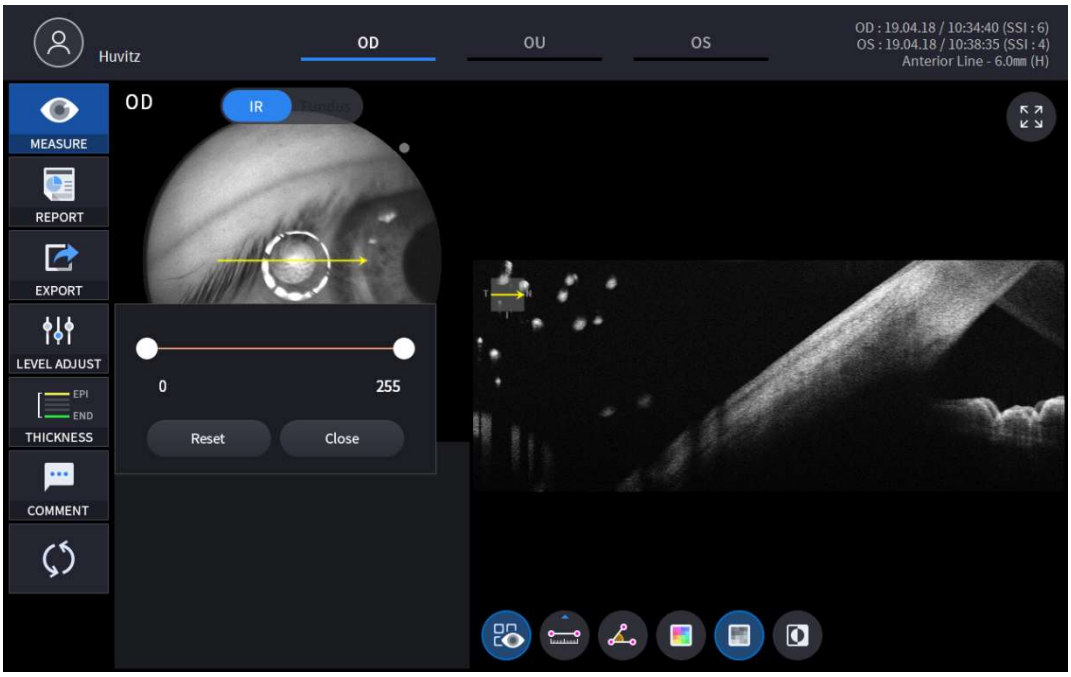
4. External storage device is connected, you can select TRANSFER icon (

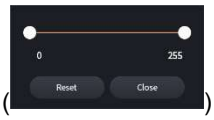
) to save the desired data to the external storage device.



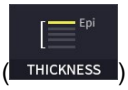
5. Selecting LEVEL ADJUST icon (

) shows an adjustable pop-up window shown below.

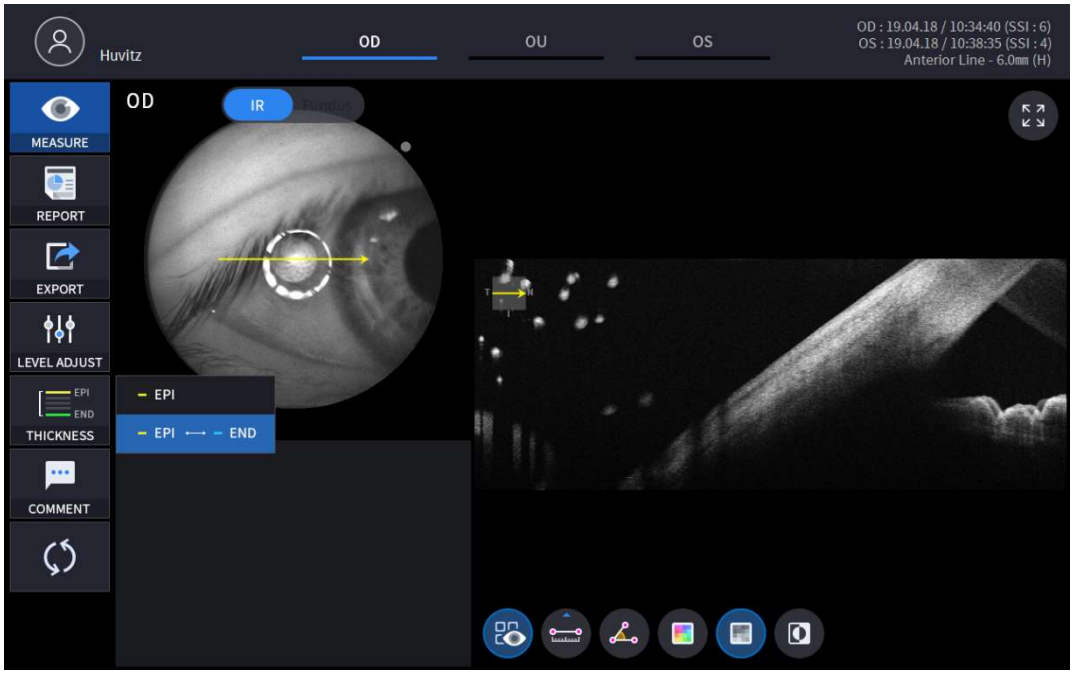


- Use Slide Bar (

) to control Bscan Contrast.

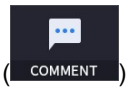
6. Selecting THICKNESS icon (

) shows a pop-up window shown below.

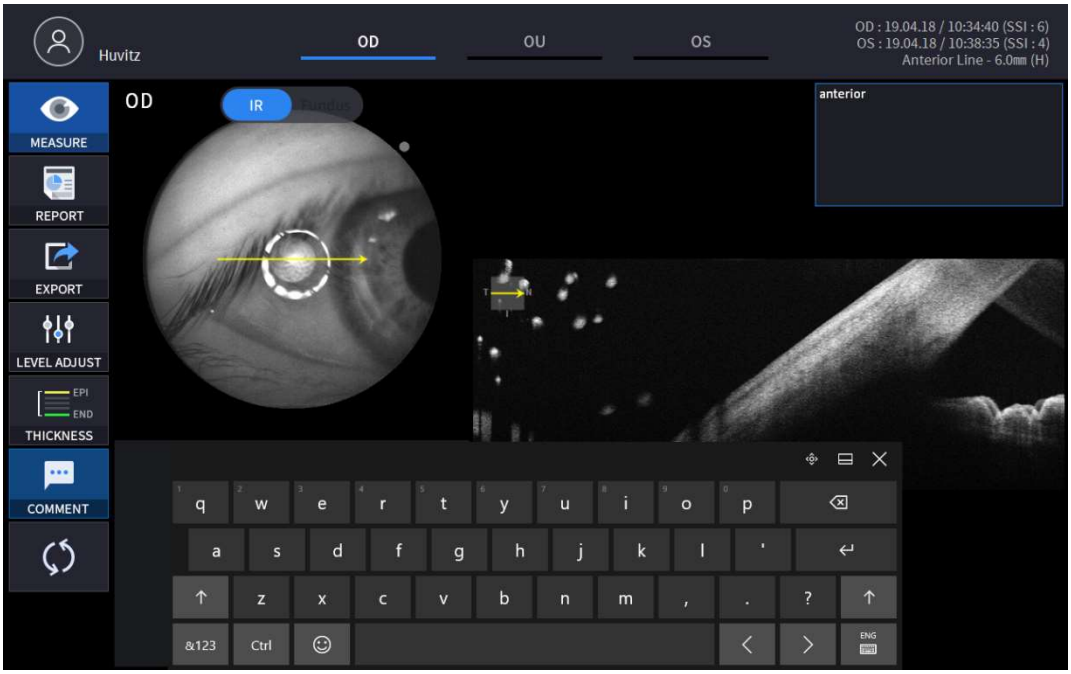


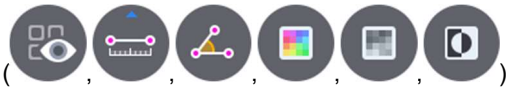
EPI	Set Analysis Criteria to EPI ~ Bowman's.
EPI <-> END	Set Analysis Criteria to EPI ~ Endo.

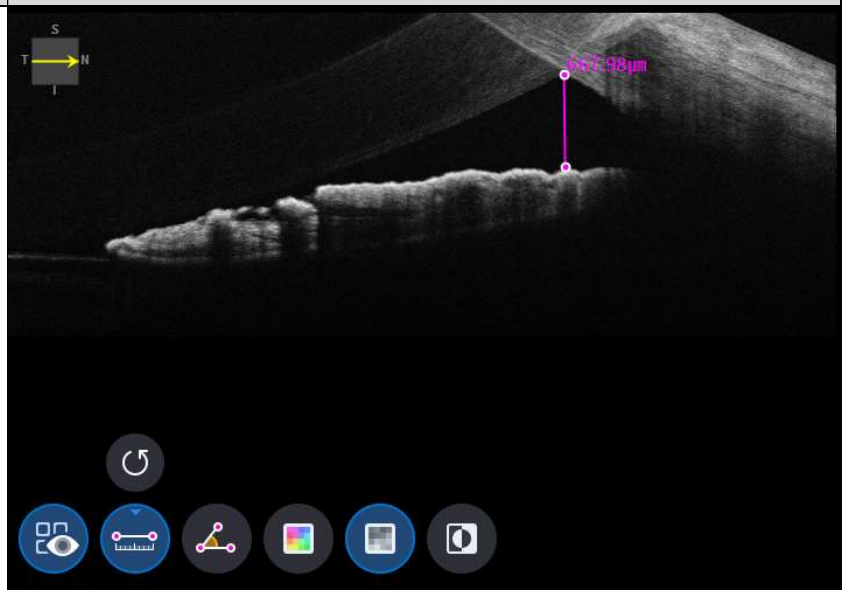
- Analysis results will be displayed according to each setting value.

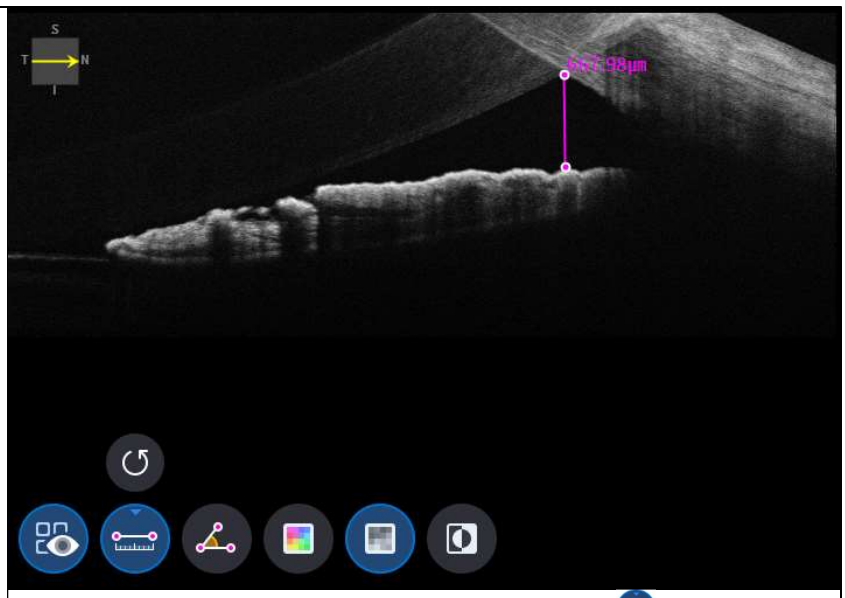
7. Select the COMMENT icon (

) to leave a brief comment on the patient or measurement.

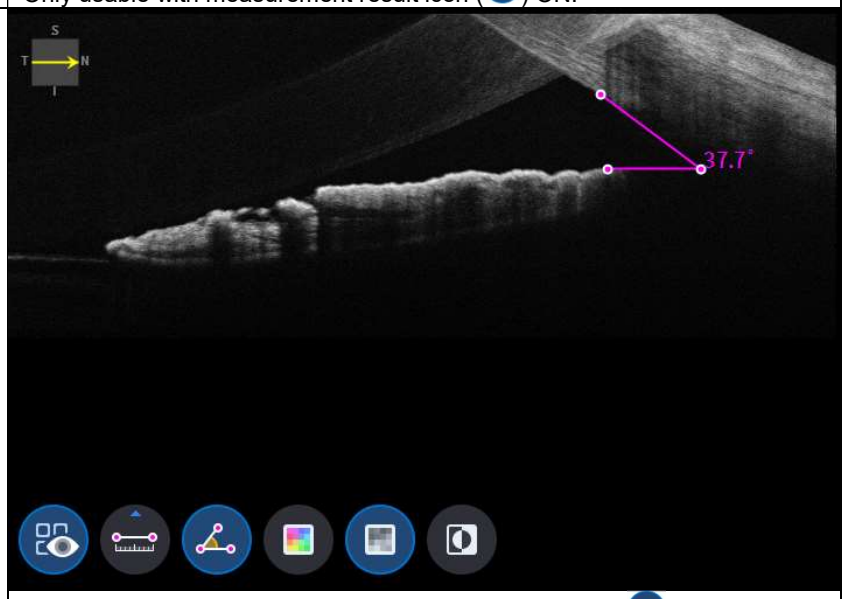


8. Select Bscan analysis tool () on Bscan image to analyze the Bscan currently displayed.

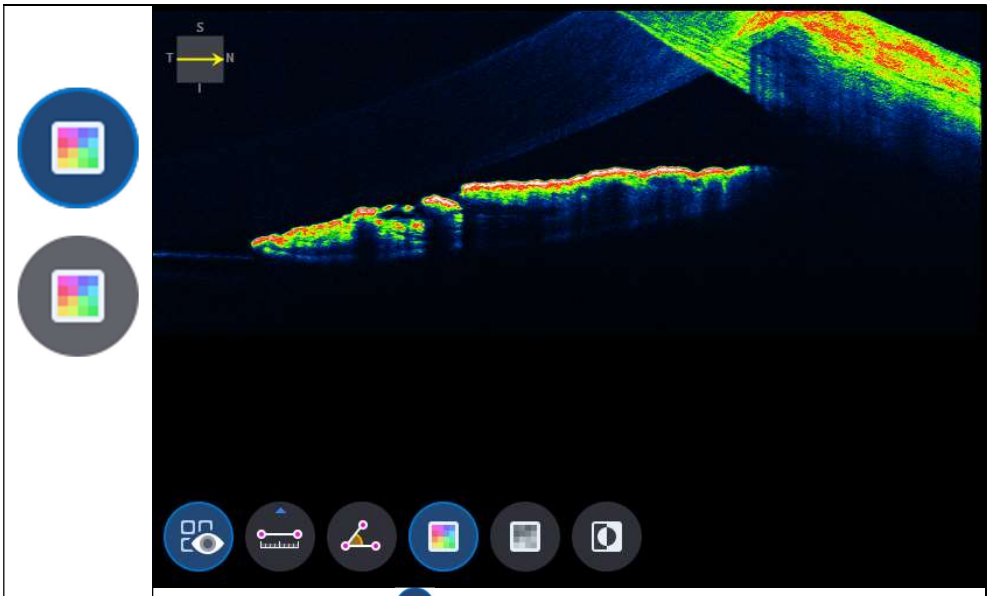
Icon ON / OFF	Screen and Function
	
	- ON: Shows the length and the angle measured using length measurement icon ( ) and angle measurement icon ( ). - OFF: Hides the measurements.



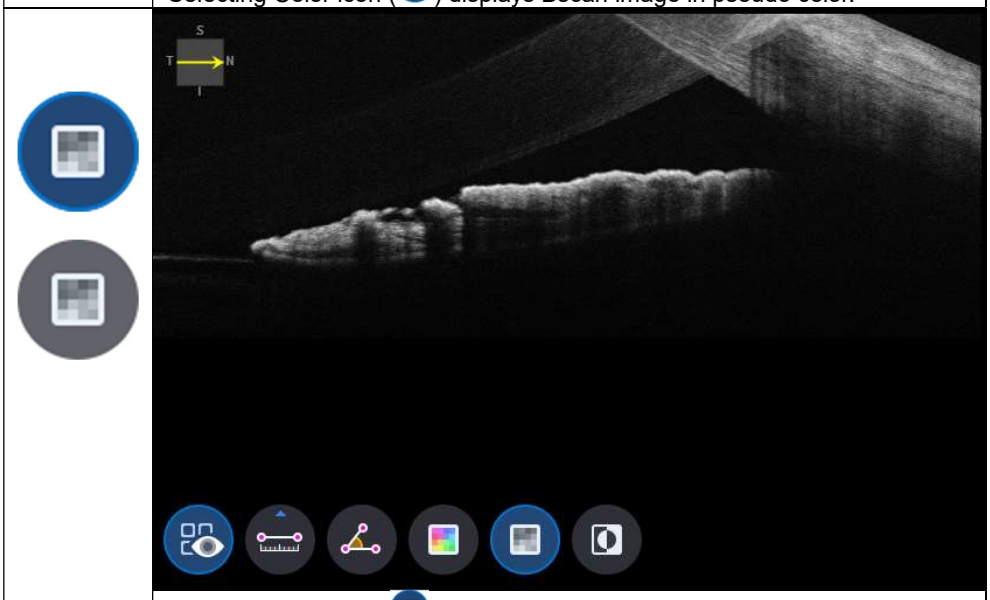
- Selecting two points with the length measurement icon ( ) ON shows the length between the two points.
- Latest data can be deleted by selecting Undo icon ( ).
- Only usable with measurement result icon ( ) ON.



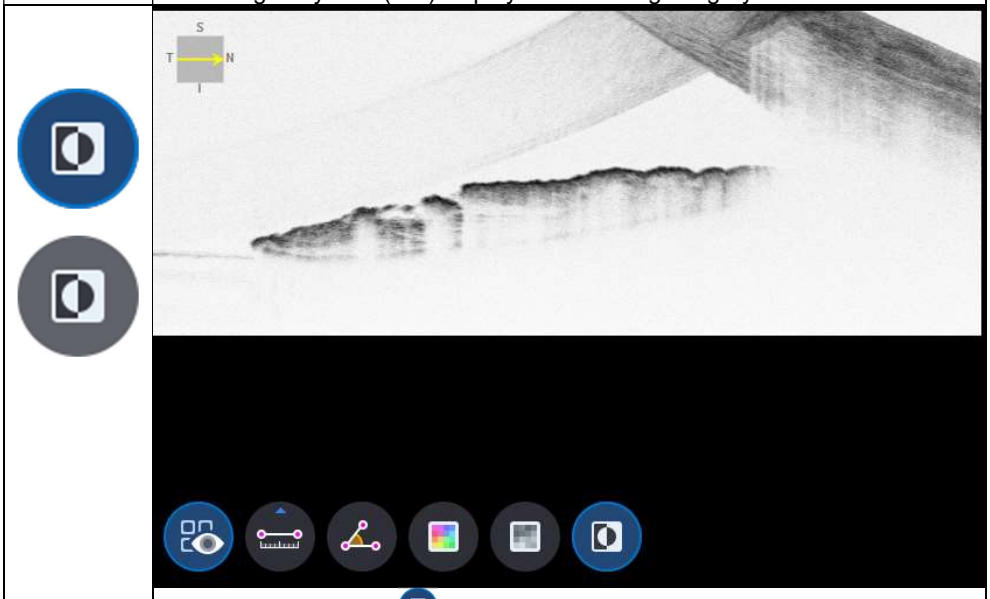
- Selecting three points with the angle measurement icon ( ) ON shows the angle made by the three points.
- Latest data can be deleted by selecting Undo icon ( ).
- Only usable with measurement result icon ( ) ON.



- Selecting Color icon ( ) displays Bscan image in pseudo color.

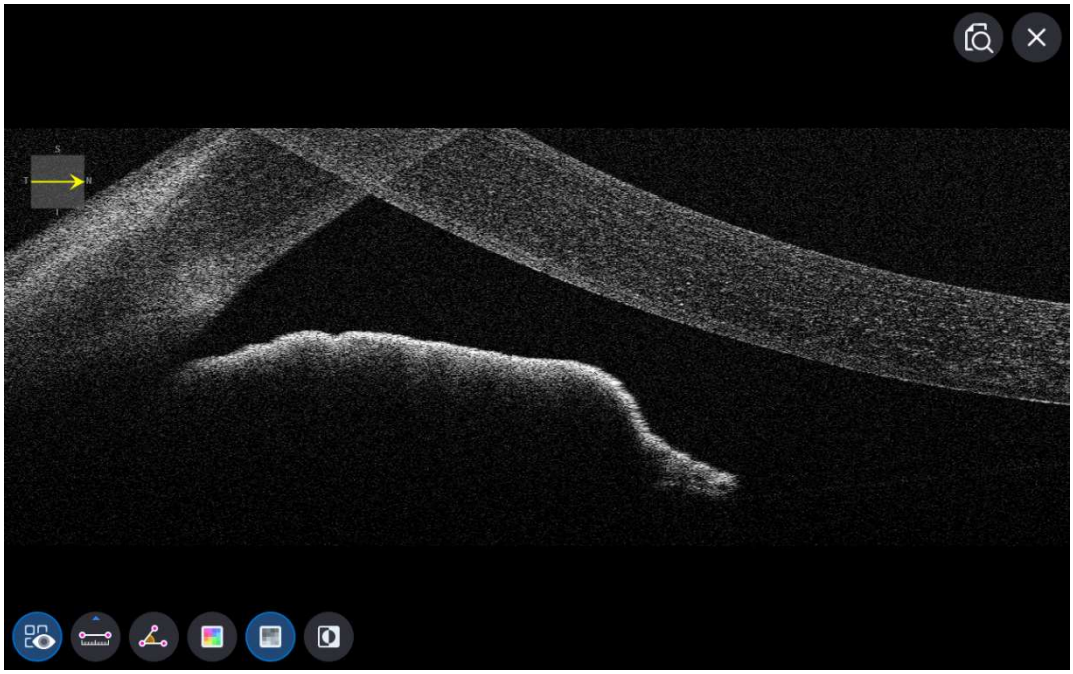


- Selecting Gray icon ( ) displays Bscan image in grayscale.



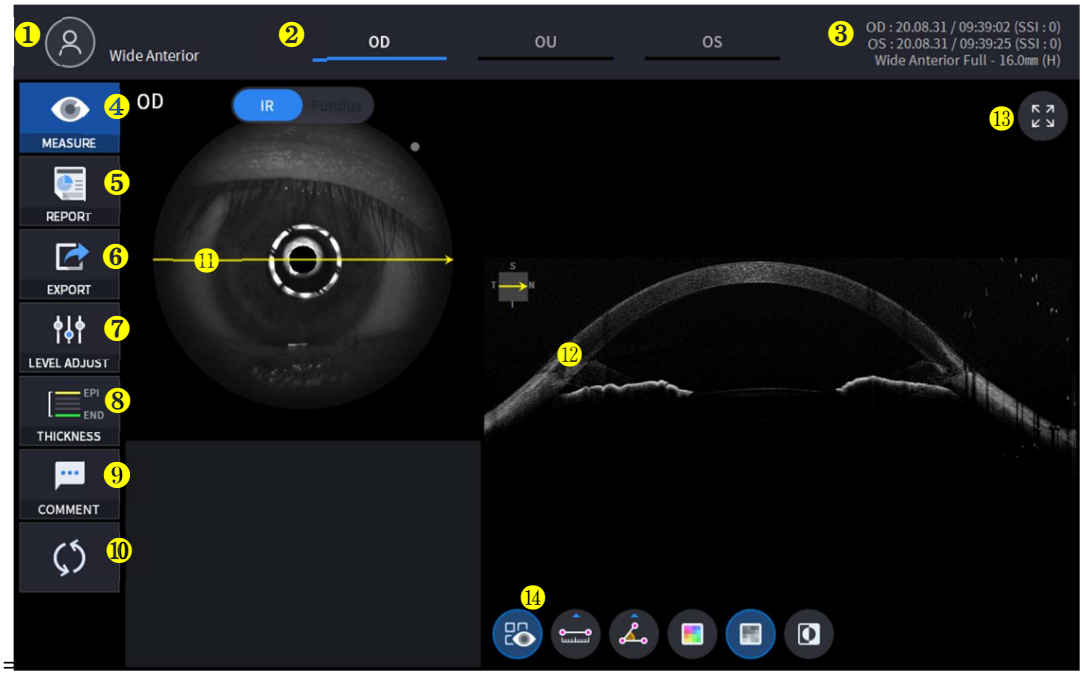
- Selecting Invert icon ( ) displays Bscan image in inverted grayscale.

9. Selecting FULL Screen icon ( ) shows the current Bscan image in full screen.

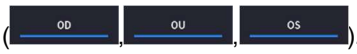


OCT Anterior Wide Analysis screen

1. Composition of screen.



No	Name	Function
1	Patient information	Shows the information of patient ID and name. Go back to patient list by clicking the icon.
2	OD / OU / OS	Indicates which side of eye is showing. You can move to the measurement of the other side or the both sides by selecting unhighlighted tabs. - OD: right eye, OS: left eye, OU: both eyes.
3	Date	Displays the date and information that the measurement was taken.
4	MEASURE	Moves to capture screen after finishing analysis.
5	REPORT	Moves to report screen of the current measurement.
6	EXPORT	If an external storage device is connected, you can store the data that you want to on an external storage device.
7	LEVEL ADJUST	Adjust contrast of Bscan.
8	THICKNESS	Select the analysis range between Epi <-> Bowman's / Epi <-> Endo.
9	COMMENT	Leave a brief comment on the patient or measurement.
10	RECALCULATION	Update the information.
11	Scan position	Indicates the position of the displayed Bscan on cornea.
12	Bscan-1	Bscan screen.
13	Full Screen	Switch Bscan image to a Full screen.
14	Bscan Tool	Tools for Bscan analysis.

2. Select analyze mode choosing OD / OU / OS icon (

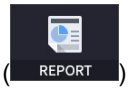
).

OD	Right eye Analysis.
OU	Both eyes Analysis.
OS	Left eye Analysis.

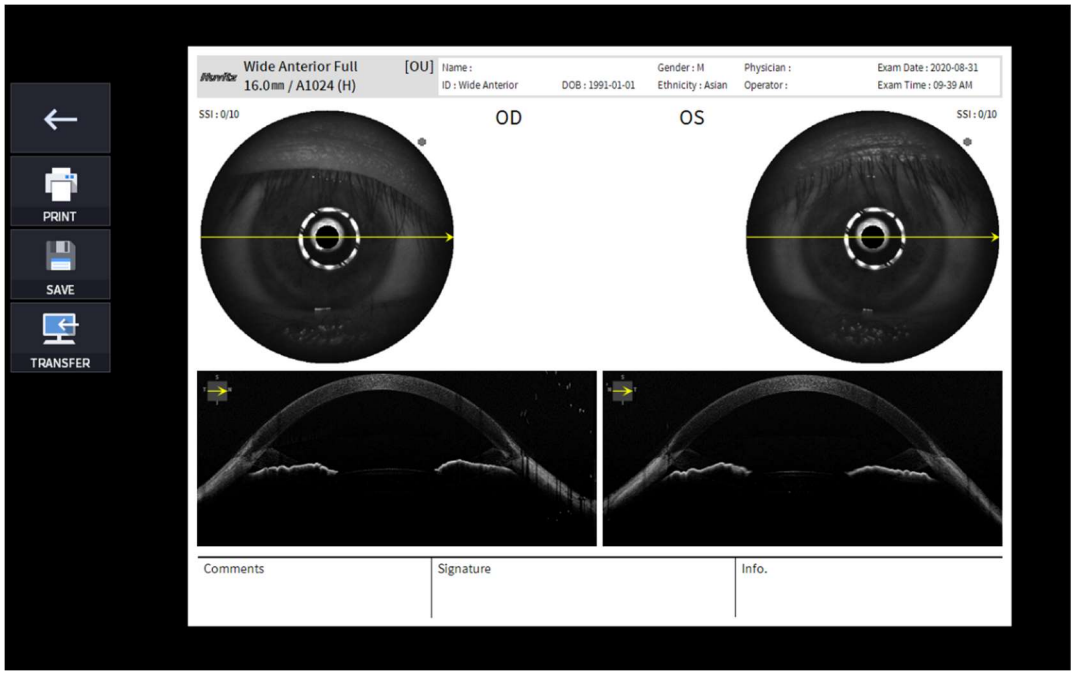
When selecting OU (

) among OD / OU / OS, screen changes to OU analysis screen shown below.



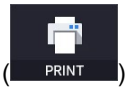
3. Select REPORT icon (

) show REPORT screen shown below.



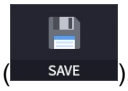
No	Name	Function
1	Previous screen	Go back to analysis screen.

2	PRINT	Save the current report showing as PDF file or print to a connected printer.
3	SAVE	Save the report as a JPG image if you have an external storage device connected to it.
4	TRANSFER	Sends the report to the DICOM Server if you are using the DICOM feature.
5	Report Preview	Preview of generated report.

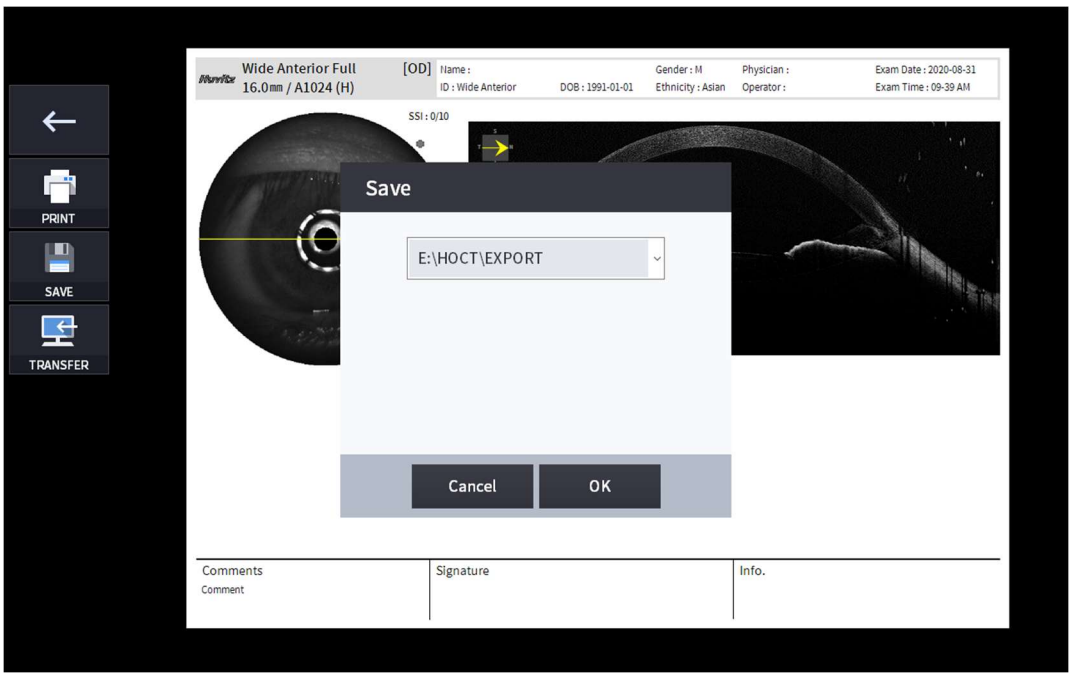
(1) Selecting PRINT icon (

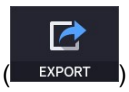
) shows printer option window.



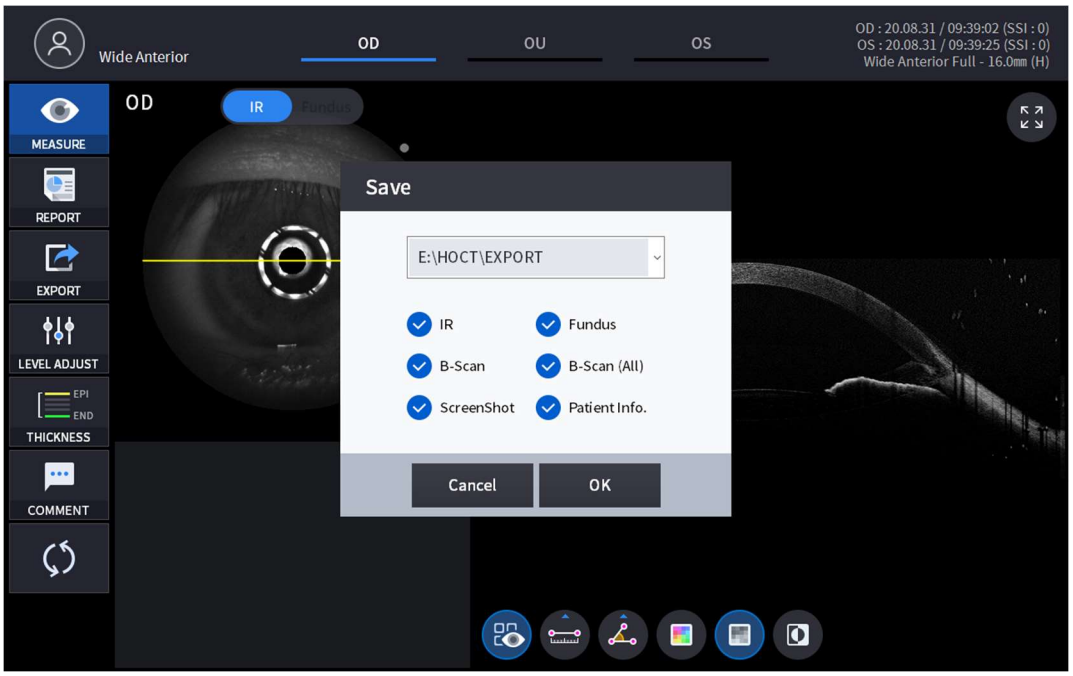
(2) Select the Save icon (

), the Select Storage Location window appears.



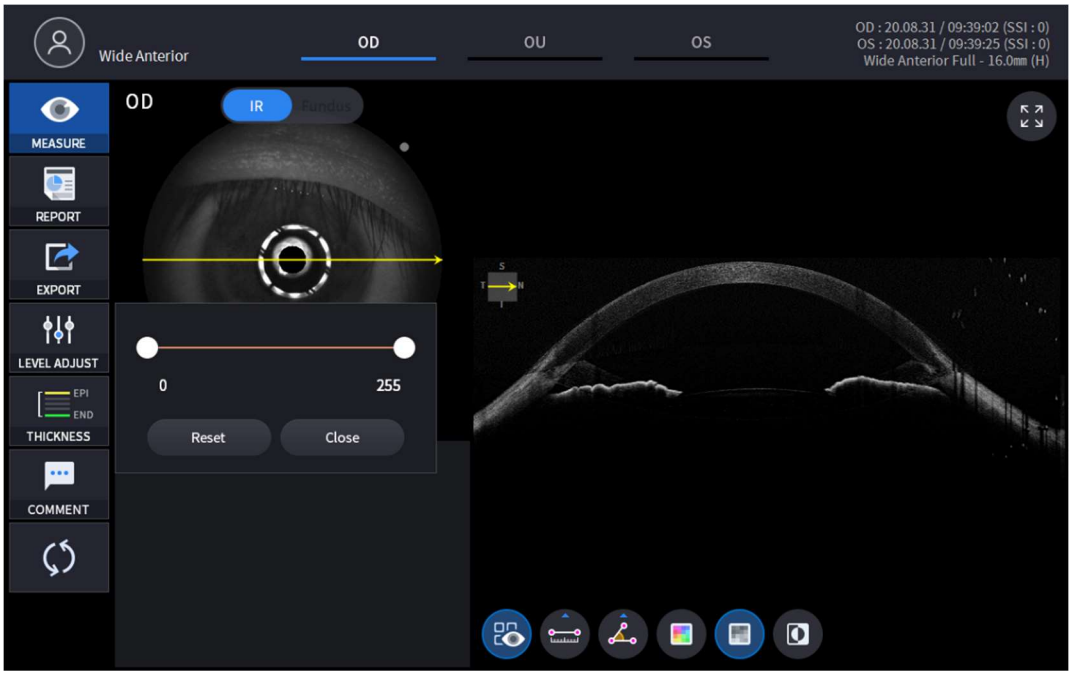
4. External storage device is connected, you can select TRANSFER icon (

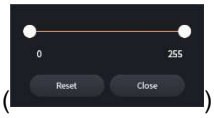
) to save the desired data to the external storage device.



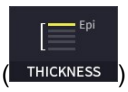
5. Selecting LEVEL ADJUST icon (

) shows an adjustable pop-up window shown below.

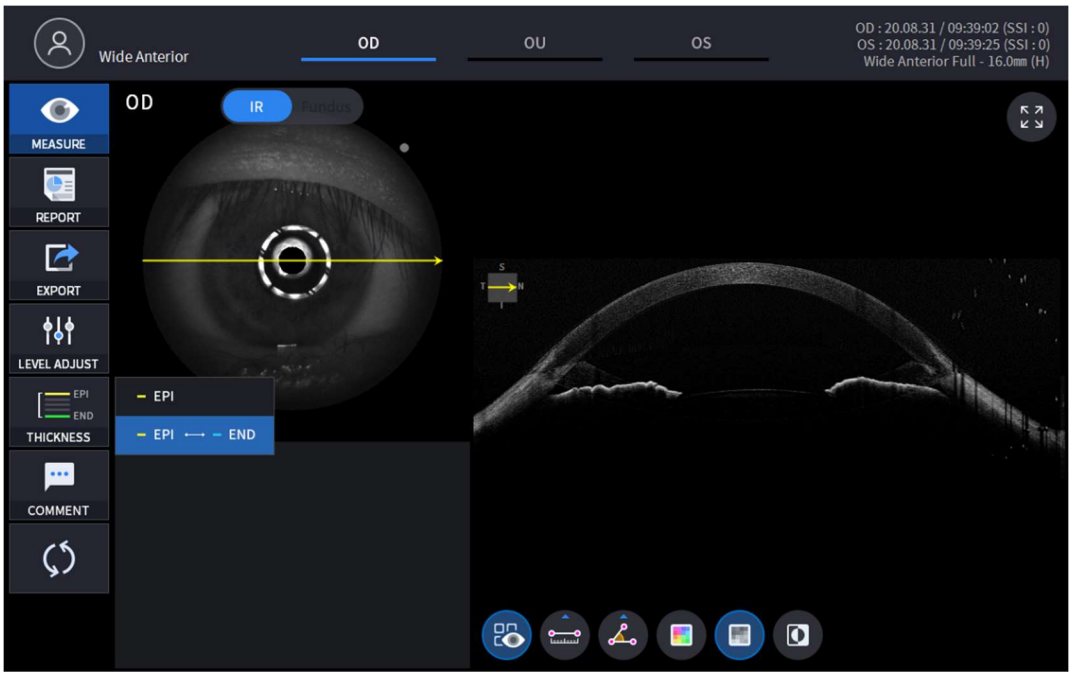


- Use Slide Bar (

) to control Bscan Contrast.

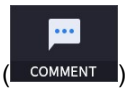
6. Selecting THICKNESS icon (

) shows a pop-up window shown below.

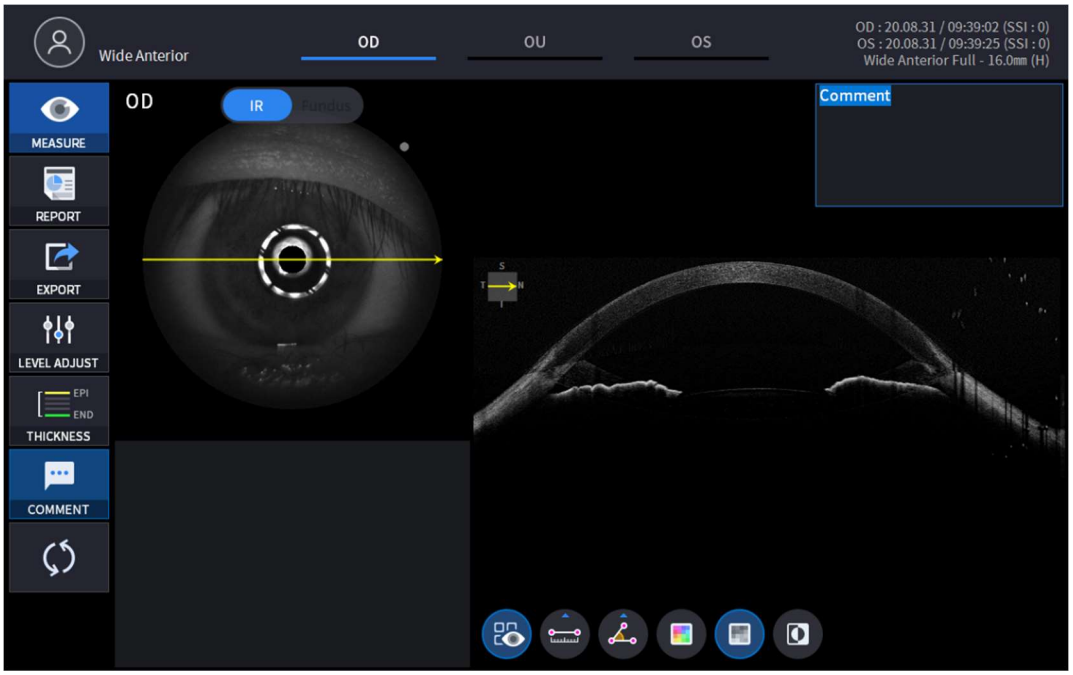


EPI	Set Analysis Criteria to EPI ~ Bowman's.
EPI <-> END	Set Analysis Criteria to EPI ~ Endo.

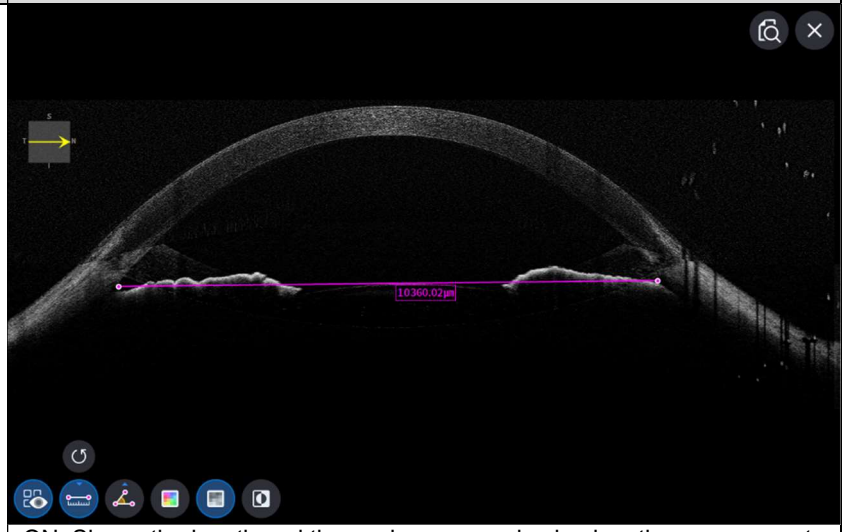
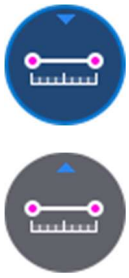
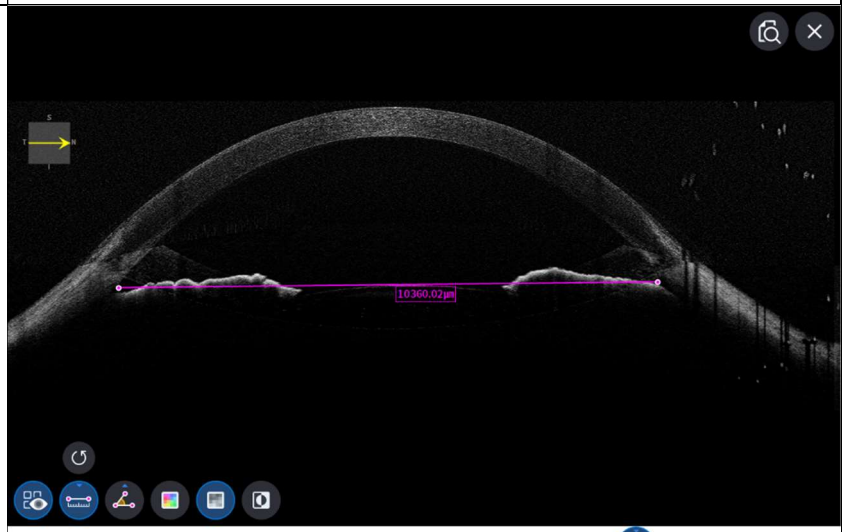
- Analysis results will be displayed according to each setting value.

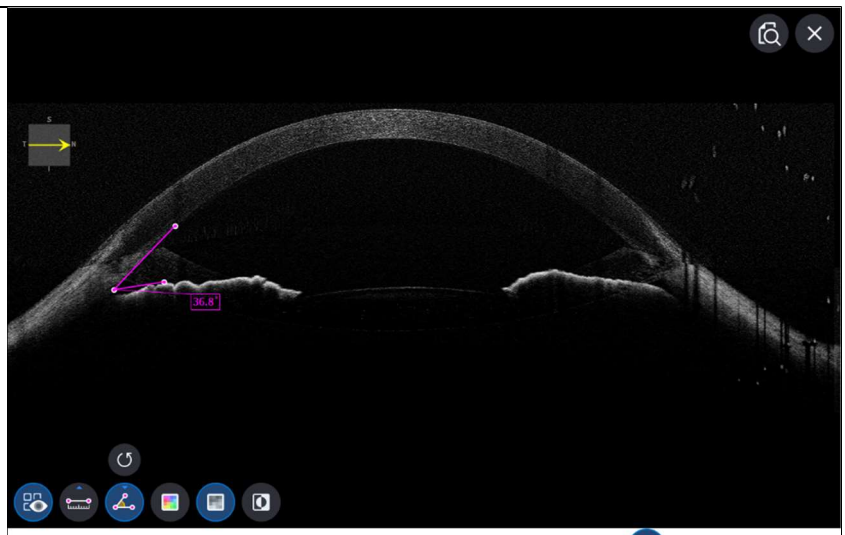
7. Select the COMMENT icon (

) to leave a brief comment on the patient or measurement.

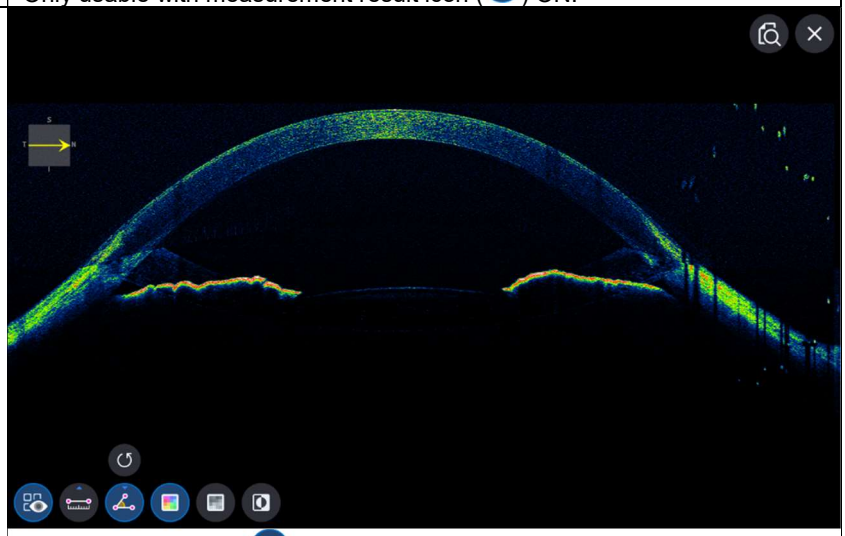


8. Select Bscan analysis tool (, , , , , ,) on Bscan image to analyze the Bscan currently displayed.

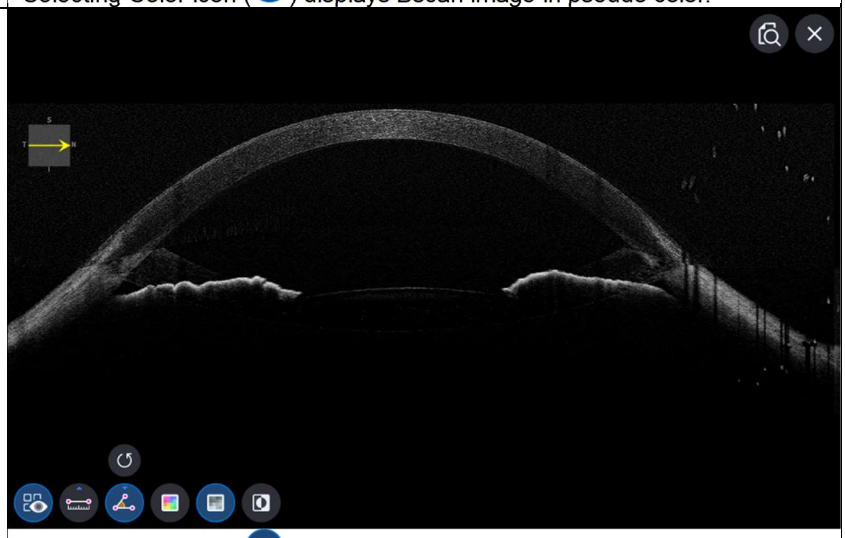
Icon ON / OFF	Screen and Function
	 - ON: Shows the length and the angle measured using length measurement icon ( ) and angle measurement icon ( ). - OFF: Hides the measurements.
	 - Selecting two points with the length measurement icon ( ) ON shows the length between the two points. - Latest data can be deleted by selecting Undo icon ( ). - Only usable with measurement result icon ( ) ON.



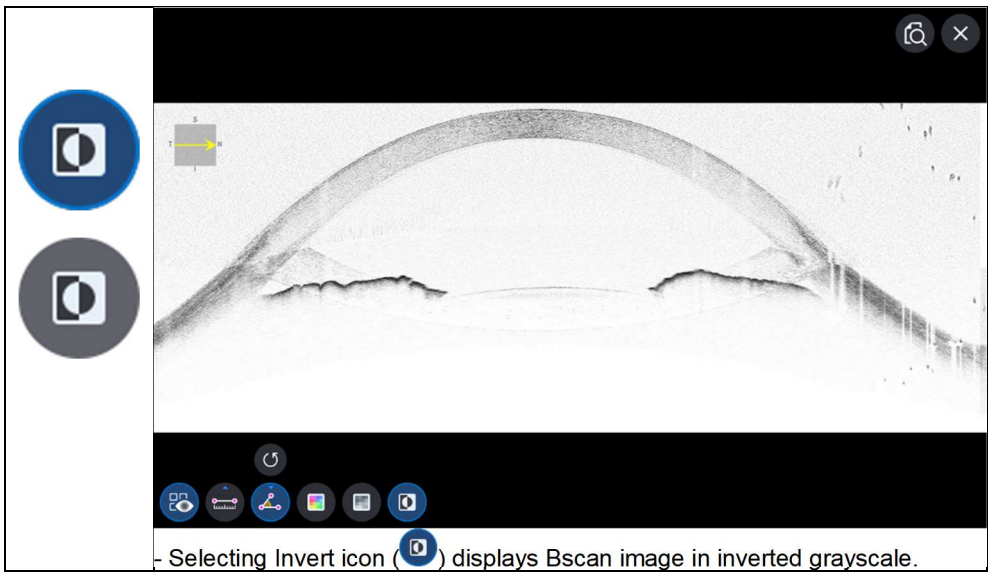
- Selecting three points with the angle measurement icon ( ) ON shows the angle made by the three points.
- Latest data can be deleted by selecting Undo icon ( ).
- Only usable with measurement result icon ( ) ON.



- Selecting Color icon ( ) displays Bscan image in pseudo color.

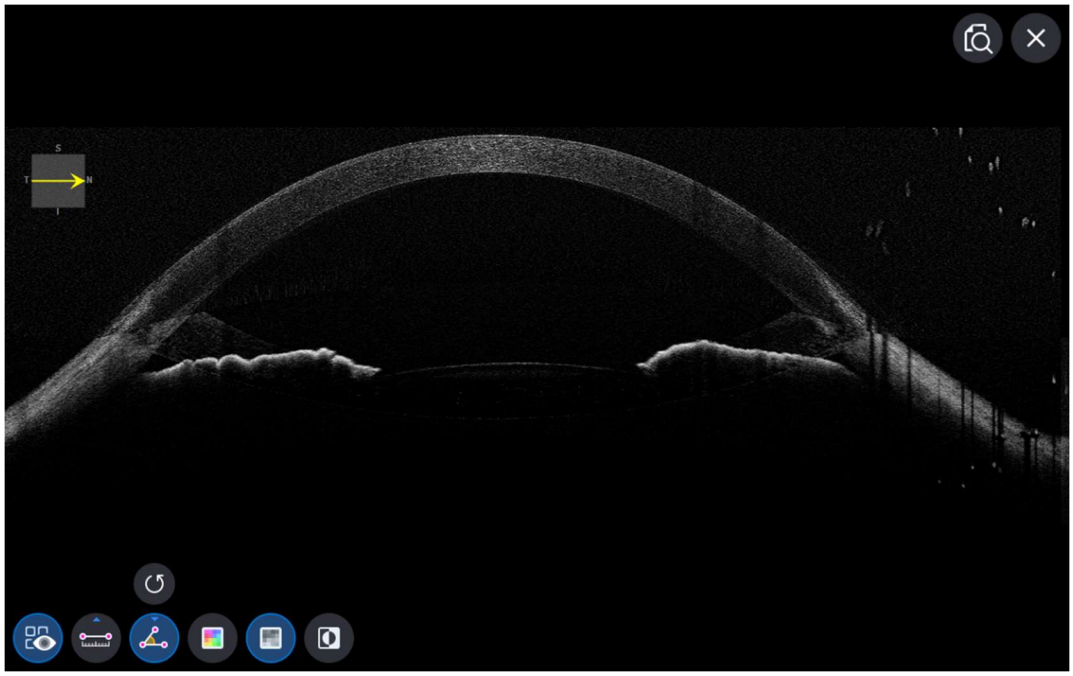


- Selecting Gray icon ( ) displays Bscan image in grayscale.



- Selecting Invert icon ( ) displays Bscan image in inverted grayscale.

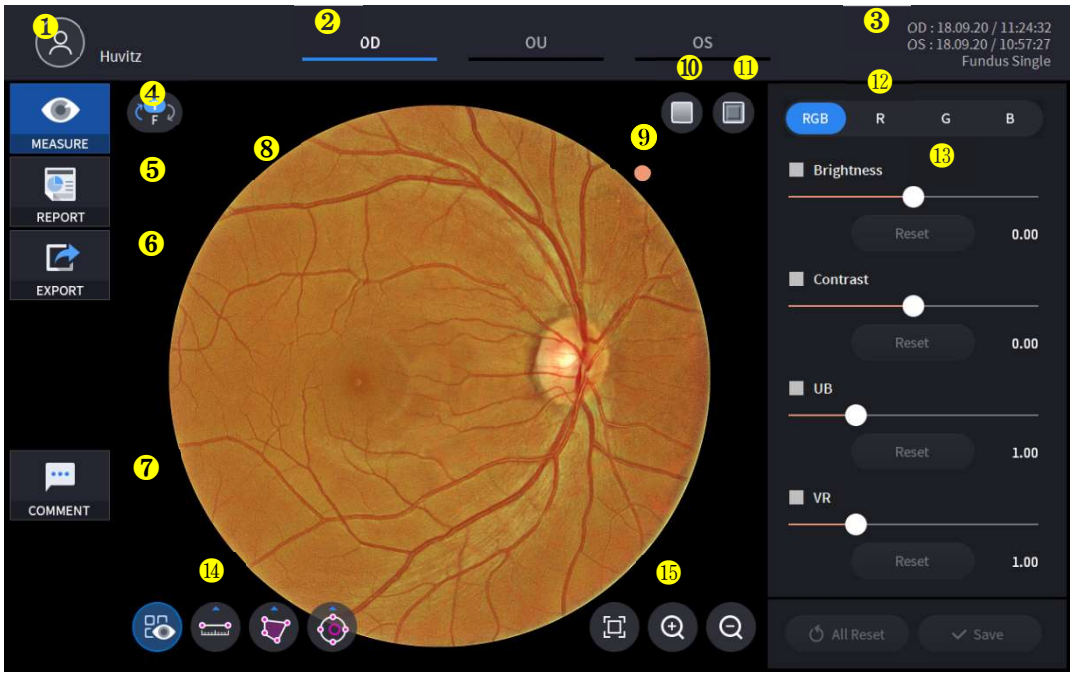
9. Selecting FULL Screen icon ( ) shows the current Bscan image in full screen.



Fundus Analysis screen

- On the analysis screen, single and stereo are the same.

1. Composition of screen.



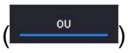
No	Name	Function
1	Patient information	Shows the information of patient ID and name. Go back to patient list by clicking the icon.
2	OD / OU / OS	Indicates which side of eye is showing You can move to the measurement of the other side or the both sides by selecting unhighlighted tabs. - OD: right eye, OS: left eye, OU: both eyes.
3	Date	Displays the date and information that the measurement was taken.
4	MEASURE	Moves to capture screen after finishing Analysis.
5	REPORT	Moves to report screen of the current measurement.
6	EXPORT	Capture current screen and store it.
7	COMMENT	Leave a brief comment on the patient or measurement.
8	Fundus Image	Shows captured Fundus Image.
9	Direction Indication Mark	Indicates the orientation of the Fundus image. Mark always locates on the right upper side of the image.
10	Red Free	Apply a Red Free effect to the Fundus image.
11	Embossing	Apply a Embossing effect to the Fundus image.
12	RGB Channel	Selection of RGB Channel.
13	Adjustment control	Adjusting function of Brightness, Contrast, UB, VR.

14	Measurement tool	Length, Area, C/D Ratio measurement function on Fundus Image.
15	Magnification tool	Magnifying and Analyzing function of Fundus Image.

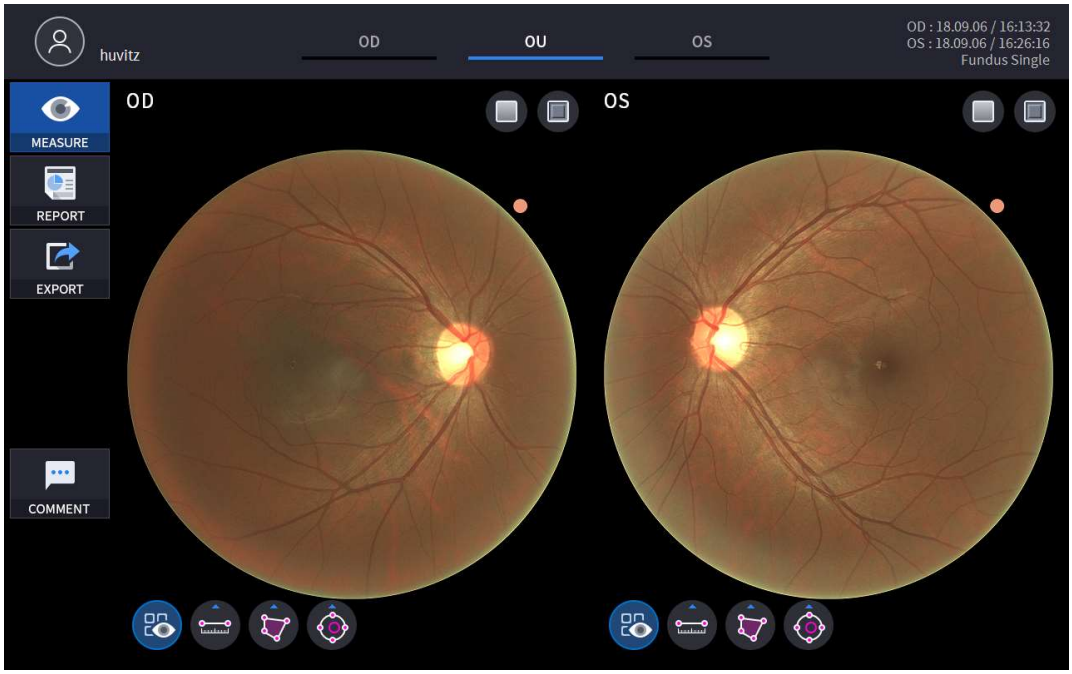
2. Select analyze mode choosing OD / OU / OS icon (

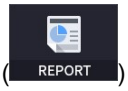
).

OD	Right eye Analysis.
OU	Both eyes Analysis.
OS	Left eye Analysis.

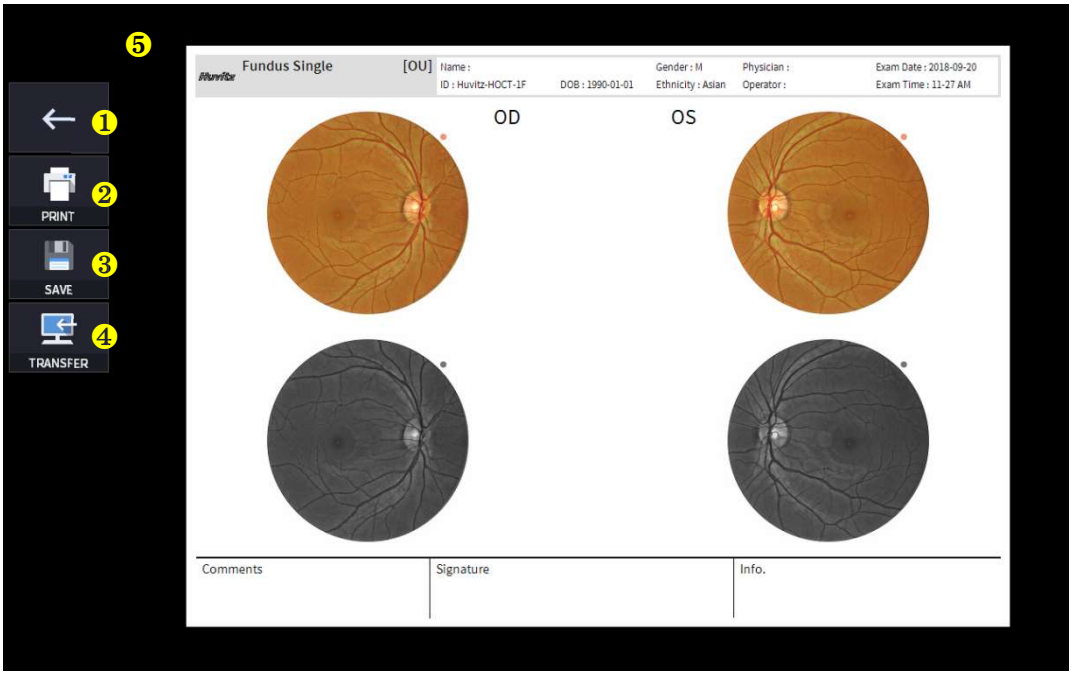
When selecting OU (

) among OD / OU / OS, screen changes to OU analysis screen shown below.

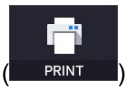


3. Select REPORT icon (

) shows REPORT screen shown below.

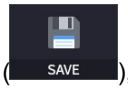


No	Name	Function
1	Previous screen	Go back to analysis screen.
2	PRINT	Save the current report showing as PDF file or print to a connected printer.
3	SAVE	Save the report as a JPG image if you have an external storage device connected to it.
4	TRANSFER	Sends the report to the DICOM Server if you are using the DICOM feature.
5	Report Preview	Preview of generated report.

(1) Selecting PRINT icon (

) shows printer option window.

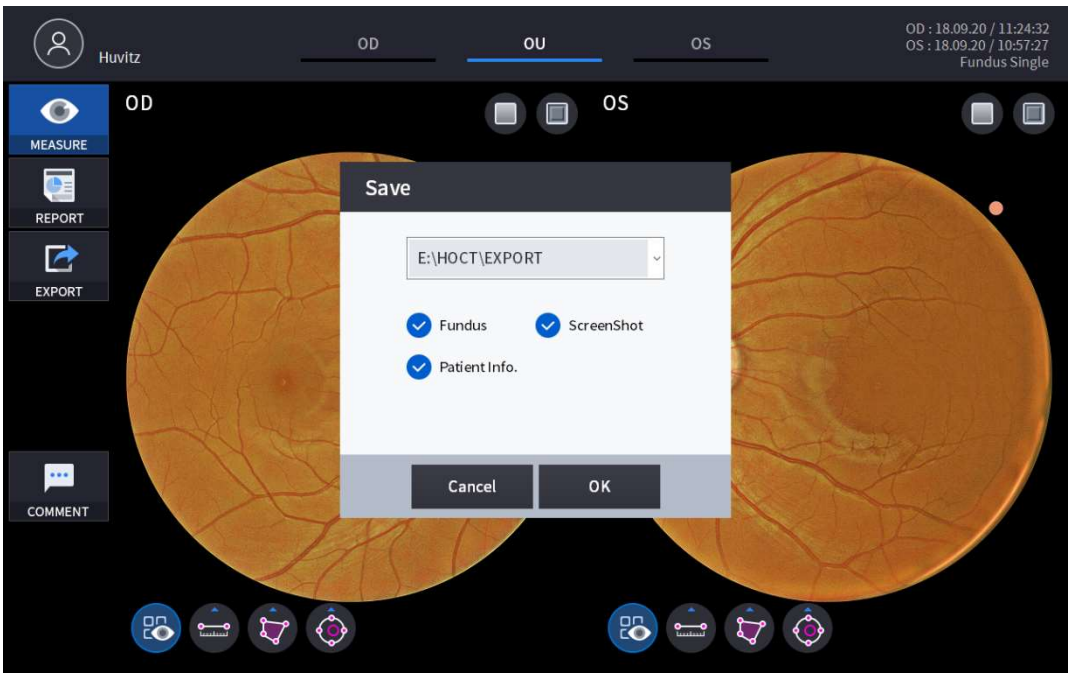


(2) Select the Save icon (

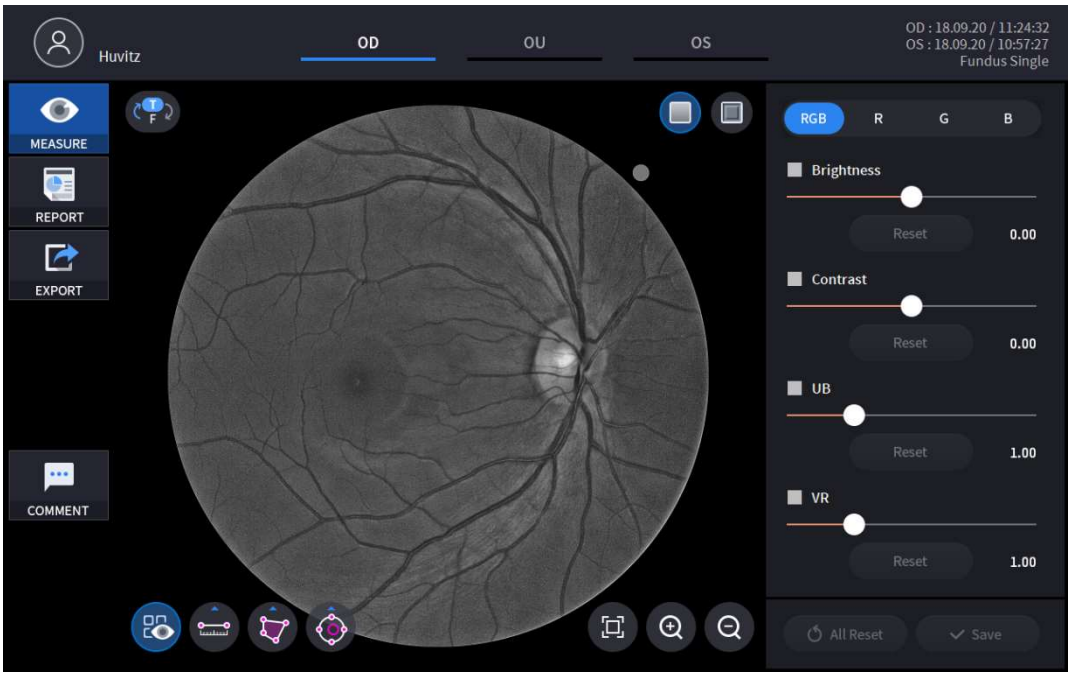
), the Select Storage Location window appears.



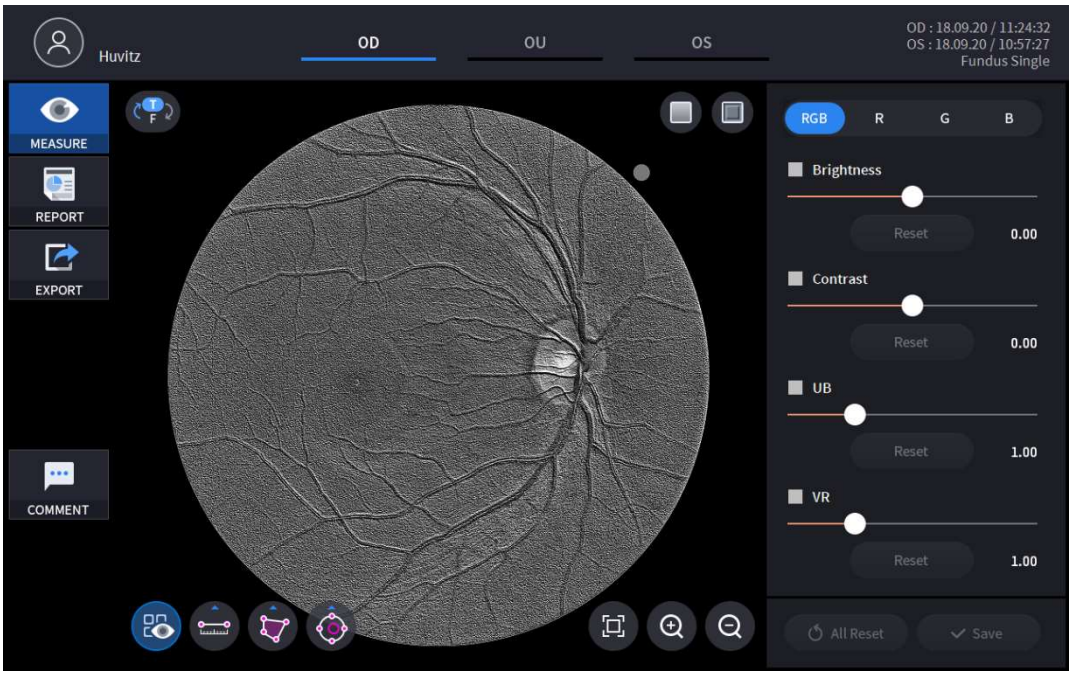
4. External storage device is connected, you can select TRANSFER icon (EXPORT) to save the desired data to the external storage device.



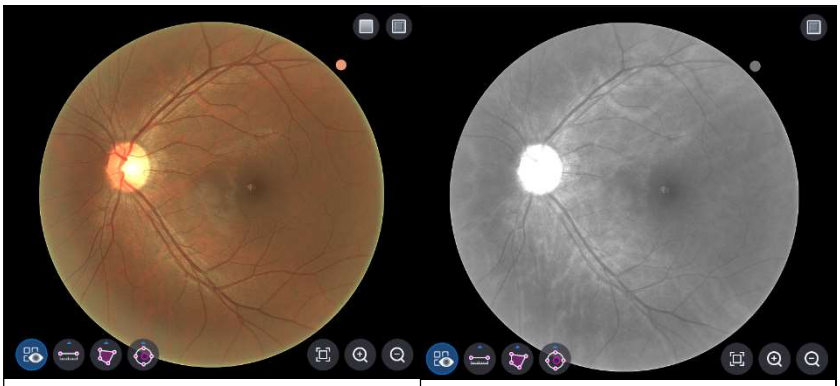
5. Use Red Free ON / OFF icon ( , ) to analyze Fundus Image with Red free Screen.



6. Use Embossing ON / OFF icon ( , ) to analyze Fundus Image with Red free Screen.



7. By selecting one of the RGB channels, only selected channel displayed in monochromatic image.



<RGB Channel>	<R Channel>
<G Channel>	<B Channel>

8. Images can be adjusted using Slide Bar (

, 

, 

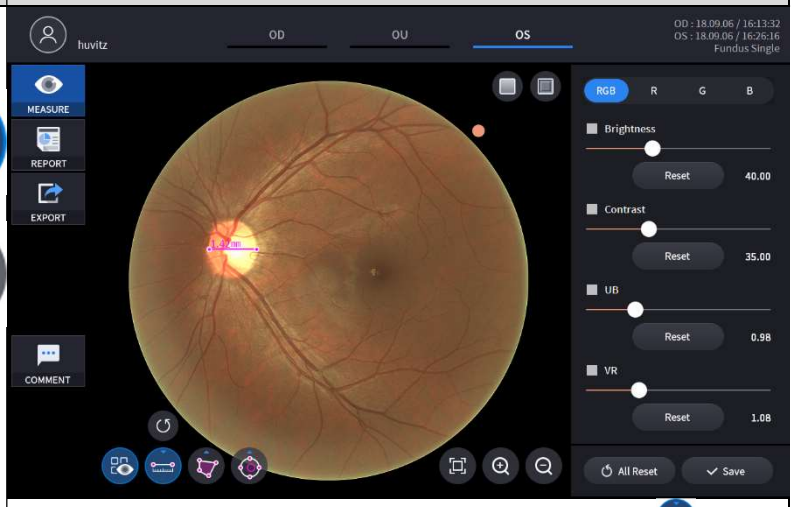
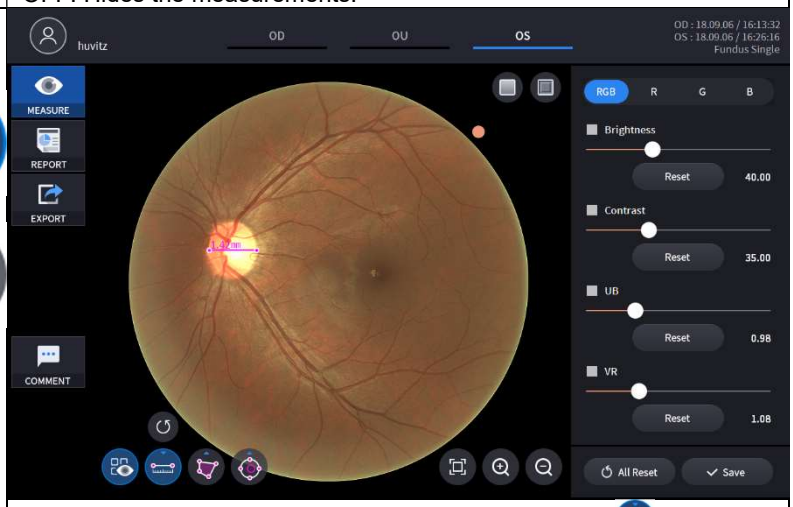
, 

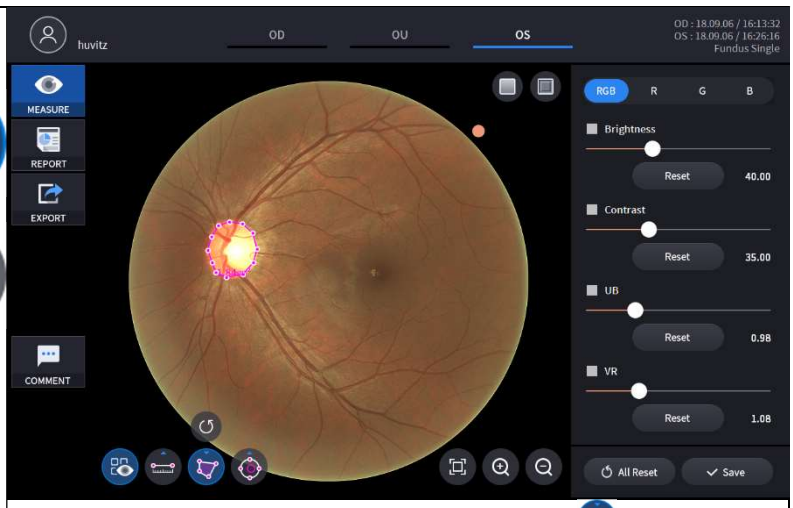
) of Adjustment Control.

	Adjustment of Brightness.
	Adjustment of Contrast.
	Adjustment of UB.
	Adjustment of VR.
	Resetting of individual Adjustment.
	Resetting of all Adjustment.
	Save all adjustments.

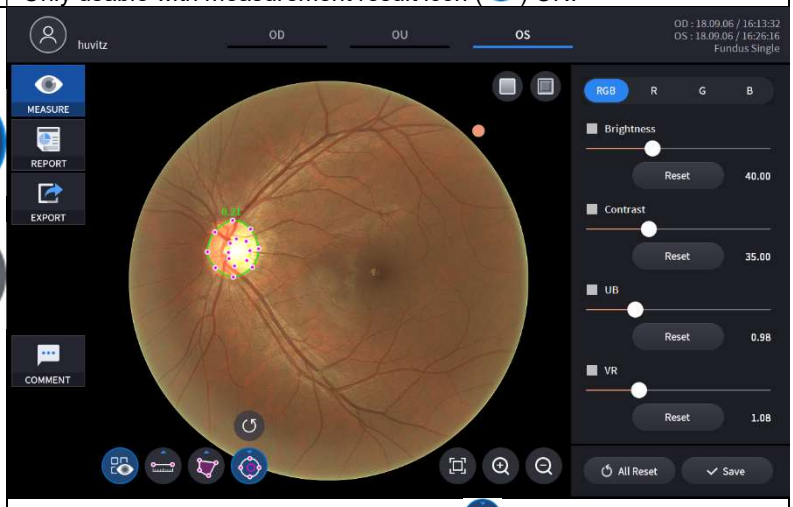
9. Length, Area, C/D Ration can be measured using Measurement Tool icon.

(, , ,)

Icon ON / OFF	Screen and Function
	 - ON: Shows results measured by length measurement icon ( ), area measurement icon ( ), C/D ration measurement icon ( ) on Fundus Image. - OFF: Hides the measurements.
	 - Selecting two points with the length measurement icon ( ) shows the length between the two points. - Latest data can be deleted using Undo icon ( ). - Only usable with measurement result icon ( ) ON.

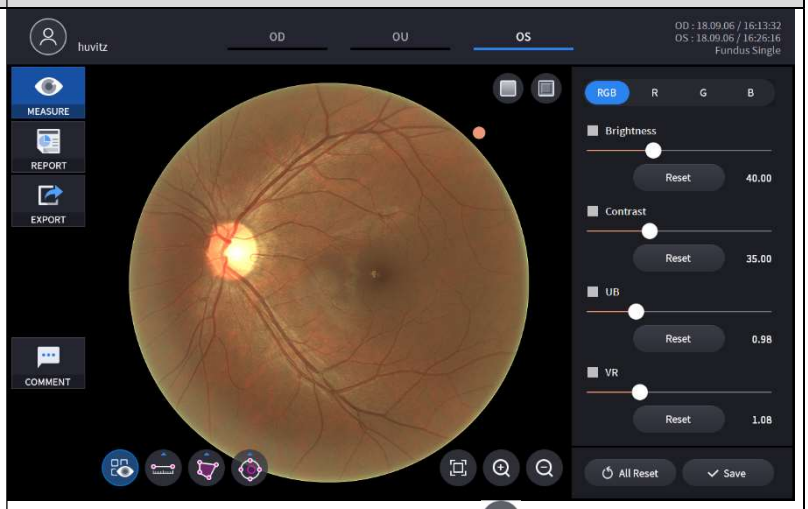
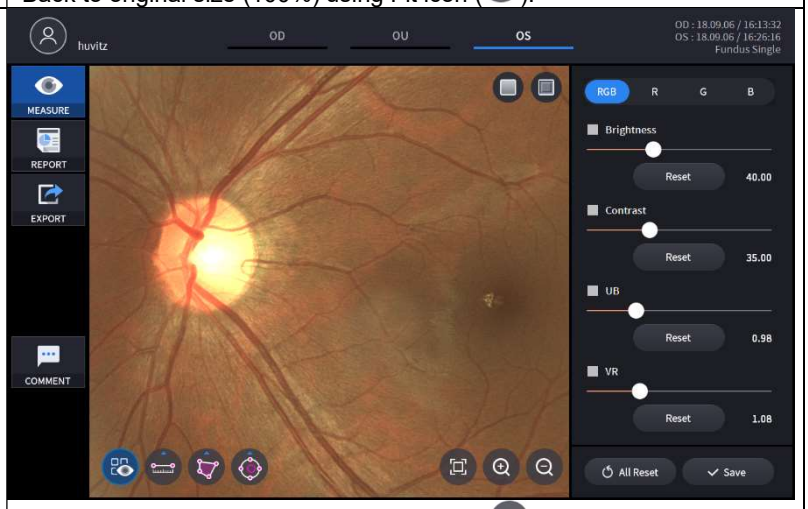
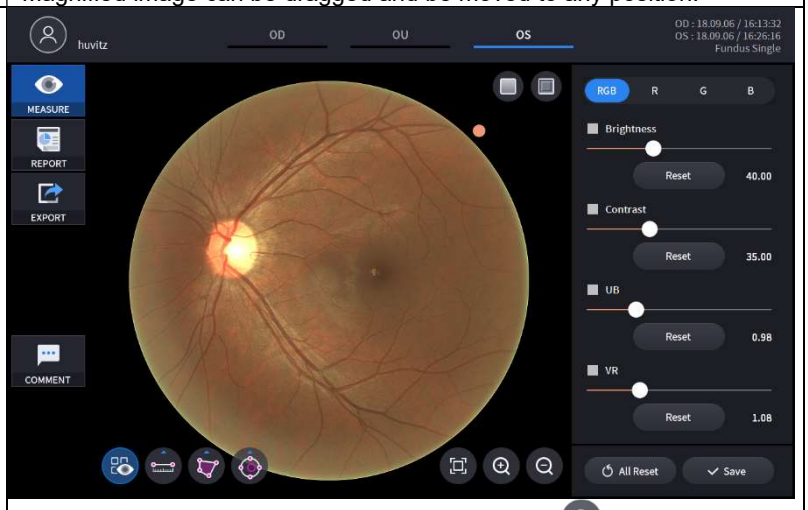


- Selecting a region with the Area measurement icon ( )shows the area of the region.
- Latest data can be deleted using Undo icon ( ).
- Only usable with measurement result icon ( ) ON.



- With C/D ratio measurement switch icon ( ), clicking a point on the fundus image produces two concentric circles at the point. C/D ratio is calculated as the ratio of area of the two circles. The shape and size of each circles are adjusted by dragging the marks on the circles.
- Latest data can be deleted using Undo icon ( ).
- Only usable with measurement result icon ( ) ON.

10. Magnified Image analysis is possible by selecting magnifying icon (, ,).

Icon	Screen and Function
	 - Back to original size (100%) using Fit icon ( ).
	 - Magnify Fundus Image using Zoom In icon ( ). - Magnified image can be dragged and be moved to any position.
	 - Reduce the magnified image using zoom out icon ( ). - Image will not be reduced to smaller than the original size.

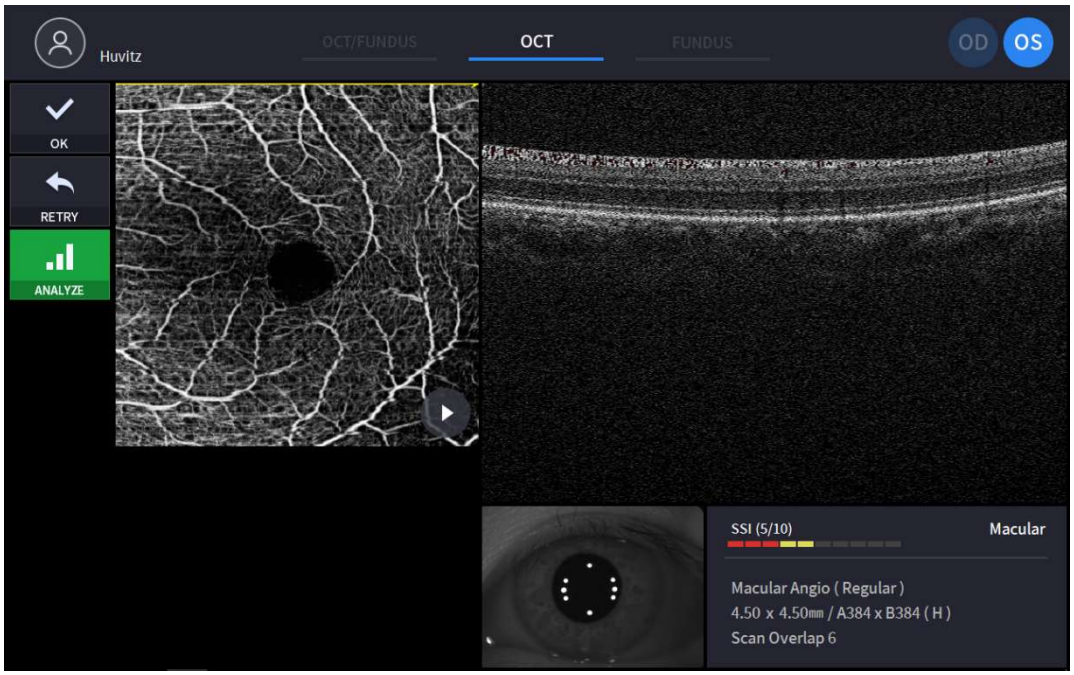
Angiography Analysis screen (Optional)

Angio OCT module is available as an upgrade to the SOCT system.

Angio can be used to detect flow within ocular tissue. The algorithm uses the variation information in the repeated B-scans to detect locations of flow within ocular tissue. The Angio scan protocol create a 3D scan data set, that combines the results of repeated B-scans. The Angio mode graphically represents the results giving by OCT images that contrast areas of flow and static tissue. The Angio scan which constructs angiography OCTA data is acquired by predefined A-scans and predefined B-scans. User can change the number of A-scan and B-scan in User Setup menu.

1. Going into Confirmation Screen

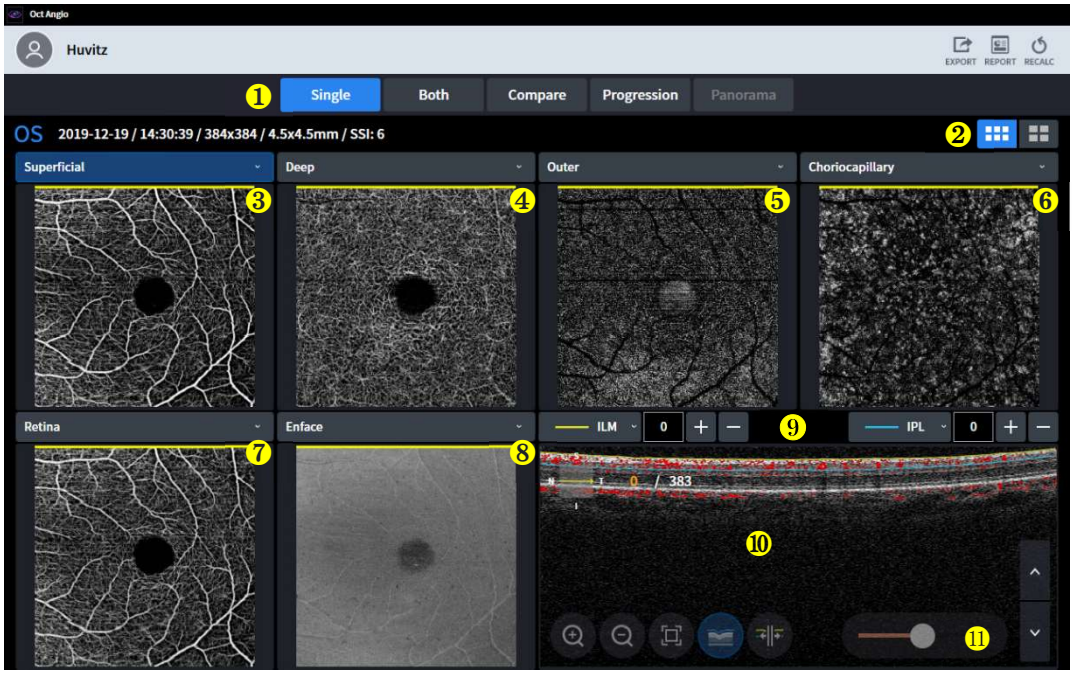
(1) If pressing ‘ANALYZE’ buton, Angiography Analysis is started.



(Refer ‘4.2.1. OCT/Fundus mode – Confirmation screen’ for uncommented item)

(2) After selecting one of Angiography examination, then press ‘ANALYZE’ to start Angiography Analysis.

2. Basic Display for an angiography



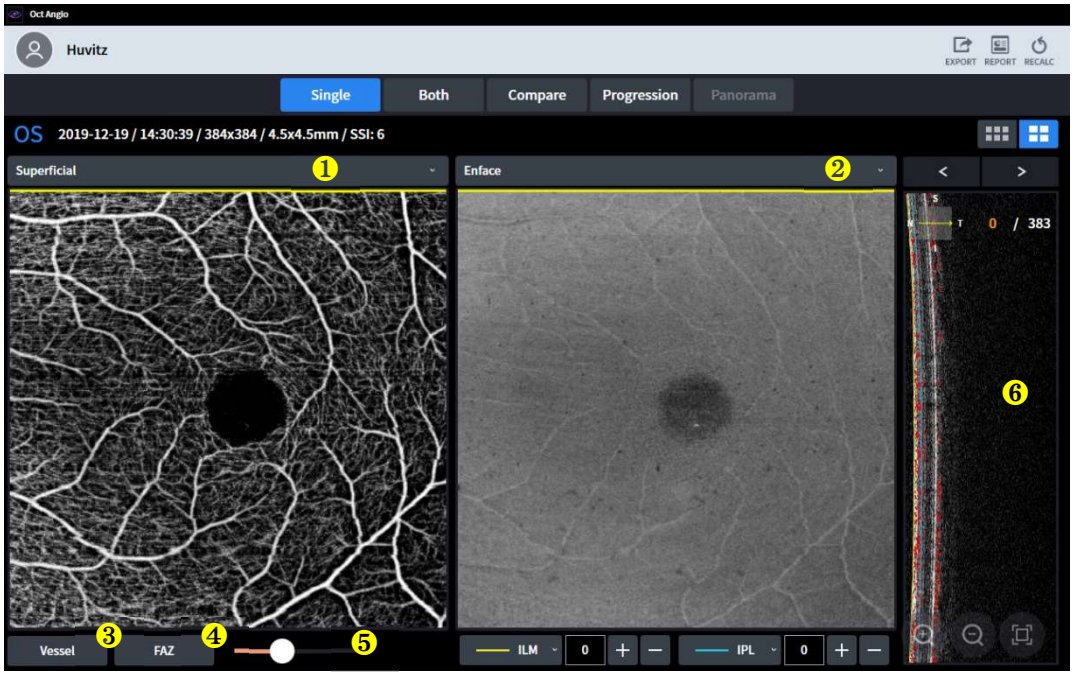
No	Name	Function
1	Screen setting	- Single: display angio information about only single eye. - Both: display angio information about both of eyes. - Compare: compare angio data from two different days. - Progression: It is easy to check the progress by comparing the eyes taken over several days. - Panorama: stitch several map and make one of big detail angio image.
2	Basic/Detail Display	Choose one between Basic angio map and Detail angio map.
3 4 5 6 7	Angio image	Select the angiogram in the combo box. - Superficial: Its signal depth is from ILM(0um) to IPL(0um). - Deep: Its signal depth is from IPL (0um) to OPL(0um). - Outer: Its signal depth is from OPL(0um) to BRM(0um). - Choriocapillary: Its signal depth is from BRM(15um) to BRM(45um). - Retina: Its signal depth is from ILM(0um) to OPL(0um). - Custom: Its signal depth is customized by user. As user set the depth range, angiogram is also changed
8	Enface, Thickness, Depth coded map	Select the image in the combo box. - Enface: It represent Enface image. - Thickness: It represent Thickness map. - Depth coded map: Choriocapillary, Deep, Outer map is overlapped in this image.
9	Layer and depth info	Inform the layer&depth of the displayed image. And User make the custom angiogram by setting the layer&depth with this tool bar.
10	B-Scan	Acquired B-Scan with angiogram. And Tomography can overlap with a red color for a blood probability.
11	Sensitivity slider	Control blood vessel sensitivity with this slider.

The SOCT algorithm calculates the decorrelation value for each pixel in the B-scan by comparing the OCT signal intensity variations across the B-scans in each set. Static tissue locations, without flow, exhibit little variation in OCT signal intensity over the repeated B-scans; Therefore, the decorrelation values would be low. Tissue locations with flow (for example inside a flowing vessel), show large variations in OCT signal intensity over the repeated B-scans. At these pixel locations, the decorrelation values would be high, indicating the presence of flow. The Angiogram image is a graphical representation of

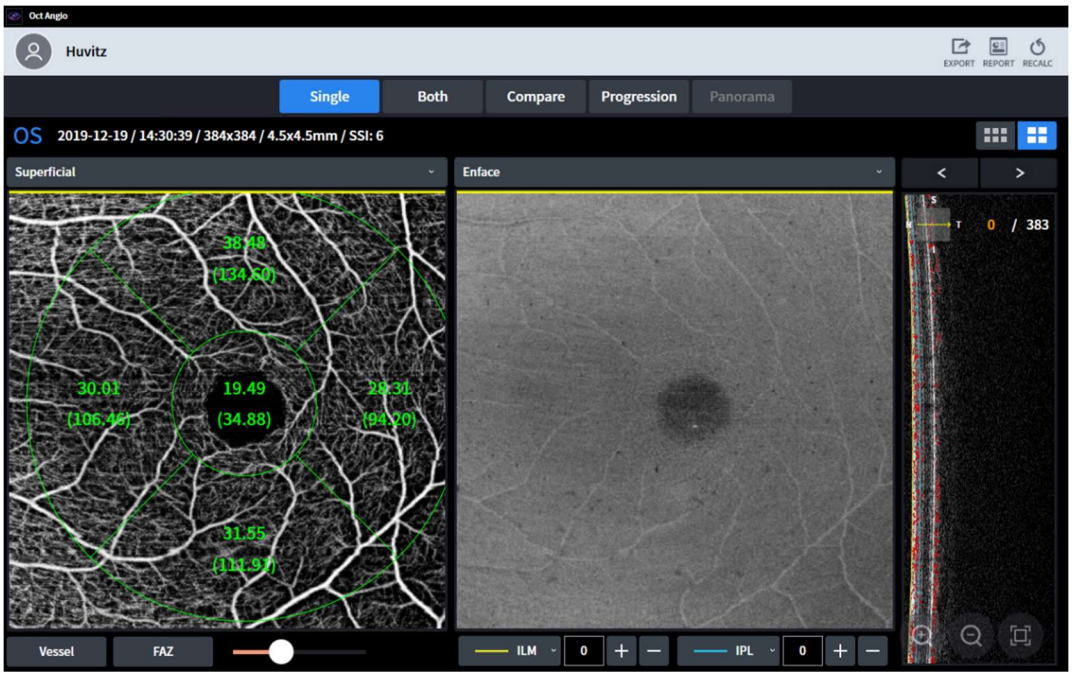
the calculated decorrelation values, with high decorrelation values indicating flow and low decorrelation values indicating static tissue.

Information displayed on the angiogram object is extracted from the space limited by position of the top (selected retina layer and their offset) boundary and bottom (retina layer and their offset) boundary.

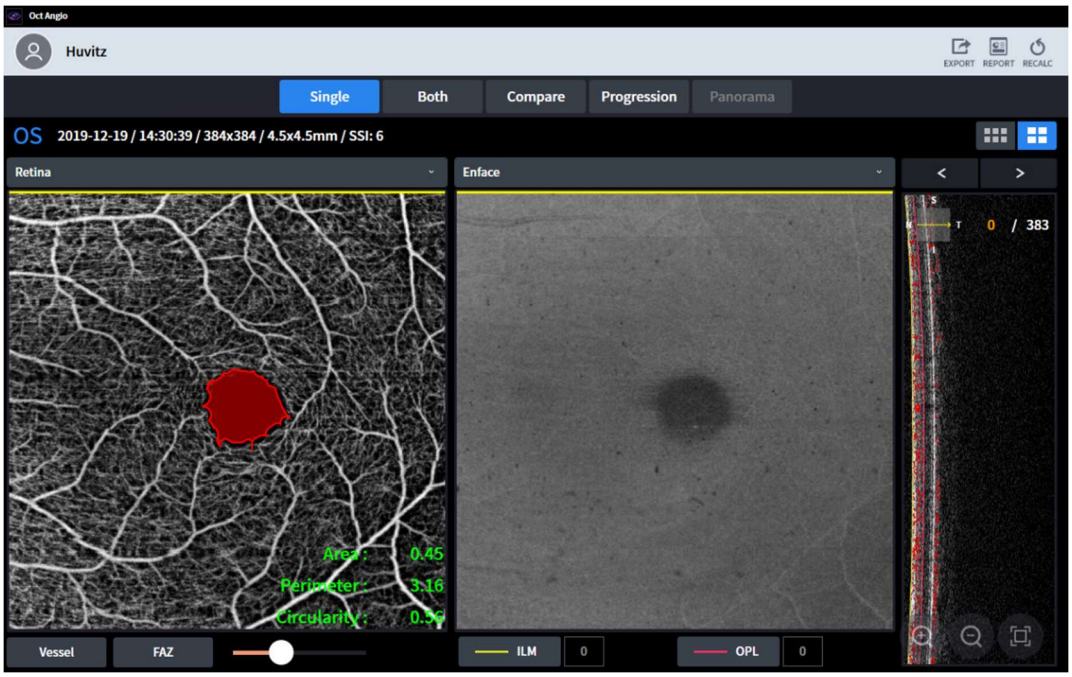
3. Detailed display for an angiography



No	Name	Function
1	Angio image	Select the angiogram in the combo box. - Superficial: Its signal depth is from ILM(0um) to IPL(0um). - Deep: Its signal depth is from IPL (0um) to OPL(0um). - Outer: Its signal depth is from OPL(0um) to BRM(0um). - Choriocapillary: Its signal depth is from BRM(15um) to BRM(45um). - Retina: Its signal depth is from ILM(0um) to OPL(0um). - Custom: Its signal depth is customized by user. As user set the depth range, angiogram is also changed
2	Enface, Thickness, Depth coded map	Select the image in the combo box. - Enface: It represent Enface image. - Thickness: It represent Thickness map. - Depth coded map: Choriocapillary, Deep, Outer map is overlapped in this image.
3	Vessel	-Calculate Blood vessel densities and Flows in each sections.
4	FAZ	Fovea Avascular Zone -Area: FAZ area in mm^2. -Perimeter: FAZ perimeter in mm. -Circularity: FAZ circularity ratio.
5	Sensitivity slider	Control blood vessel sensitivity with this slider.
6	B-Scan	Acquired B-Scan with angiogram. And Tomography can overlap with a red color for a blood probability.


Oct Angio
Huvitz
EXPORT
REPORT
RECALC
Single
Both
Compare
Progression
Panorama
OS
2019-12-19 / 14:30:39 / 384x384 / 4.5x4.5mm / SSI: 6
Superficial
Enface
38.48
(134.60)
30.01
(106.46)
19.49
(34.88)
28.31
(94.20)
31.55
(111.91)
0 / 383
Vessel
FAZ
ILM
0
IPL
0

-Vessel


Oct Angio
Huvitz
EXPORT
REPORT
RECALC
Single
Both
Compare
Progression
Panorama
OS
2019-12-19 / 14:30:39 / 384x384 / 4.5x4.5mm / SSI: 6
Retina
Enface
0 / 383
Area: 0.45
Perimeter: 3.16
Circularity: 0.56
Vessel
FAZ
ILM
0
OPL
0

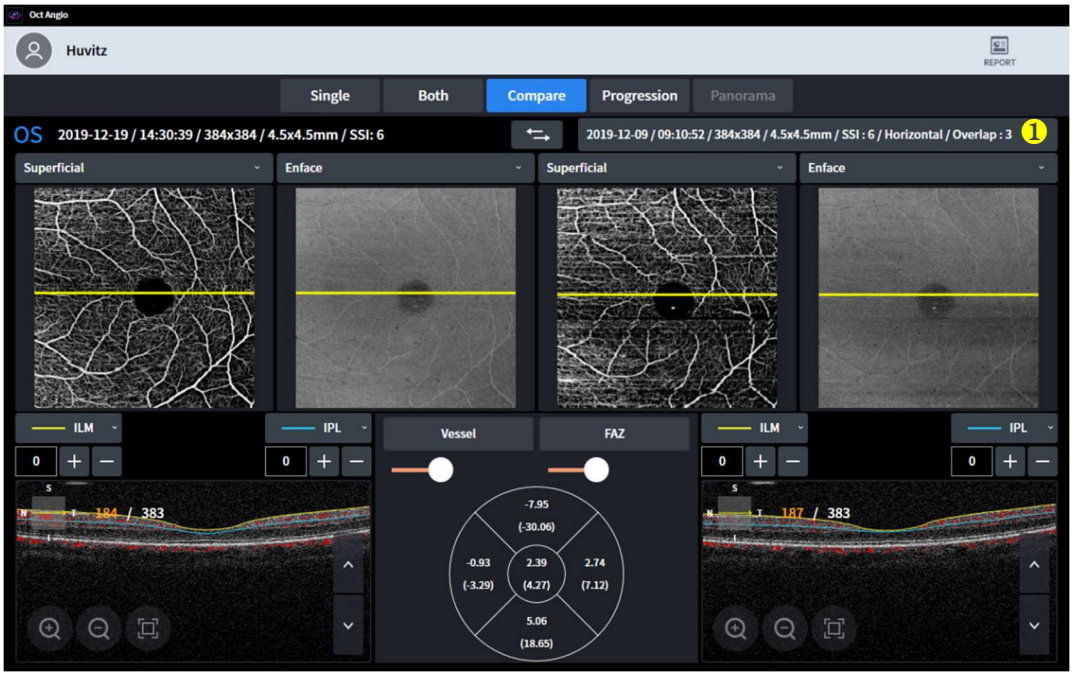
-Faz

4. OU Display for an angiography



No	Name	Function
1	Change OD/OS	Change the standard of single eye.
2	Sensitivity slider	Control blood vessel sensitivity with this slider.

5. Comparison Display for angiography



(1) Comparison Display shows you two examinations in order to compare.
(2) Users can select one of examinations in the examination list.

(3) Comparison Display enables users to compare today's examination with one of previous examination.

No	Name	Function
1	Data list box	Select data with which you want to compare in the list box.

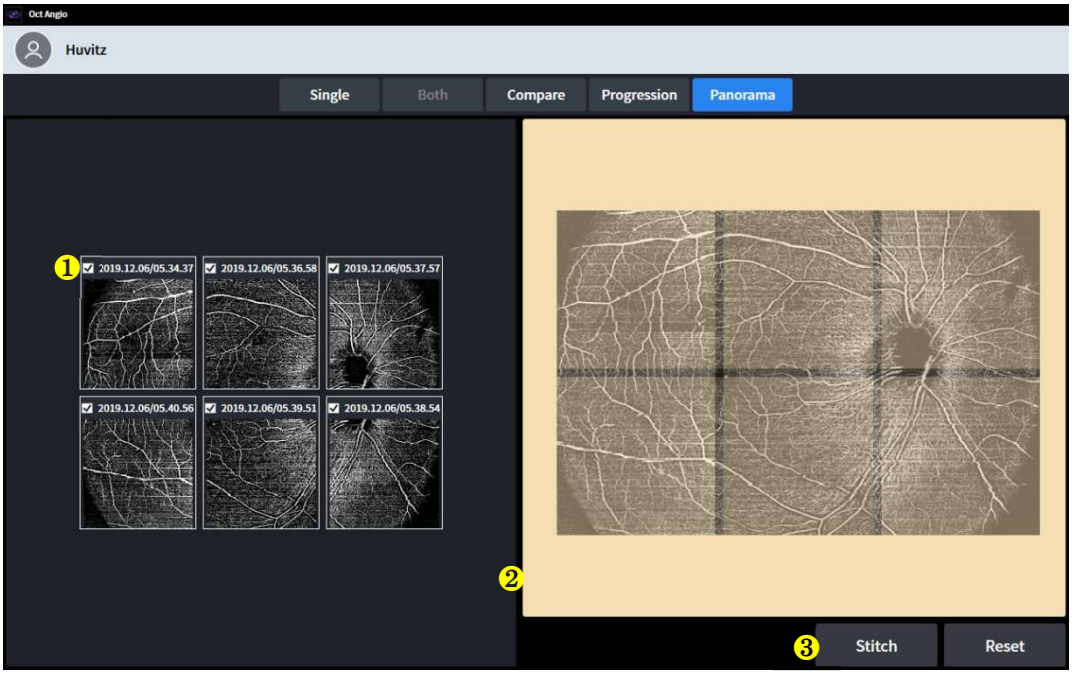
6. Progression Display for angiography



(1) Progression Display shows users the trend of sequential examinations.
(2) All examinations are ordered by time, and the oldest examination is placed at first.

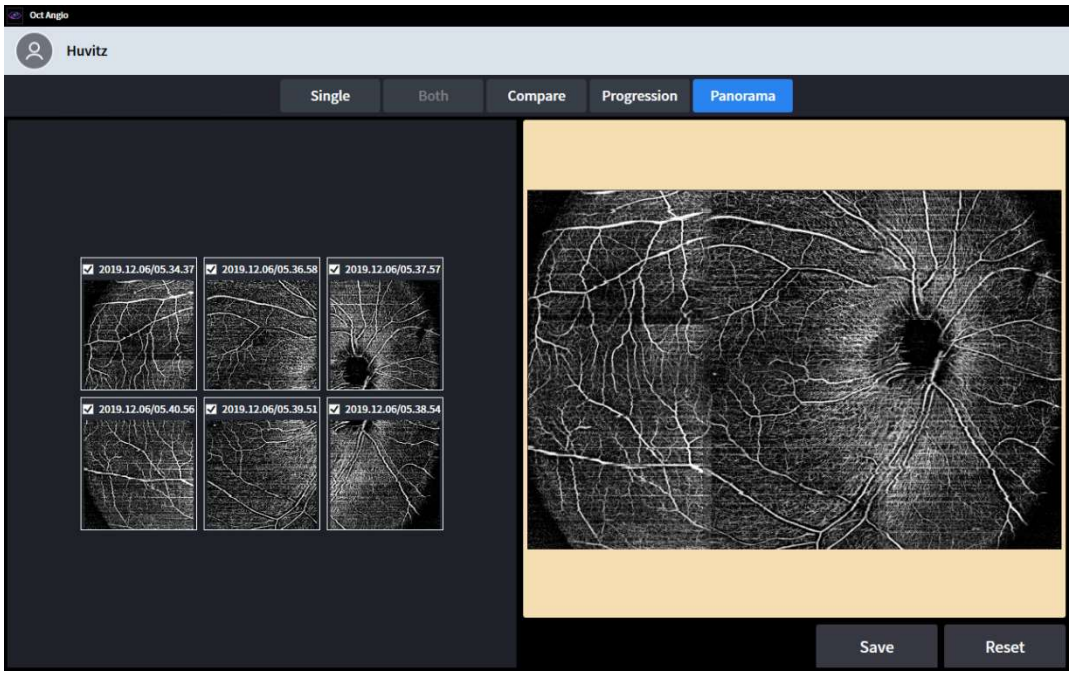
No	Name	Function
1	Data list box.	Select data with which you want to compare in the list box.
2		
3		
4	Angio image	Select the angiogram in the combo box. - Superficial: Its signal depth is from ILM(0um) to IPL(0um). - Deep: Its signal depth is from IPL (0um) to OPL(0um). - Outer: Its signal depth is from OPL(0um) to BRM(0um). - Choriocapillary: Its signal depth is from BRM(15um) to BRM(45um). - Retina: Its signal depth is from ILM(0um) to OPL(0um). - Custom: Its signal depth is customized by user. As user set the depth range, angiogram is also changed
5	Vessel&FAZ graph	It shows progression with graph.

7. Panorama Display for angiography



(1) Panorama Display shows users bigger and more detail angiography.
(2) If user capture several part of angiography with panorama mode, it can be stitched with panorama-page.
(3) And make small-angiography big.

No	Name	Function
1	Check box	Select angio-image, which want to stitch.
2	Layout	Arrange the angio-image for best position.
3	Stitch&Reset	Stitch: After Arrangement, make it one image. Reset: Arrange again if angio-image is placed wrong position.



(4) It can be saved when it done.

Biometry Analysis screen (Optional)

Biometry OCT module is available as an upgrade to the HOCT system.

1. Basic Display for biometry



번호	명칭	기능
1	Screen setting	- Single: display Biometry information about only single eye. - OU: display Biometry information about both of eyes.
2	OD / OS	Indicates which side of eye is showing.
3	Full Anterior	Display the measurement results of the Full Anterior (Bscan)
4	Anterior Radial results	Display the measurement results of the Anterior Radial (Thickness map)
5	Axial Length results	Display the measurement results of the Axial Length (AL)
6	Lens Thickness results	Display the measurement results of the Lens Thickness (ACD, LT, CCT)
7	Axial Length Bscan Image	Display selected Bscan Image in (5)
8	Lens Thickness Bscan Image	Display selected Bscan Image in (6)

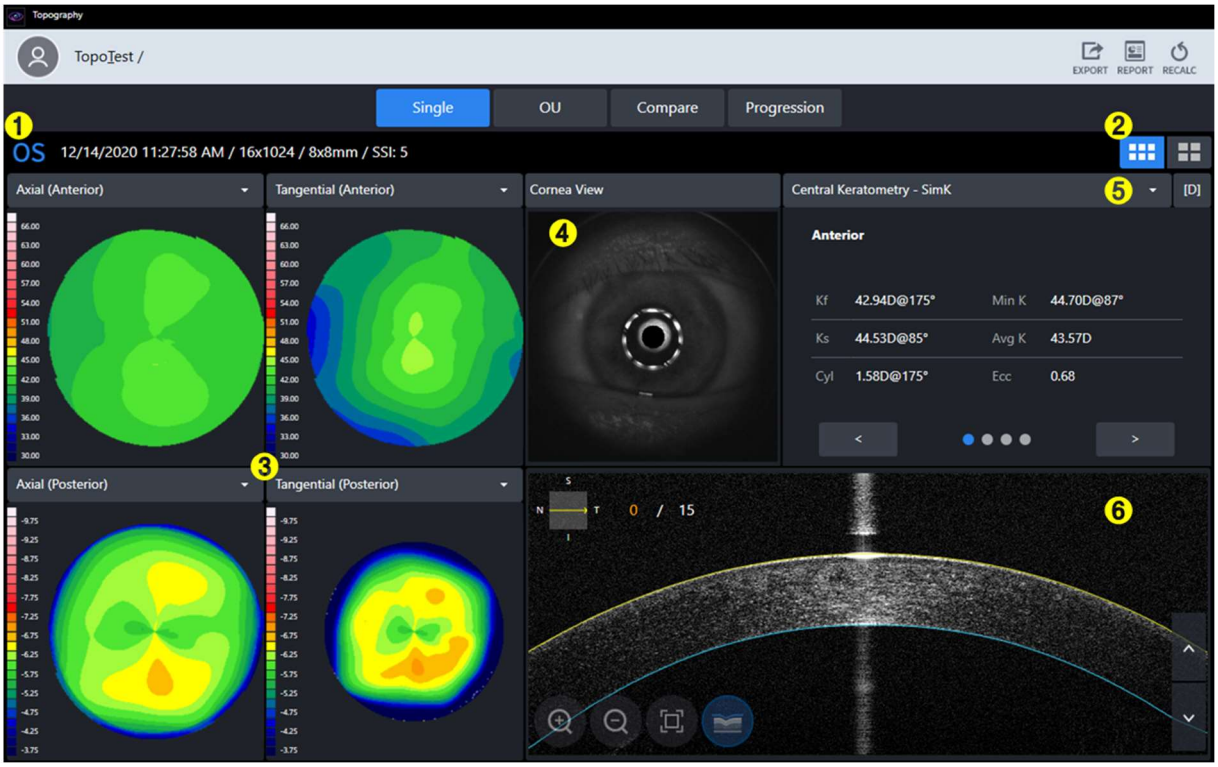
2. OU Display for biometry



번호	명칭	기능
1	Axial Length Results (OD)	Display the measurement results of the Axial Length. (OD) (AL)
2	Lens Thickness Results (OD)	Display the measurement results of the Length Thickness. (OD) (ACD, LT, CCT)
3	Full Anterior Results (OD)	Display the measurement results of the Full Anterior(OD) (Bscan)
4	Anterior Radial Results (OD)	Display the measurement results of the Anterior Radial(OD) (Thickness map)
5	Axial Length Results (OS)	Display the measurement results of the Axial Length. (OS) (AL)
6	Lens Thickness Results (OS)	Display the measurement results of the Length Thickness. (OS) (ACD, LT, CCT)
7	Full Anterior Results (OS)	Display the measurement results of the Full Anterior(OS) (Bscan)
8	Anterior Radial Results (OS)	Display the measurement results of the Anterior Radial(OS) (Thickness map)

Topography Analysis screen (Optional)

1. Basic Display for Topography



번호	명칭	기능
1	Information	Display basic information for exam.
2	Basic/Detail Display	Choose one between Basic Topography map and Detail Topography map.
3	Topography map	Display Topography map.
4	Cornea View	Display Cornea Image.
5	Summary Table	Display Summary data table for analysis.
6	Bscan Image	Display Bscan for Topography.

2. Detailed Display for Topography



번호	명칭	기능
1	Basic/Detail Display	Choose one between Basic Topography map and Detail Topography map.
2	Topography map	Displays Topography map.
3	Summary Table	Displays Summary data table for analysis.
4	Change color scale and unit	Change the color scale and unit of curvature data.

3. OU Display for Topography



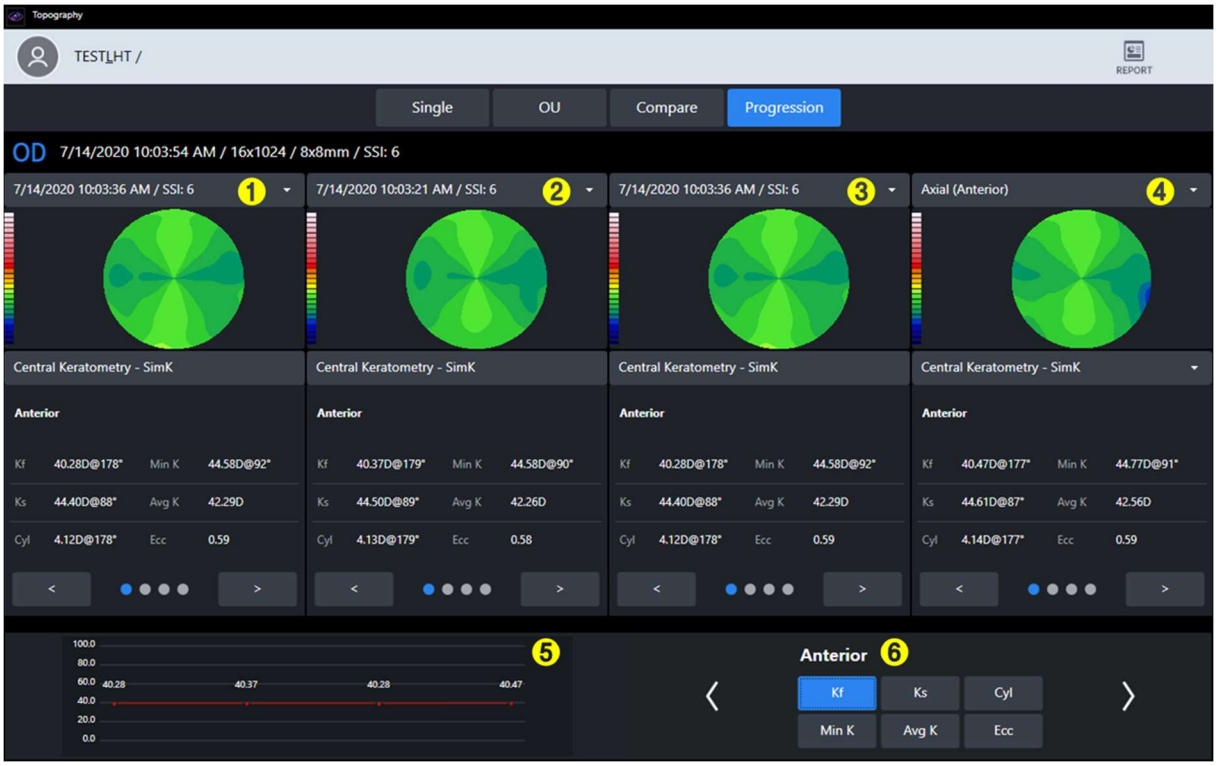
번호	명칭	기능
1	Data list box	Select data to compare in the list box.
2	Summary list box	Select summary table to compare in the list box.
3	Topography Map (OD)	Displays Topography map. (OD)
4	Difference	Displays difference data.
5	Topography Map (OS)	Displays Topography map. (OS)

4. Compare Display for Topography



번호	명칭	기능
1	Comparison reference data	Displays comparison reference data.
2	Comparison target data	Select comparison target data
3	Topography map	Select topography map to compare.
4	Difference map	Displays the difference in topography map between the reference and the comparison target.
5	Difference Summary Table	Displays numerically the difference between the reference data and the comparison data.

5. Progression Display for Topography

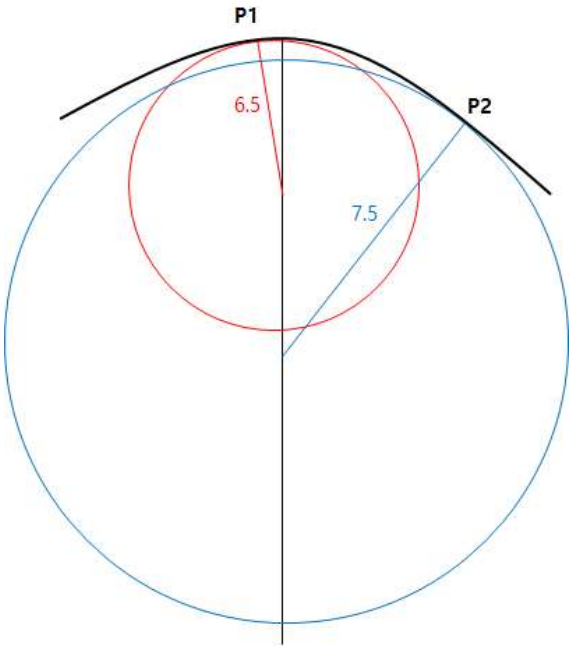


번호	명칭	기능
1	Progression Data Selection	Displays the map of the first comparison data.
2	Progression Data Selection	Displays the map of the second comparison data.
3	Progression Data Selection	Displays the map of the third comparison data.
4	Progression Data Selection	Displays the map of the fourth comparison data.
5	Progression Graph	Displays progression graph.
6	Graph setting	Select the analysis data to be displayed on the graph.

6. Topography map

I. Axial map

- This map is useful for understanding the overall curvature distribution of the cornea.
- Calculate the vertical distance from the corneal surface to the central optical axis as the radius of curvature.
- The radius of curvature always ends at the central optical axis.



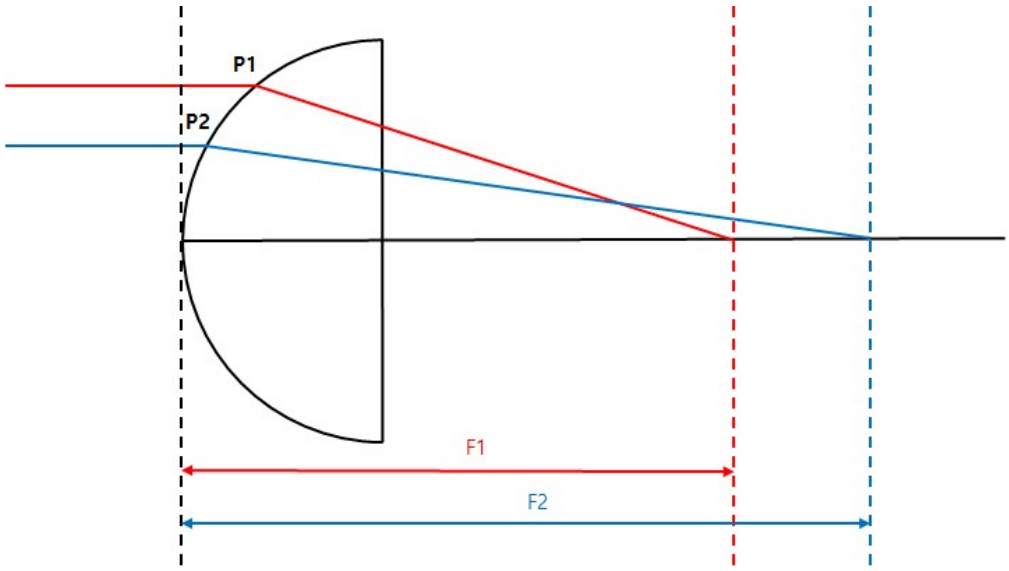
- For example, the curvature of points P1 and P2 on the measurement surface is 6.5 and 7.5, respectively.
- Also known as sagittal map.

II. Tangential map

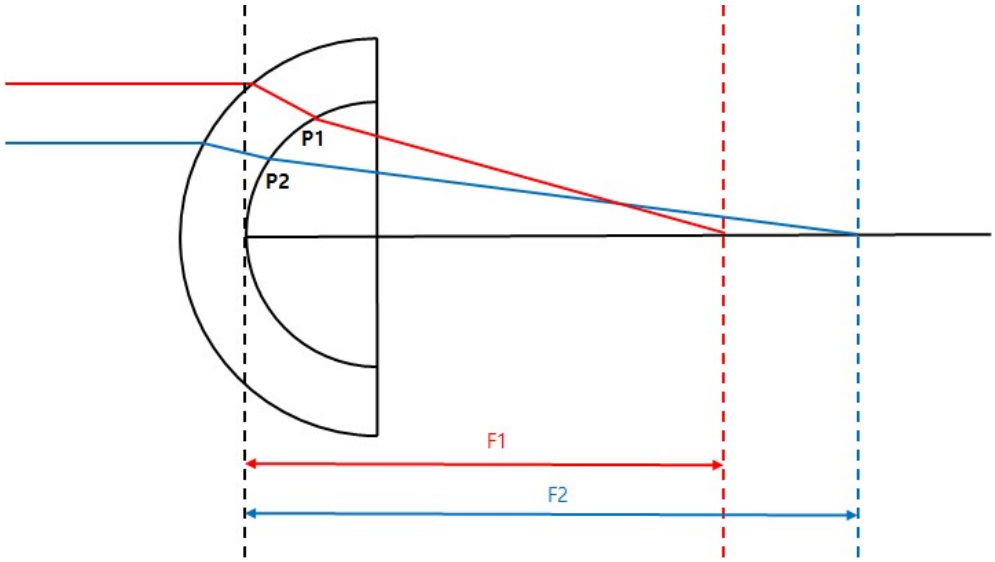
- This map is useful for understanding the partial curvature changes of the cornea.
- Calculate the instantaneous curvature of each position independent of the central optical axis.
- A more accurate curvature value can be identified for a particular position. But noise can occur as sensitive to change.

III. Refractive Power

- This map displays the refractive power of the cornea.
- Calculate the curvature using the Focal Length obtained by Snell's law.



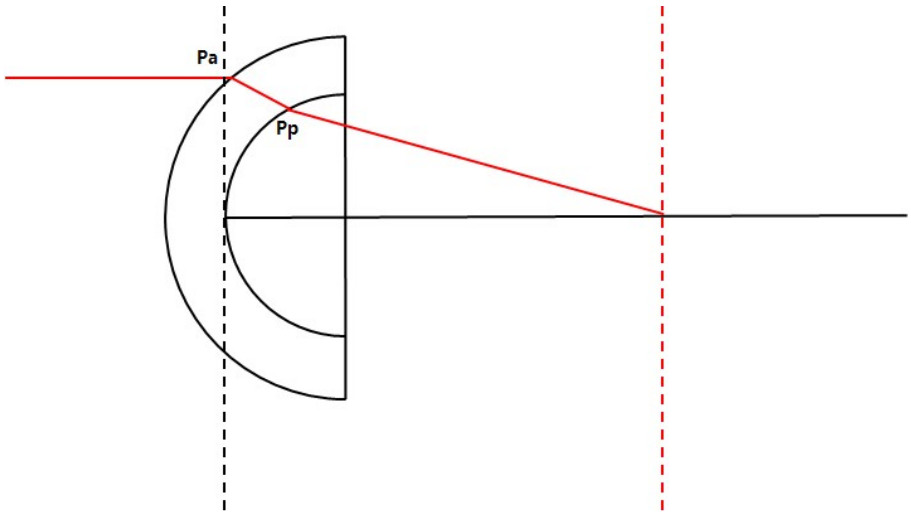
- Kerato map and Axial map display curvature of the front and use the Refractive index 1.3375 and 1.3376, respectively.
- Posterior map displays the rear curvature.



- Total map uses a ray tracing technique that tracks the movement of light through the cornea. The most accurate refractive power can be calculated by considering the slope of the anterior and posterior cornea, the thickness of the cornea, the difference in refractive index between the air and the corneal tissue and the vitreous body.

VII. Net Power

- This map displays the refractive power of the cornea.
- Total refractive power is the sum of the front and rea refractive power. The refractive power uses the curvature obtained by sagittal method.
- Use corneal index (1.376) for front refractive power calculations and Vitreous index(1.336) for rear refractive power calculations.



- If the path of incident light is the same as shown above, the Net Power at point Pa is [Reflection at Pa + Reflection at Pp].

VIII. Axial True Net

- This map displays the refractive power of the cornea.
- Calculate the total refractive force by considering the lens thickness and the refractive power at the front and rear. The refractive power uses the curvature obtained by sagittal method.
- Use corneal index (1.376) for front refractive force calculations and Vitreous index (1.336) for rear refractive force calculations.

IX. Equivalent Keratometer

- This map displays the refractive power of the cornea.
- Use a typical anterior and posterior corneal curvature ratio (0.822) and a simulated curvature ratio (0.8976).
- Equivalent Keratometer is designed to identify corneal refractive power in corneal surgery patients.

X. Elevation

- Assume the ideal circle that best fits the measured corneal data and calculate the difference between that circle and the measured data to make a map.

XII. Height

- Calculate the height difference between each part of the cornea and the cornea peak to make a map.

XIII. Pachymetry

- Calculate the thickness of the cornea to make a map.

XIV. Epithelium

- Calculate the thickness of the Epithelium to make a map.

7. Topography Analysis Data

I. Central Keratometry - SimK

- Displays the simulated Keratometry value of the central area(3mm)
- Calculate based on Axial map data.

II. Keratometry (Meridian)

- Meridian(bidirectional) Astigmatism information by area(3mm, 5mm, 7mm) is displayed.
- The minor axis(Ks) is determined in the direction vertical to the major axis(Kf).
- Calculate based on Axial map data.

III. Keratometry (SemiMeridian)

- Semi-Meridian(unidirectional) Astigmatism information by area(3mm, 5mm, 7mm) is displayed.
- Calculate the minor axis(Ks) and the major axis(Kf) and the major axis(Kf) is calculated for the right and left side of the eye, respectively.
- Calculate based on Axial map data.

IV. Keratoconus screening

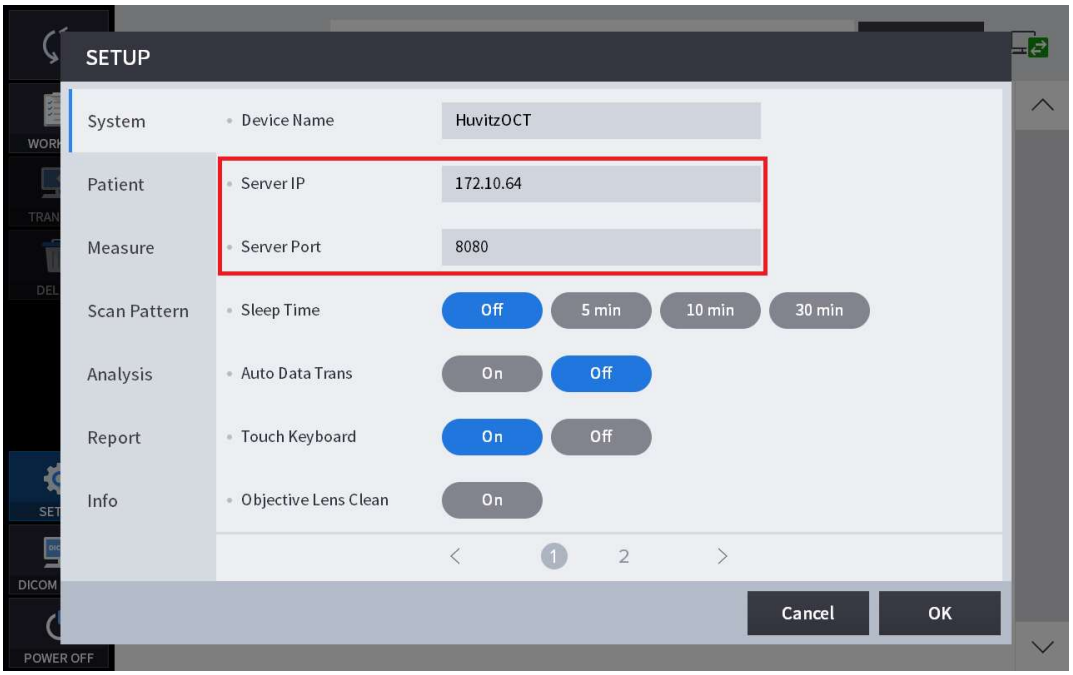
- Analyze information that can be used as a reference for conical cornea diagnosis.
- Keratoconus Prediction Index
  - The following index information is analyzed to predict and display the probability of conical cornea.
- Keratoconus
  - Analyze KPI and the following index information to predict and display the corneal condition.
- Surface Asymmetry Index
  - For all locations on the map, the average value of the difference in refractive power form the opposite point is displayed.
- Differential Sector Index
  - Divide the entire area into 8 sectors according to the direction and calculate the average power of each sector.
  - Display the difference by taking the two values with the most difference of them.
- Opposite Sector Index
  - Divide the entire area into 8 sectors according to the direction and calculate the average power of each sector.
  - Display the most difference by compared with the value in the opposite direction.
- Central/Surrounding Index
  - Divide the entire area into a central area and an outer area and calculate the average power of each area.
  - Display the difference between the two values.
- Irregular Astigmatism Index
  - Display as a numerical value After calculating the difference between each ring and the surrounding ring.

V. Pachymetry

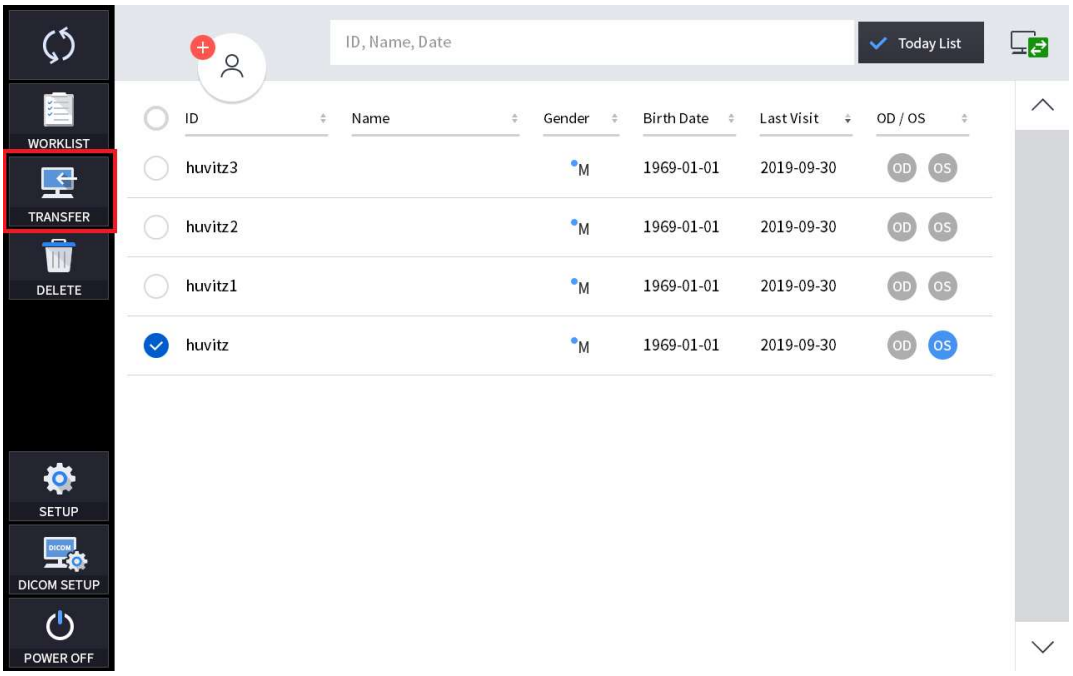
- Display thickness information of cornea.

6.10. Send data to Web-Viewer

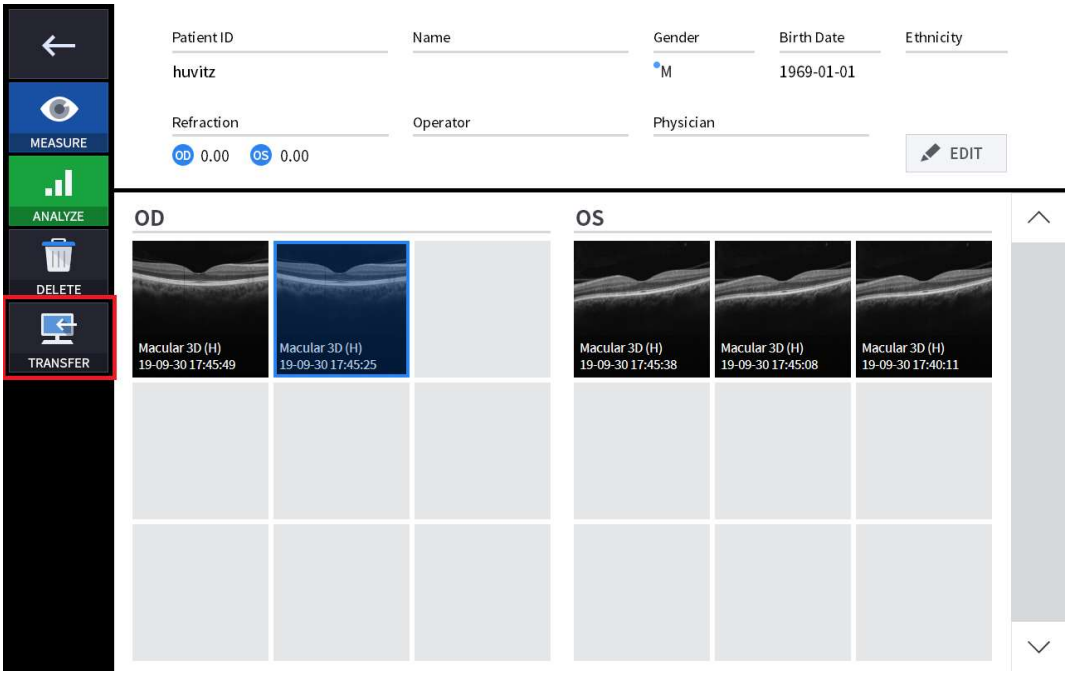
1. Fill in Server IP and Server Port information.
   (Server IP, it means local IP address, where HIS S/W program is installed. And Server Port is fixed with 8080.)



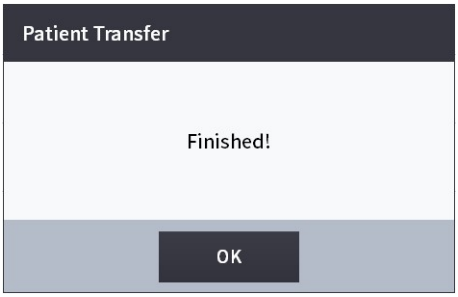
2. Select patients in the Patients List. And Clicking 'TRANSFER' button, send all of the patient data.



3. Select data in Data List. And Clicking 'TRANSFER' button, send the data.



4. When it succeeded to send data, the following message box popped up on the window.



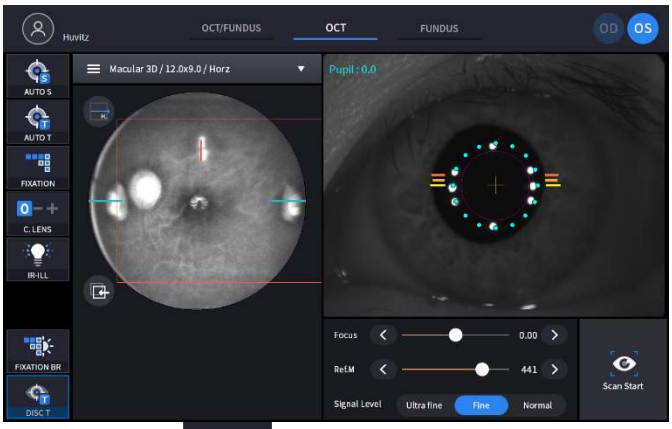
6.11. Maintenance

After operation

1. Exit HOCT software and Power off.

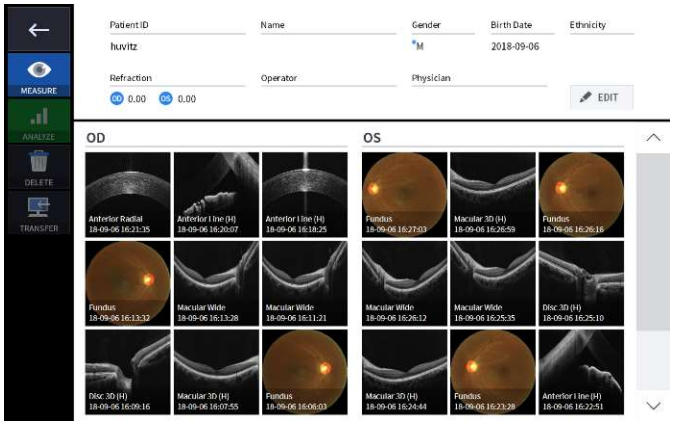
(1) Select the Patient information icon ( ) in the upper left corner of the screen.

❶



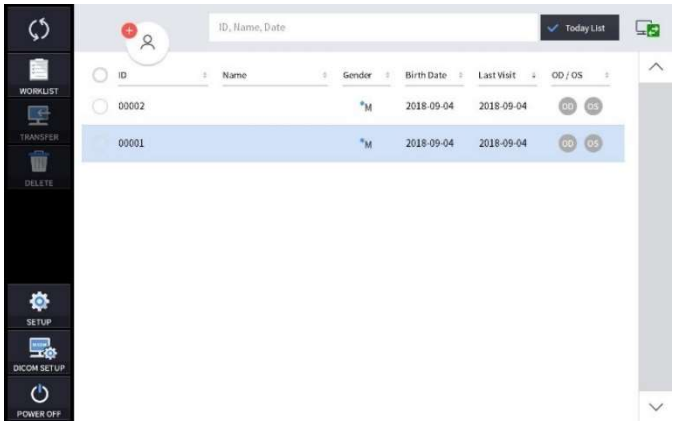
(2) Select the Previous screen icon ( ) in the upper left corner of the screen.

❷

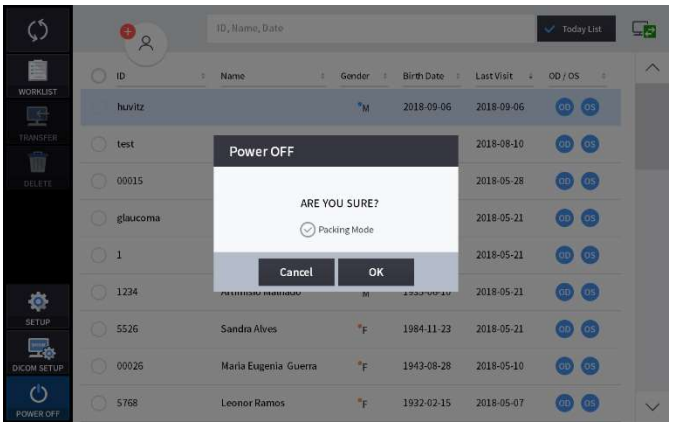


(3) Select the Power Off icon (POWER OFF) from the bottom left corner of the screen.

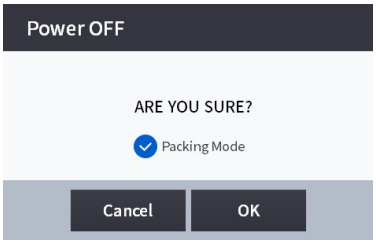
❸



(4) Selecting POWER OFF icon (POWER OFF) shows a pop-up window show below.



(5) Checking the Packing Mode will move Chinrest and the body of HOCT to the lowest position before Power off (This is for packaging).

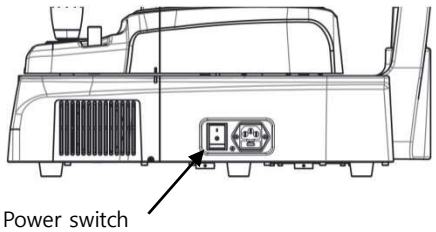


NOTE

Be sure to select the Packing Mode in order to place the equipment in the packing box.

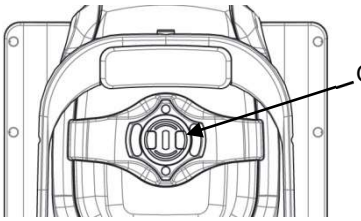
2. Turn off external devices (monitor, etc.) if any external device is connected.

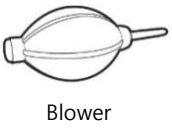
3. Turn the power switch off(O) on the base plate.



Cleaning

1. Cleaning objective lens and anterior segment adopter
   (1) Cover the objective lens with lens cap to protect the lens from external pollution.
   (2) Use blower for removing dust on the surface of lens.



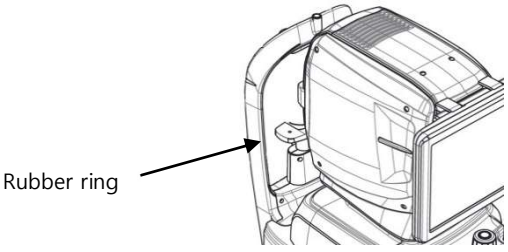


   (3) Any contaminants on the objective lens will affect the measurement. Wipe them using soft cotton swab or lens cleaning paper moistened with alcohol.
   (4) Be careful not to use the wrong tools, so as not to damage the surface of the lens.
   (5) When the Objective Lens Clean option in Setup mode is ON, the light is turned on to facilitate cleaning of the Objective Lens.
   (6) If anterior segment adapter is used for patients with any infectious disease, be sure to clean the Anterior segment adapter with cotton swab moistened with alcohol to prevent secondary infection.

2. System exterior
   (1) Keep system exterior clean with soft cloth. For severe stains, wipe with a soft cloth with neutral detergent diluted with water. Do not use organic solutions such as thinner or benzene.
   (2) Wipe the touch screen with dry soft cloth. Do not use sponge or cloth soaked with large amount of liquid.
   (3) Do not press hard or place magnetic objects near the touch screen.

3. Part of patient contact
   (1) Wipe the headrest and the chinrest with a clean cotton swab or gauze. For severe stains, use a soft cloth with alcohol.
   (2) Remove a single sheet of chinrest paper if the chinrest paper is used.

4. Others
   (1) Cover device with dustcover for unused storage for a long time.
   (2) Clean headrest and chinrest with alcohol before sending device to authorized agent or Huvitz for maintenance.
   (3) The rubber ring inserted to conceal the wires may be out during use. It can be used either by inserting it again or by removing it.



⚠ CAUTION

Do not use the solvents such as strongly volatile substance, thinner, benzene, etc

Do not use a sponge or cloth soaked in water because the water might leak into the equipment.

Clean headrest rubber and chinrest with an alcohol before sending device to authorized agent or Huvitz for maintenance.

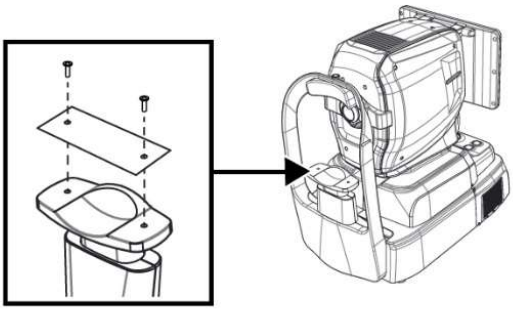
N'utilisez pas de solvants tels que des substances fortement volatiles, des diluants, du benzène, etc.

N'utilisez pas d'éponge ou de chiffon imbibé d'eau car l'eau pourrait s'infiltrer dans l'équipement.

Nettoyez le caoutchouc de l'appuie-tête et la mentonnière avec de l'alcool avant d'envoyer l'appareil à un agent autorisé ou à Huvitz pour l'entretien.

Replacement of consumables and fuse

1. Replacing chinrest paper
   (1) Pull out two fixing pins from chinrest.
   (2) Put a new chinrest paper on the chinrest.
   (3) Insert two fixing pins into the chinrest paper hole.
   (4) Attach the chinrest paper to the chinrest.



2. Replacing fuse
   (1) Ensure the power switch of device off (O).
   (2) Remove power cable from inlet.
   (3) Pull out fuse holder in the inlet with a tweezers.
   (4) Replace two new fuses in the fuse holder. Be sure to check the fuse specification for the replacement (250V T 3.15AL).
   (5) Insert fuse holder into the inlet.

Calibration

NOTE

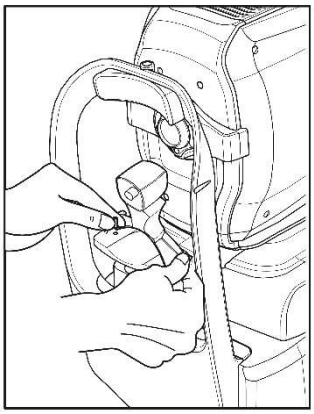
Huvitz recommends to calibrate the system once a year.
Contact to the HUVITZ's service technicians or other authorized experts.

Self-diagnosis using Model eye

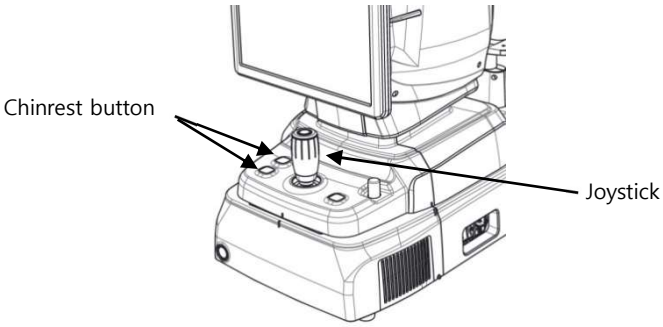
1. How to mount Model eye

(1) Remove chinrest paper.

(2) Mount Model eye as shown below and then fix it using two paper pins.



(3) Align the center of the Model eye with the objective lens using joystick and chinrest button.



2. Checking working distance

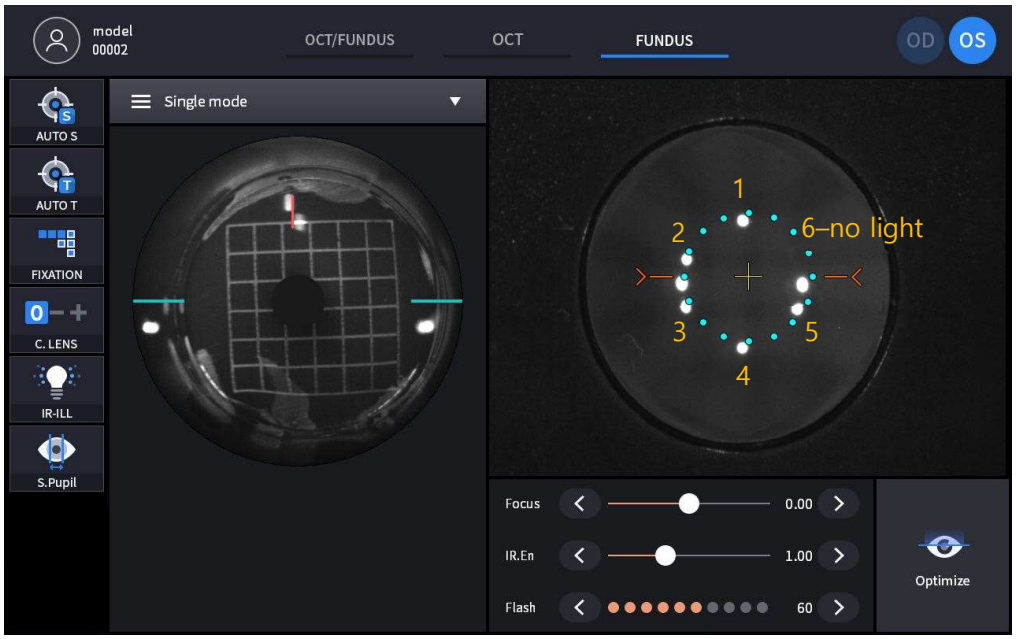
(1) Select FUNDUS measurement in MEASURE mode.



- At anterior screen, align the device till the target mark (circular orange) appears which indicated the Model eye and the device's alignment and focusing is correct.
- Align the device till the working dot marked red on the left IR screen to be positioned on the blue guide line and also the size to be smallest while maintaining the target mark (circular orange) to be displayed.
- KERATO SETUP shall be performed when the Working dot is extremely distorted while the target mark (circular orange) displayed.

3. Checking anterior lightning LED

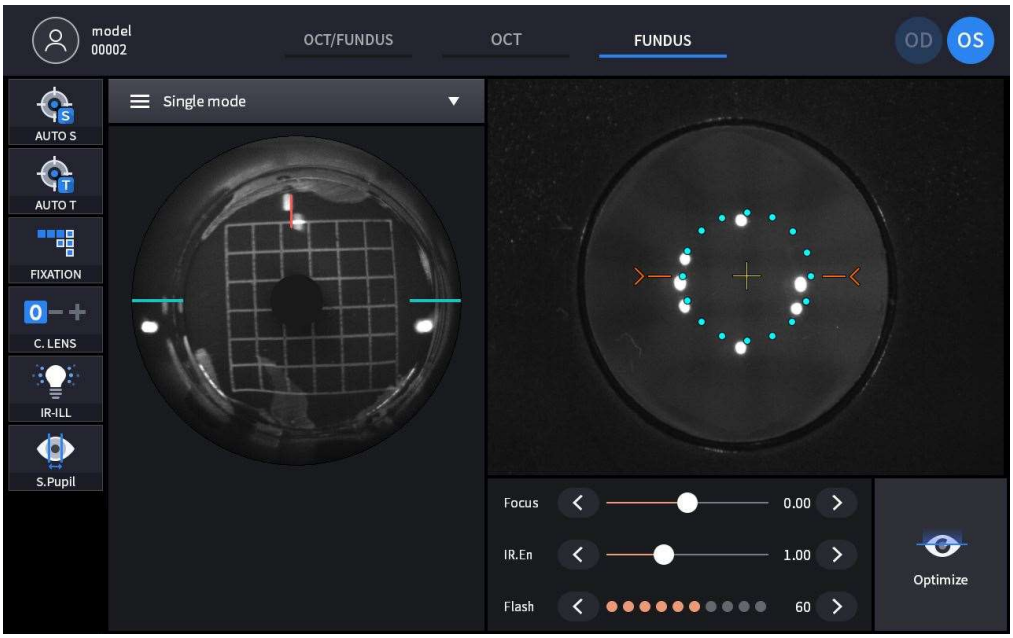
(1) Select FUNDUS measurement in MEASURE MODE.



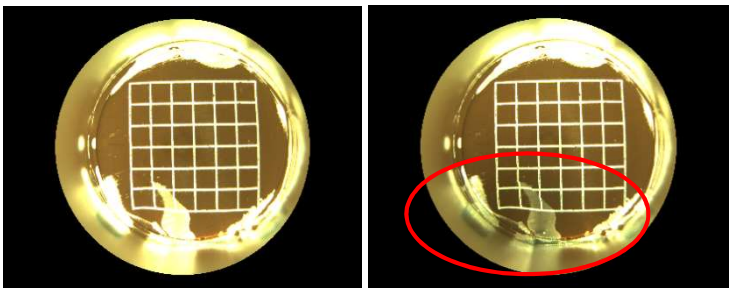
- Check anterior lighting LED. They consist of six dots except two center dots out of eight dots at anterior screen.
- KERATO SETUP shall be performed after changing LED when there is a problem with the LED and the LED shows OFF as number six shown in the picture.

4. Check Fundus Camera

(1) Select FUNDUS Mode and measure Fundus.

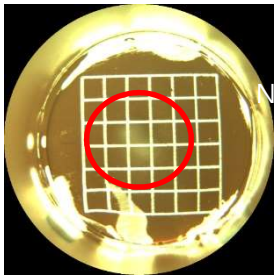


(2) Check if there are asymmetric areas as right picture from the measured images.



- If there are some, re-boot the device and measure again.

(3) Check if there are any blurriness or smear as below picture from the scanned images.

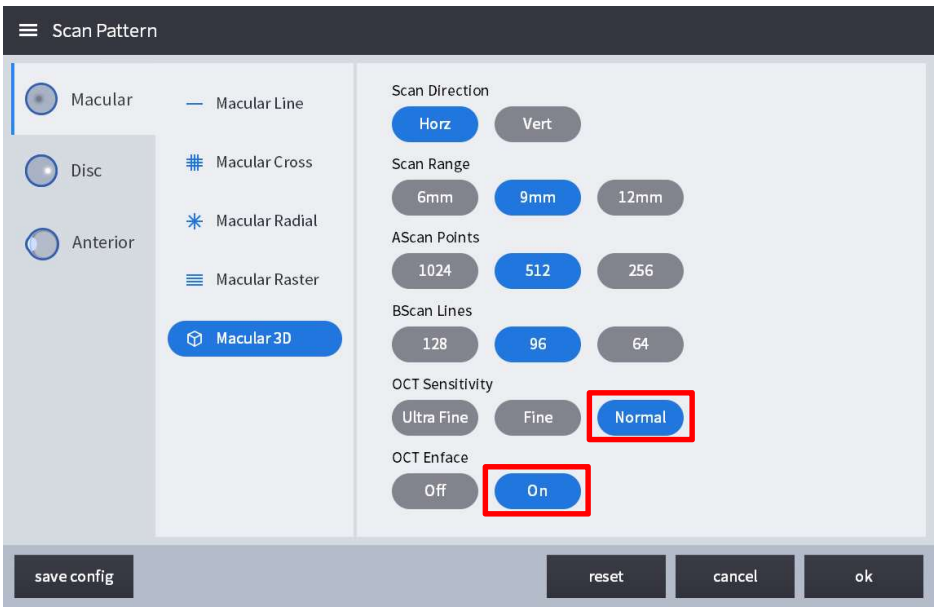


- If blurriness or smear appears, clean the finger prints or stain on the objective lens.

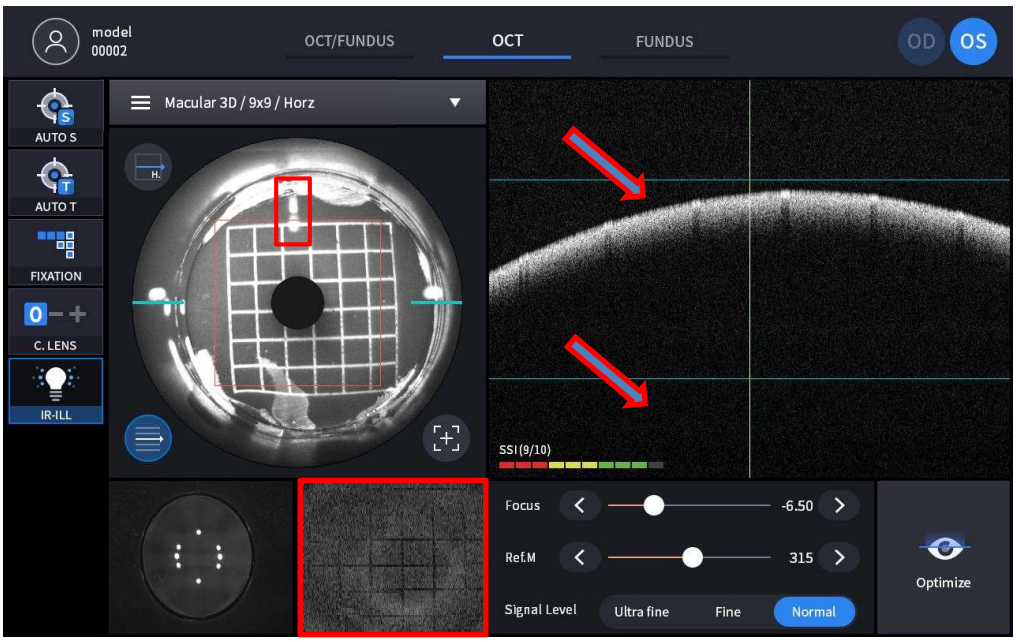
5. Check OCT Scan

(1) Select OCT Scan in MESURE Mode.

(2) Select Macular 3D at Scan Pattern and change the OCT Sensitivity to Normal as below picture and then turn the OCT Enface option to On.



(3) Scan will start automatically when the alignment and focusing is correct, and let the Bscan, IR Fundus and real time Enface screen to be displayed as below picture using Optimize function.



- Check if the Split Focus is aligned as straight line in IR FUNDUS screen.
- Check if the Retina image of the Bscan screen is in between the green guidelines.
- Check if the real time enface video marked with red rectangle shows grid pattern.

7

Troubleshooting Guide

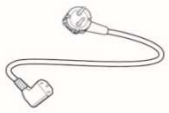
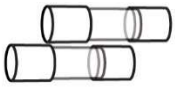
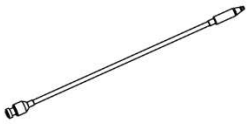
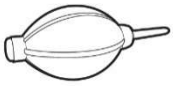
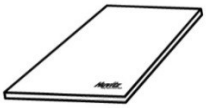
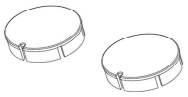
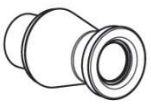
Should the device function improperly, attempt to correct the problem according to the following table before contacting sales distributors. Contact a sales distributor after turning off the power when the device does not resume normal operation even after taking the following measures.

Problem	Cause	Solution
The screen does not turn on.	The power cable may not connected.	Check the connection of the power cable.
	The power switch may not be turned on.	Check whether the power switch is turned on.
The screen does not turn on even though the system power is on	The system may be in sleep mode.	Restore the system from sleep mode by touching the screen.
The screen suddenly turns off		
The image of the intended part cannot be captured.	The patient may not be looking at the fixation target at the time of image capture	Instruct the patient to focus on the fixation target.
	The intended part may be outside the range for image captures.	Insert a compensation lens.
The quality of the captured image is low.	The objective lens or the lens of Anterior segment adapter may be contaminated.	Perform the cleaning.
	The patient’s eyelid or eyelashes may be interfering with image capture.	Ask the patient to open their eyes wider. If the patient cannot open their eyes wider, lift the patient’s lid, paying attention not to press against eyeballs.
The captured image is dark.	Alignment to and focus on the anterior eye front may not proper.	Manipulate the joystick to align the working dot to the center of the target mark.
	The amount of light for image capture may not be sufficient.	Increase flash intensity.
The internal fixation target is blurred.	The internal fixation target may be blurred because of compensation lens.	Remove compensation lens.

8

Specifications and Accessories

8.1. Standard Accessories

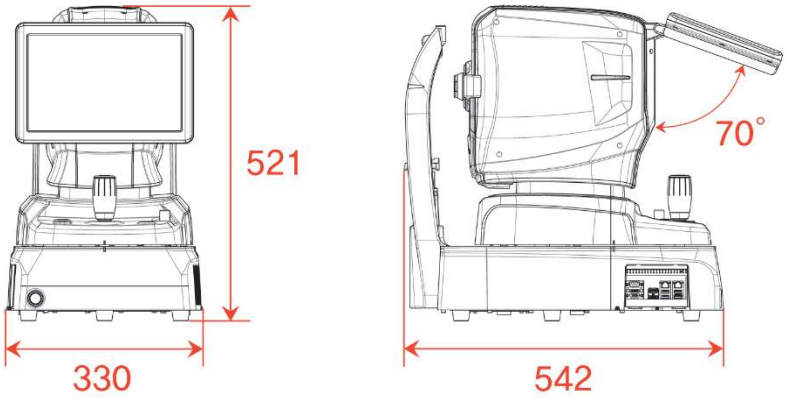
		
Chinrest paper	Touch pen	Power cable
		
Fuse (250V T 3.15A)	Dust cover	External LED
		
Blower	User manual	Packing lock cap
		
Model Eye	anterior headrest rubber (optional)	Anterior segment adapter, Wide Anterior segment adapter (optional)

8.2. Specifications

OCT	
Principle	Spectral domain OCT, Fundus digital photography
Light source	840 nm
Scan speed	Max. 80,000 A-Scan/sec.
Resolution in tissue	20 um(Lateral), 7 um(z-axis) at index 1.36
Scan Range	X: 6 ~ 12 mm, Y: 6 ~ 9 mm, Z: 2.34 mm
Display resolution	X: 5.85 um, Y: 23.40 um, Z: 3.05 um
Minimum pupil diameter	2.5 mm
Scan patterns	Macular: Macular Line, Macular Cross, Macular Radial, Macular 3D, Macular Raster, Angio(Option) Disk: Disc Circle, Disc Radial, Disc 3D, Disc Raster, Angio(Option)
Optical power at cornea	≤ 1.3 mW
Acquisition time of 3D image	1.0 sec. (Normal mode, A512 x B96)
Depth Accuracy (measuring 1mm glass)	±3%
OCT Angiography – Option(HOCT-1, HOCT-1F)	
Angiography Range	3-9mm
Angiography Map	Superficial, Deep, Outer, Choroicapilary, Retina, Custom, Enface, Thickness map, Depth coded map
Angiography Analysis	FAZ, Vessel Density
Fundus Camera (HOCT-1F)	
Type	Non-mydriatic fundus camera
Resolution	60 line pair/mm or more (center), 40 line pair/mm or more (middle), 25 line pair/mm or more (periphery)
Angle of view	45˚
Camera	Built-in 20Mega pixel, Color
Minimum pupil diameter	4.0 mm (Normal mode), 3.3 mm (Small pupil mode)
Flash light	White light, 10 levels
Pixel pitch at fundus	3.69um (20M Pixel Color)
Capture mode	Single Macular, Single Disc, Stereo Macular, Stereo Disc, Widefield panorama
Common specification	
Working distance	33 mm
Display	12.1 inch, 1280x800 pixel, Touch panel color LCD
Dioptric compensation for patient's eye	-33D ~ +33D total -13D ~ +13D with no compensation lens +7D ~ +33D with plus compensation lens -33D ~ -7D with minus compensation lens
Fixation target	LCD (internal), White LED (external)
Fundus illumination light	760 nm
Horizontal movement	70 mm (back and forth), 100 mm (left and right)
Vertical movement	30 mm
Chinrest movement	62 mm (up and down), motorized
Auto tracking	30mm (up and down), 10 mm (right and left), 10mm (back and forth)
Power supply	AC 100 - 240 V, 50/60 Hz, 1.6 - 0.7 A
PC	Built in computer
LCD Tilting Angle	70˚
Dimensions	330(W) x 542(D) x 521(H) mm
Mass	30 kg
Anterior segment adapter (optional)	
Working distance	15 mm
Scan range	6 ~ 9 mm (width), 2.3 mm (depth)
Scan pattern	ACA line, Anterior Radial
Software Analysis	Corneal Layers, Thickness map, Thickness, Angle

Wide Anterior segment adapter (optional)	
Working distance	15 mm
Scan range	16 mm (width), 2.3 mm (depth)
Scan pattern	ACA line, Anterior Radial, Full
Software Analysis	Dimension, Angle
Biometry (optional)	
Metric	Axial Length, Central Corneal Thickness, Anterior Chamber Depth, Crystalline Lens Thickness
Topography (optional)	
Supported Maps	Anterior Axial Map, Posterior Axial Map, Anterior Tangential Map, Posterior Tangential Map, Anterior Refractive Map, Posterior Refractive Map, Kerato Refractive Map, Total Refractive Map, Net Map, Axial True Net Map, Equivalent Keratometer Map, Anterior Elevation Map, Posterior Elevation Map, Height Map, Pachymetry Map, Epithelium Map
Web Viewer	
Feature	Web-Based, Multi users can be accessible Progression analysis, Comparison analysis, 3D Analysis

8.3. Drawings of System



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EMC INFORMATION

Manufacturer announcement – electromagnetic waves trouble

- **Electromagnetic waves trouble**

  HOCT-1/1F should be used in the below mentioned electromagnetic wave environment. HOCT-1/1F urchaser or user needs to confirm whether HOCT-1/1F 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

- **Electromagnetic waves tolerance**

  HOCT-1/1F is to be used in the below designated electromagnetic wave environment. HOCT-1/1F customer and user need to guarantee that the HOCT-1/1F 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 %UT(UT's > 95 % decrease) For 5 cycle, 40 % UT(UT's 60 % decrease) For 25 cycle, 70 %UT(UT's 30 % decrease) For 5 seconds < 5 % UT(UT's > 95 % decrease)	For 0.5 cycle < 5 %UT(UT's > 95 % decrease) For 5 cycle, 40 % UT(UT's 60 % decrease) For 25 cycle, 70 %UT(UT's 30 % decrease) For 5 seconds, < 5 %UT(UT's > 95 % decrease)
Power frequency magnetic field (50/60 Hz) IEC 61000－4－8	30 A/m	30 A/m
Other UT is the a.c. power voltage for before approving the test level.		

- **Electromagnetic waves tolerance**

HOCT-1/1F is to be used in the below mentioned electromagnetic wave environment. HOCT-1/1F purchaser or user needs to confirm whether HOCT-1/1F is sued 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	3 Vrms
Radioactivity RF electromagnetic field tolerance IEC 61000－4－3	10 V/m 80 MHz~2.7 GHz scope	10 V/m

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SERVICE INFORMATION

Repair: If the problem is not solved in spite of the settlement according to the contents of chapter 7, please contact to Huvitz's agent with the information on the following items.

1.1 Name of Equipment Type: Optical Coherence Tomography HOCT-1/HOCT-1F
1.2 Typical No.of Equipment: Typical number consisted of 8 digits and characters written on its name plate.
1.3 Explanation on its symptom: Description in detail.

Supply of parts required for repair:

1.4 The preservation period of parts required for repair of this machine is by seven(7) years after stopping to produce the product.

Parts to be repaired by qualified service manpower:

1.5 Parts below are consumable in their characteristics, or the quality of them shall degraded after the long time use. User should not replace them by him or herself. Please contact to Huvitz`s agent for the replacement if these parts are consumed enough or degraded by the longtime use.

1.6 Back up battery for clock and data.

■ How to Contact Huvitz Co., Ltd.

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(F/A)
E-mail : svc@huvitz.com website : www.huvitz.com

■ EU Representative

Medical Device Safety Service GmbH (MDSS)
Schiffgraben 41, 30175 Hannover, Germany
Tel: +49-511-6262-8630

■ Canada Representative

AXIS Medical Canada Inc.,
9820 Boulevard Du Golf, Anjou, QC
H1J 2Y7
Tel: 1 877 388-1515

■ U.S. Representative

COBURN TECHNOLOGIES
83 Gerber Road West, South Windsor, CT 06074, United states
Tel: +1-860-648-4906

■ **Brazil Representative**

QR Consulting

Importação e Distribuição de Produtos Médicos Ltda.
Rua Carlos Muzzi, 184. Palmeiras. Belo Horizonte-MG. CEP: 30.575-490
Resp Técnico: Ana Paula T. P. Castro – CRFMG 10060
Tel: Tel: +31-3021-8091

■ **Australia Representative**

OPTICARE

118 Adderley St, Auburn NSW 2144
PHONE: 02 9748 8777
FAX: 02 9748 8666

■ **UK Representative**

MDSS-UK RP LIMITED

6 Wilmslow Road, Rusholme
Manchester, M14, 5TP, England, United Kingdom
Tel: +44 (0)7898 375115

■ **Switzerland Authorized Representative**

MDSS CH GmbH
Laurenzenvorstadt 61
5000 Aarau
Switzerland
Email: info@mdssch.com

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