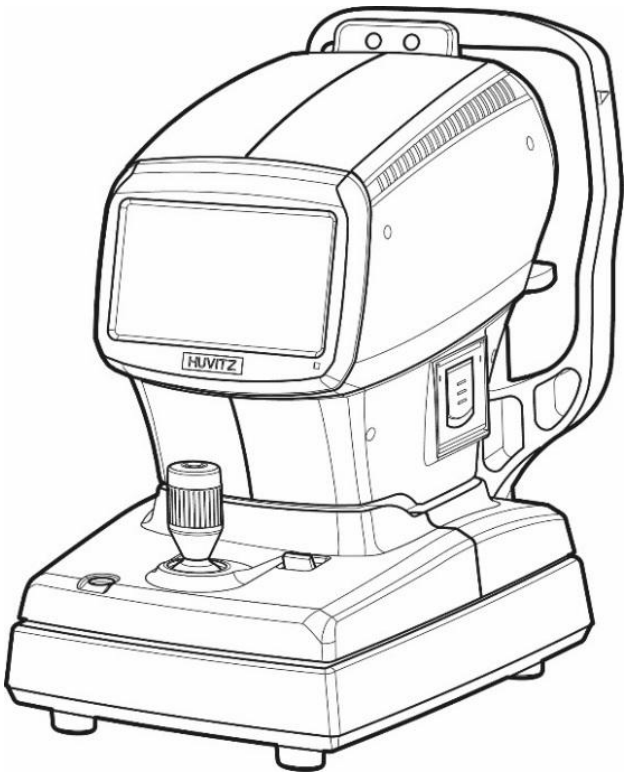
ENG

Huvitz

Non-Contact Tonometer

HNT-1 / 1P

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.

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1

Introduction

1.1. Intended Use

The Non-Contact Tonometer HNT-1 is intended to be used to measure the intraocular pressure of the human eye. HNT-1P is also provided measurement of patient's central corneal thickness, as well as HNT-1's function.

1.2. Indication for Use

The Non-Contact Tonometer HNT-1/1P is indicated for measuring intraocular pressure to aid in the screening and diagnosis of glaucoma. Non-contact Tonometer HNT-1/1P measured intraocular pressure of both eye by Auto alignment function. In particular, when a lot of lights are sensed the moment that compressed air is separated, prescription about glaucoma is possible by system that convert time to mmHg intraocular pressure after measure microseconds.
Automatic and passivity compensation function of measurement by cornea thickness are possible, It supply optimum intraocular pressure information.

1.3. Classification

- Classification of product: Class IIa according to Annex VIII (Rule 10) of the Medical Device Regulation 2017/745(MDR)
- Resistance against electric shock: Class I (earthed)
- Protection class against electric: Type B(Head rest rubber, chinrest paper)

1.4. 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
- ISO8612: Ophthalmic Instruments - Tonometer

1.5. Contraindication

Do not measure an eye whose cornea is easily damaged due to corneal disease or surgery

1.6. Patient Requirement

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.

1.7. Residual Risk

There is no any known residual risk.
However, when an unexpected event occurs such as power failure, restart HNT-1/1P in the usual way. If you are unable to do this or have different problem, please contact your local distributor or representative.

2

Safety Information

2.1. Overview

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

⚠ WARNING

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

"Warning" indique la présence d'un danger qui pourrait entraîner des blessures graves, la mort ou des dommages matériels importants si ignoré.

⚠ NOTE

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

"Note" décrit les informations pour l'installation, le fonctionnement ou la maintenance qui sont importantes mais liées aux dangers si elles sont ignorées.

⚠ CAUTION

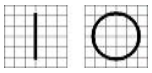
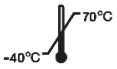
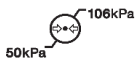
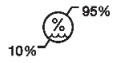
"Caution" indicates the presence of a hazard that could result in minor injury, or property damaged if ignored.

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

2.2. Symbol Explanation

2.2.1. Safety Symbol and Indication

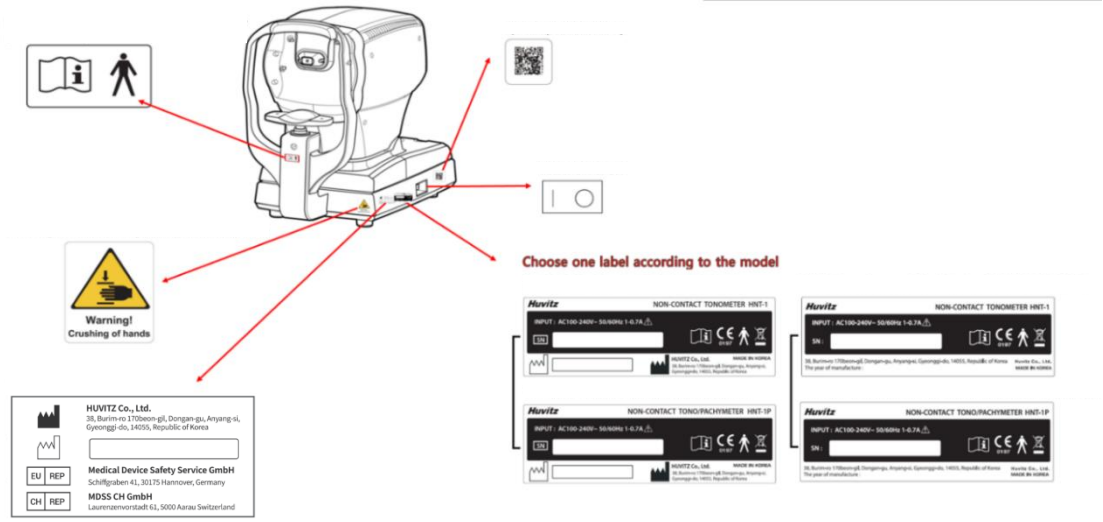
The International Electrotechnical Commission (IEC) has established a set of symbols for medical electronic equipment which classify a connection or warn of any potential hazards. The classifications and symbols are shown below.

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 0197	CE Mark (Marque CE)

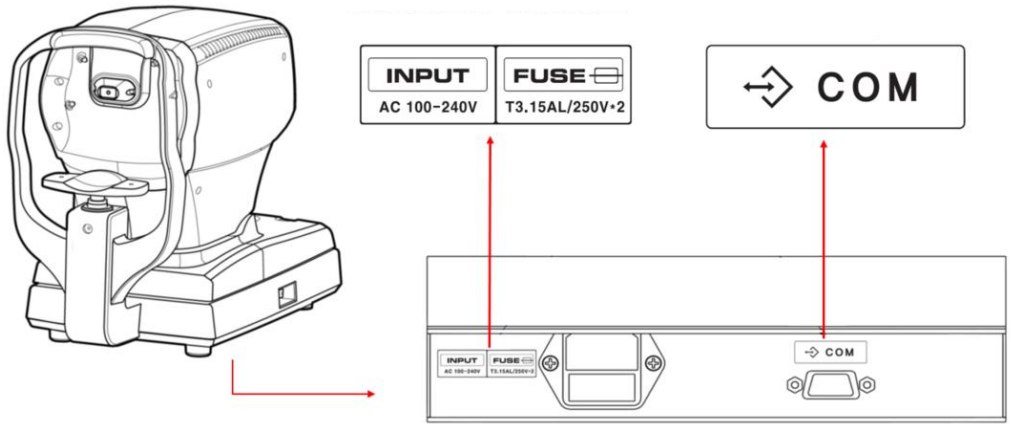
	Use no hook (N'utilisez aucun crochet)
	WEEE Symbol – EU only Disposal of your old appliance When this crossed-out wheeled bin symbol is attached to a product it means the product is covered by the European Directive 2002/96/EC. All electrical and electronic products should be disposed of separately 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.)
	COM Port (Port COM)

	Input power & FUSE rating (Puissance d'entrée et indice FUSE)
	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)
	Authorised Representative in Switzerland (Représentant autorisé dans la Sussie)
	To indicate this product is Medical device (Pour indiquer que ce produit est un dispositif medical)
	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.)

2.2.2. Safety Symbol location



[Front View of HNT-1(P)]



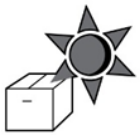
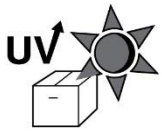
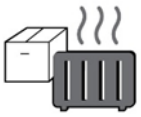
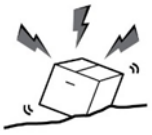
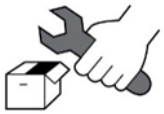
[Bottom side of HNT-1(P)]



[Package Box]

2.3. Environmental Considerations

Please avoid the environment below for the operation and storage of the equipment.

	A place where the equipment can be exposed to water. Do not operate the equipment with wet hand.
	A place where the equipment can be exposed to direct sunlight.
	A place where the equipment can be exposed to direct ultraviolet.
	Where the temperature changes frequently (Normal temperature for operation of the machine is at the range of 10°C ~ 40°C, and the humidity is at the range of 30%~90%.
	A place nearby a heating apparatus.
	A place where the equipment can be exposed to water. Do not operate the equipment with wet hand
	A place where the equipment can be exposed to excessive pressure or vibration.
	A place where the equipment can be exposed to chemical substances or flammable gas.
	Watch out for dust, especially metal pieces from entering the equipment.
	Do not disassemble the product. Huvitz will not be held responsible for any negligence regarding such action.

	Do not close the thermal ventilation outlet
	Do not connect the AC power adapter before all parts are fully assembled. It can lead to a malfunction.
	Always pull the power cord holding the plug and not the cord.

This instrument can withstand the following conditions:

1. Operation

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

2. Transportation

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

3. Storage

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

Avoid environments where the equipment is exposed to excessive shocks or vibrations.
Do not expose products or packing to environmental conditions outside of those specified above.

2.4. Safety Precaution

BEFORE USE, READ THIS MANUAL

The safety precautions and operating procedures must be thoroughly understood prior to operation of the device.

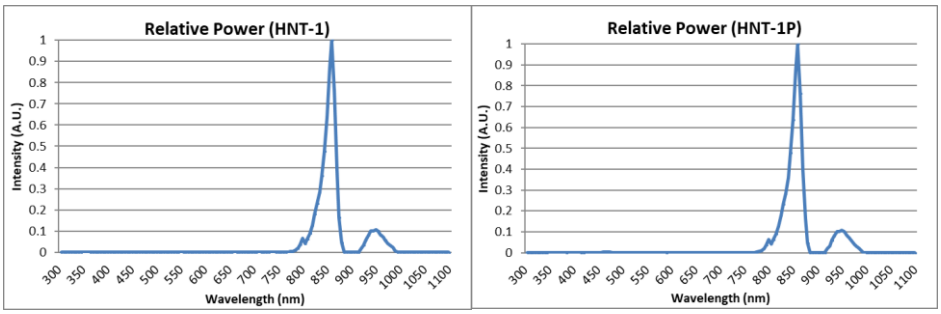
This equipment has been developed and tested in conformity with domestic & international safety standards and regulations, which guarantees the high stability of this product. This guarantees a very high degree of safety for this device. The legislator expects us to inform the user expressively about the safety aspects in dealing with the device. The correct handling of this equipment is imperative for its safe operation. Therefore, please read carefully all instructions before switching on this device. For more detailed information, please contact our Customer Service Department or one of our authorized representatives.

1. Light Hazard Group I (according to the ISO15004-2)

   This device is classified as a Group I. The LED used for the device is safe under expected use.

   However, observe the following precautions when using the device.

   - Do not direct LED beams to human eyes when unnecessary.
   - Do not look into the objective lens for a prolonged time.
   - If the device cannot be used appropriately or any problem cannot be solved, Stop using the devcie immediately, and contact Huvitz or your authoirzed distributor
   -



2. Do not touch directley if an operator has a hand injury or a significant allergic reaction to the material used in the operaton contact part.

Part Name	Material
LCD Touch pannel	Glass
Joystick / button	ABS + Silicon, Spray
Power switch	PC + PA66
Safety button	A6061 T6, SILVER ANODIZING
Cover	ABS
Printer cover	ABS
Chin Rest	ABS

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

4. 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.

5. The device should neither be kept nor installed in the place with high humidity. For the optimal operation, the humidity should be at the range of 30%~90%. The machine should not be exposed to the place where water splashes, drips or sprays.

6. Do not install the device in an eviroment where cotaminants such as corrosive gas, acid, or salt is containedin the air.

7. Do not place the substance or material on the top of the device.

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

9. As this device use lithium battery, the reckless abandon of the machine itself or the lithium battery can cause the environmental pollution. Please contact to the professional waste disposal company.

10. When disposing of the device and / or part, follow local regulations for disposal and recycling.

11. The equipment must be operated only by a, or under direct supervision of properly trained and qualified person/s such as ophthalmologist.

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

13. Be sure to check the safety distance before measurement. If the safety distance is not secured, may touch and injury the patient's eye.

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

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

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

17. The equipment may only be used together with accessories supplied by Huvitz's. If the customer makes use of other accessories, use them only if there are usability under technical safety aspects has been proved and confirmed by Huvitz or the manufacturer of the accessory.

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

19. User's manual or service manual should be kept in the place where the persons in chare of operation and maintenance can access easily any time.

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

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

22. External equipment intended for connection to signal input, signal output or other connectors, shall comply with relevant IEC Standard (e.g., IEC60950 for IT equipment and IEC60601-1 series for medical electrical equipment). In addition, all such combination-system-shall comply with the standard IEC60601-1 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.

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

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

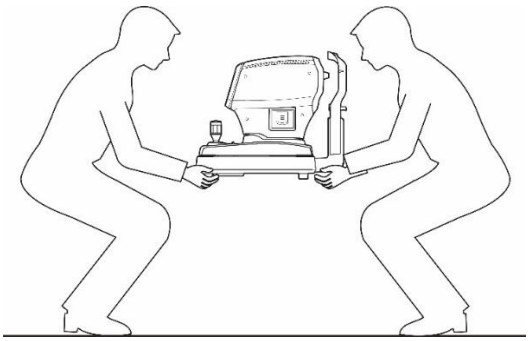
25. In case of any presence of smoke, spark or abnormal noise/smell from the machine, please power off immediately and pull out the plug.

26. IEC standard needs to be satisfied with in order to connect an outside device with input/output signal or other connector. (IT equipment is IEC 60950, and electric equipment for medical use is IEC 60601). Moreover, all the systems need to satisfy the safety requirement, IEC 60601-1 when it comes to the electric system for medical use. Person who connects outside device with input/output signal or other connector has the obligation to take responsibility in accordance to the IEC60601-1. Contact local technician or distributor if you have doubts.

27. To avoid electrocution, this device must be connected to the supply power along with protective grounding.

28. Do not place at a difficult location when separating cable when it comes to the device's placement.

29. When you carry this product, please hold on left and right bottom of the product. If you want the product to be installed on another place, please call A/S center.



30. Do not measure an eye whose cornea is easily damaged due to corneal disease or surgery.

31. 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 parts that come into contact with the patient) with a clean cloth dampened with rubbing alcohol.

32. 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.

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

34. Don't transmit data to other device when you find viruses in other device. Don't connect HNT-1/1P to other device when you find viruses in other device.

35. 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.

36. 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 ITNETWORK
    5) upgrade of hardware and/or software platforms or software applications on the IT NETWORK.

⚠ 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. – Apply for the device in the North America, Do not apply for the device in the EU

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'équipement 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 terminée par un connecteur de lame (HAR), NEMA 6-15P. - Demander l'appareil en Amérique du Nord, ne pas demander l'appareil en UE

Intended User

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

(ex. Doctor, Ophthalmologist, Opticians)

Patient Requirement

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 condition, it is not possible to take a picture correctly.

3

Characteristics

1. Distance between eye and device are established automatically to measurement position. (Working Distance : 11mm)

2. The peak of the air pressure is automatically controlled within the range of 0 to 60 mmHg.

3. Air pressure by pressure of patient`s eye in controlled suitable.

4. With the enhanced SPC function, achieves a softer and quieter air puffing.

5. Confirm data amount and detection comparison between reference pressure and data.

6. Reduce error compensating measurement according to patient`s cornea thickness.

7. It is provides the automatic calculation function of the compensated IOP based on the central corneal thickness.

8. Intraocular pressure of both eyes is measured by auto alignment function.

9. With auto-tracking and auto shot, HNT-1/1P allows easy and accurate measurement.

10. HNT-1P is the model combining non-contact tonometer and pachymeter in one unit.

11. The HNT-1/HNT-1P software is permanently imbedded in HNT-1/1P and controls all system functions including the followings:

    - To convert internal air pressure into intra ocular pressure.
    - To display focusing state and move to focus position automatically.
    - To display measurement result.
    - To print measurement result via a thermal printer.
    - To support user setup for operation environment.
    - To control air puffing pressure automatically.

    For HNT-1P
    - To convert internal central cornea thickness into distance unit(㎛).

4

Note for Use

1. Do not hit or drop the instrument. The instrument may be damaged by the strong impact. The impact may damage the function of this instrument. Handle it with care.

2. The precision of measurement can be affected when the machine is exposed to the direct sunlight or too bright indoor illumination. It is recommended to measure in the dark optometry room.

3. If you want to use it as connecting the device to other equipment, please follow the guidance of our local representative.

4. Sudden heating of the room in cold areas will cause condensation of vapor on the protective glass in the measurement window and on nozzle parts inside the instrument. In this case, wait until condensation disappears before performing measurements.

5. Make sure to keep the window in examinee side is clean at all times. In case that it has become dirty by dusts or other substances, it can cause errors in the machine or affect the precision of measurement.

6. In case of any presence of smoke, smell or noise during the use of machine, please contact our local representative after plugging it off from the socket (outlet).

7. If you clean the surface of the equipment with organic solvents such as thinner, benzene, etc, it can damage the machine. So, please do not use them.

8. In case of moving Non-Contact Tonometer HNT-1/1P, carry it holding the lower part of machine body with both hands as fixing the stage after switching the machine off all the time.

9. In case of no use of the machine for a long time, please put the dust cover on the device after powering and plugging off.

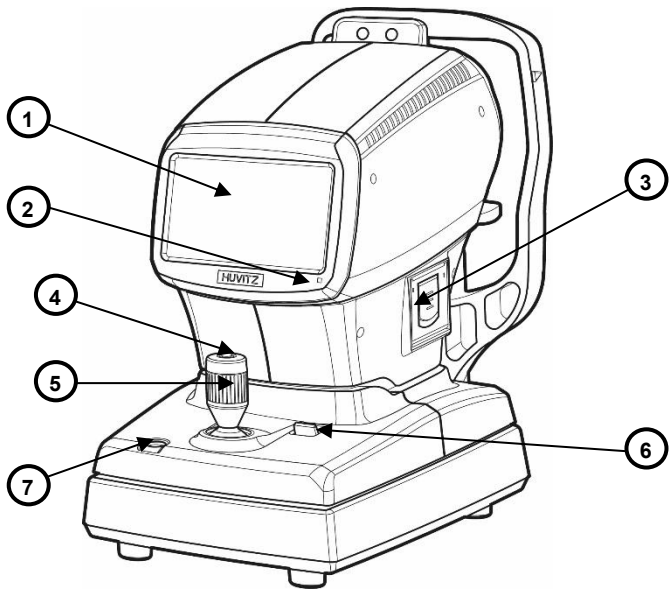
10. Language Statement.
    Huvitz currently provides GUI interface and operation manual to EU in English that is validated by Huvitz Co.,ltd. If your country restrict the operation manual and labeling that is provided in the national language only, please contact to the Huvitz's authorized distributor.

11. When label damaged, contact Huvitz or your authorized distributor

5

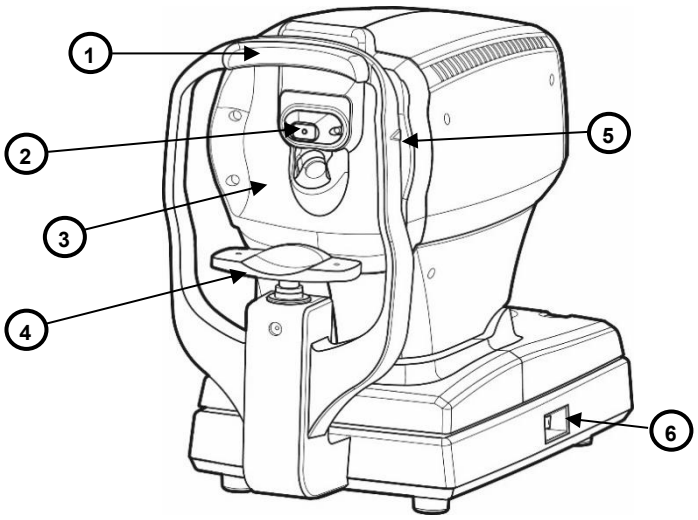
Names and functions of each part

5.1. Main Parts



[Front part]

① **LCD Touch Screen :** display user interface and the result of measurement
② **Operation Lamp :** Indicates whether or not the electric power is on
③ **Printer :** Printing the measured results
④ **Measurement Button :** A button pressed on to measure
⑤ **Joystick Lever (Operation Lever) :** A lever for moving object to the front and back, left and right, and up and down
⑥ **Stage Fixation Lever :** A lever for fixating stage
⑦ **Safety Button :** Safety distance establishment between patient and device



[Back part]

① **Forehead Rest:** Preventing the vibration by fixing the forehead.

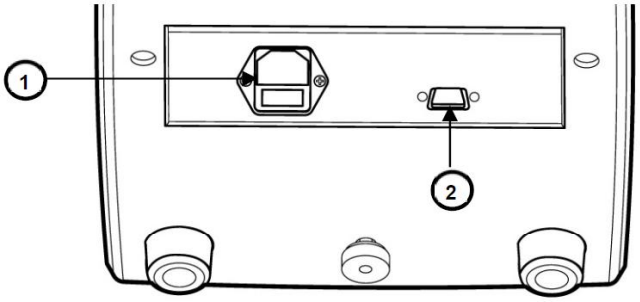
② **Air Nozzle:** Measuring the intraocular pressure on eyes.

③ **Object lens for Pachy:** Object lens for measuring the cornea thickness of examinees. (only in HNT-1P)

④ **Chinrest:** Preventing the vibration by fixing the chin.

⑤ **Height Adjustment Mark:** Adjusts the eyes` height of examinees.

⑥ **Power Switch:** Switch for power on/off



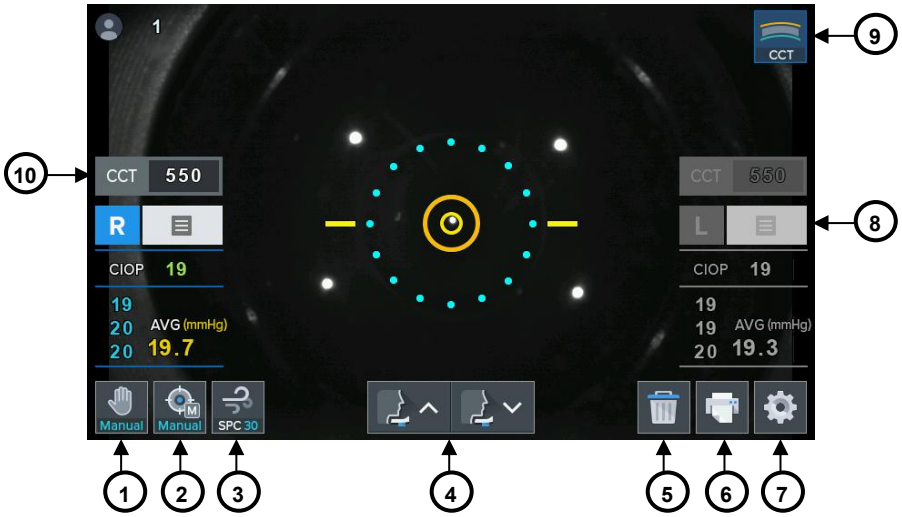
[Bottom Part]

① **Power Supply Socket :** A socket connecting to exterior power plug

② **Serial Interface (RS-232C) Connector :** A terminal connecting to the exterior equipment. When exporting the measured data to an external computer with RS-232C connector, connect an interface cable here.
For a detailed specification of the transmission data, refer to the Appendix A.

5.2. Explanation of Main Screen

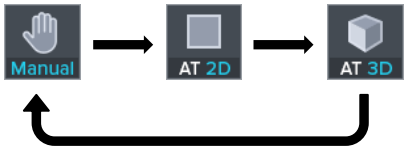
5.2.1. Main Screen of HNT-1



① 

[Tracking Mode]

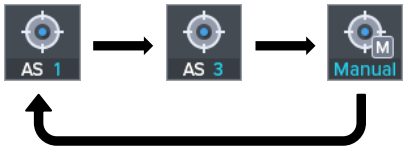
A toggle button to change the Tracking mode for measurement (MT / AT2D / AT3D)



② 

[Shooting Mode]

A toggle button to change the Shooting mode for measurement (MS / AS1 / AS3)



③ 

[SPC Mode]

A toggle button to change the SPC mode for measurement range

(SPC30 / SPC60 / 30 / 60)



④ 
[Chinrest Up/Down Button]

Move up or down the chinrest

⑤ 
[Clear Button]

Clear measurement data

NOTE

Press and hold the Clear button for 2 ~ 3 seconds to result the head position.

⑥ 
[Print Button]

Print measurement result

⑦ 
[Setting Button]

Display the user SETUP screen

⑧ 
[Result Button]

Display all measurement data on the Result screen

⑨ 

[Compensation mode Button of Cornea Thickness]

Display the CCT(Central Cornea Thickness) value and CIOP(Compensated Intra Ocular Pressure) data

NOTE

Compensation mode button is the feature to display compensated IOP value manually input the CCT values. This button is not necessary in the HNT-1P, because it has the function of measuring CCT itself.

⑩ 

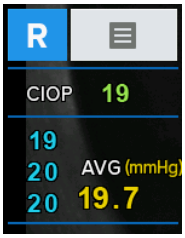
[CCT input button]

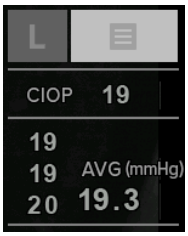
Display CCT input dialogbox to input cornea thickness.

Cornea thickness compensation is mode to input cornea thickness to device and gets correct data to measure exactly patient's intraocular pressure.



[Input data of Cornea Thickness]





[IOP Measurement Data]

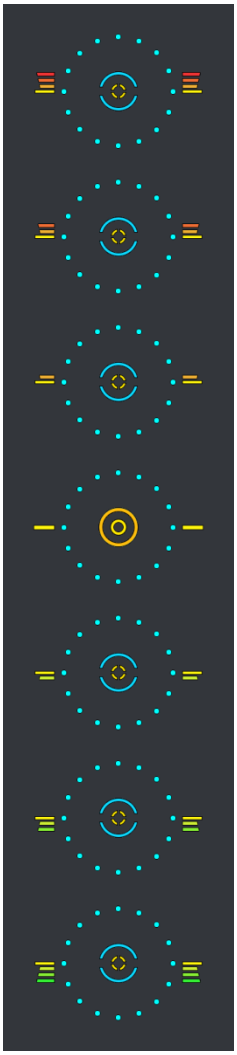
Display the CIOP, IOP data and IOP average of the last three data



[Patient Number (Counter)]

Show the patient measurement number

Divide into 7 steps by focus position.



→ Too close to the patient`s eye

→ Move the joystick lever to the operator side to move the main body away from the patient`s eye.

→ Optimal state

→ Move the joystick lever to the patient side to move the main body close to the patient`s eye.

→ Too far from the patient`s eye

[Focus Indicator]

NOTE

If the main body unit gets out of the working range of auto tracking in the forward and backward, right and left, up and down, the indicator is displayed. According to the indication of the focus indicator, you can manipulate by joystick. So the user can move to the measurement position by operating the joystick in direction of the arrow then motors start to work in their available range.

 	Move the joystick lever toward the patient
 	Move the joystick lever toward the operator
	Move up by rotating the joystick lever to the clockwise
	Move down by rotating the joystick lever to the counter clockwise
	Move the joystick lever to the left
	Move the joystick lever to the right

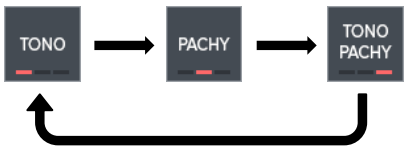
5.2.2. Main Screen of HNT-1P



① 

[Measurement Mode]

A switch to change the measure mode (TONO / PACHY / TONO-PACHY)

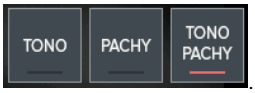




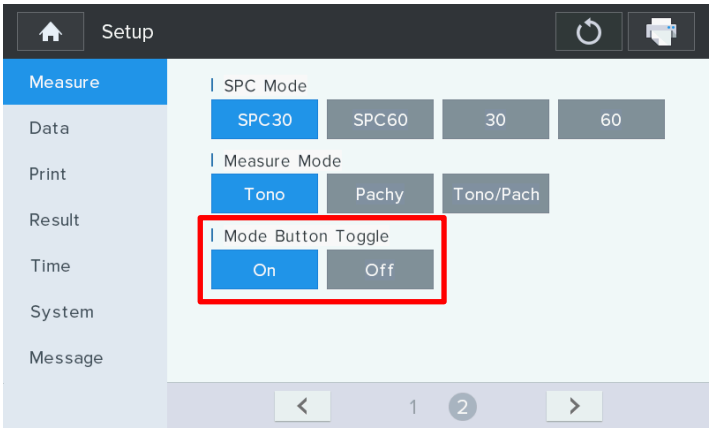
NOTE

Measure mode button can be displayed differently depending on the setting of the Setup mode. According to “Mode Button Toggle” item of the SETUP mode, if ‘ON’ is selected, it will appear only one toggle button such as 

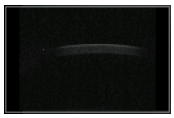
.

Otherwise, it will appear three button such as 

.



["Mode Button Toggle" of the Setup mode]

②  **[Pachy Thumbnail Button]**

Display Pachy Image enlarged Screen (Refer to Section 8.3)

③ 

[ACA Mode Button]

Display ACA(Anterior Chamber Angle) mode screen (Refer to Section 8.4)

④ 

[Pachy + IOP Measurement Data]

Display the Pachy data as well as CIOP, IOP data

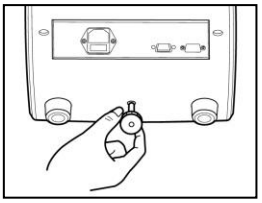
Pachy and IOP data also shows the average of the last three data

6

Installation of Equipment & Preparation of Measurement

1. Release of Lock on Stage Section

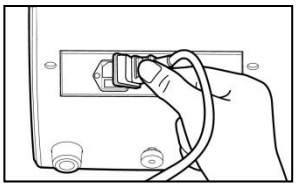
   Unlock the clamping bolt at the button of the machine by rotating it counterclockwise, and change the stage fixing lever behind the joystick to the direction of UNLOCK.



[Release of Lock on Stage Section]

2. Connection of Power Cable

- Put Non-Contact Tonometer HNT-1/1P on the table.
- Insert the power cable into power connector. at the bottom of the main body.
- After checking that the power of the machine is off, insert the power plug into AC outlet (socket)

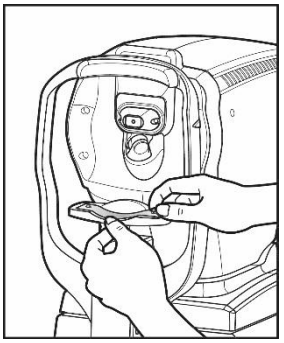


[Connection of power cable]

3. Inserting Chin Rest paper

- Pull out the pushing pins at left/right sides.
- Insert the pushing pins into the holes at left/right sides of the chin-rest paper.
- Stick the chin-rest paper inserted with the Pushing pins onto the chin-rest.

4. Installation of Printing Paper
   Please refer to section 9.2.1 regarding the sequence of installation of Printing
   paper.



[Inserting chin-rest paper]

5. Input of Message
   Input the contents desirable to be printed such as name or address of hospital, etc. in the memory of message editing monitor in advance at all times.

6. Check of Set up
   As set up of patient counter, Auto Tracking, Auto Shooting, SPC mode, pressure measurement unit, ACC mode, Cornea thickness input, print mode, data, etc, please check them in SETUP mode. (refer to Section 8.1)

7. Transmission to Other Machines.
   In case of transmitting the measured results to external computer, prepare external computer while connecting the cable into the interface connector of this machine. You can select the transmission On/Off in the user`s SETUP mode. For a detailed specification of the transmission data, refer to the Appendix A.

7

Basic Operations

⚠ WARNING

If the following situations happen, contact to the agents of Huvitz after immediately pushing the power switch off, and pulling the power cord out of AC Power connection part.

- In case that smoke comes, or strange smell or sound is heard from the equipment.
- In case that liquid is poured to the machine, or metallic substance is inputted into the equipment.
- In case that the equipment is fallen down, or the exterior case of it is broken

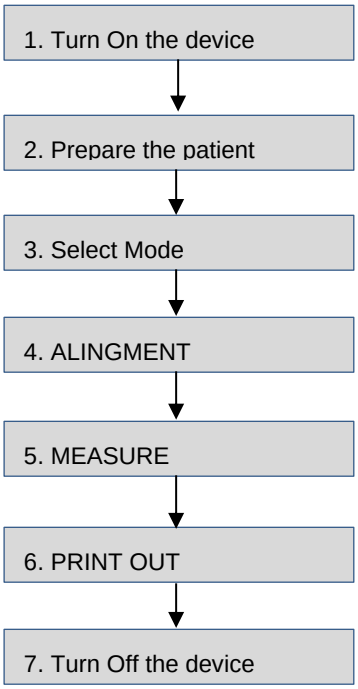
Si les situations suivantes se produisent, contactez les agents de Huvitz après avoir immédiatement poussé l'interrupteur d'alimentation hors tension et retiré le cordon d'alimentation de la partie de connexion d'alimentation secteur.

- Au cas où de la fumée viendrait, ou si une odeur ou un son étrange est émis par l'équipement .
- Dans le cas où du liquide est versé dans la machine ou une substance métallique est introduite dans l'équipement.
- En cas de chute de l'équipement ou de casse du boîtier extérieur

⚠ NOTE

As the equipment does not operate for over 3 minutes while the power switch is at the state of “ON”, the power saving mode is to be performed. If you push any buttons in the power saving mode, it is changed to the mode of measurement preparation.

7.1. Operation Flow

Flow	Description
	1. Turn on the device Refer to Section 7.2 2. Prepare the patient Refer to Section 7.3 or 7.4 3. Select Mode Refer to Section 7.3 4. Alignment Refer to Section 7.3 or 7.4 5. MEASURE Refer to Section 7.3 or 7.4 6. PRINT OUT Refer to Section 7.3 or 7.4 7. Turn Off the device

7.2. Measurement

It is the mode to measure the intraocular pressure and pachymetry.

1. Let the power switch “on”

   The measurement window as shown in the picture below appear on the screen of monitor as system check is completed.

- **HNT-1**



- **HNT-1P**



[Measurement Screen]

2. Check the measurement screen appeared on the monitor.

NOTE

If the measurement screen as shown in the above picture does not appear on the monitor screen, let the power switch “ON” again in 10 seconds after switching it off. If the measurement screen continues not to appear either, please contact to the agents of Huvitz.

3. Check the user SETUP mode. (Refer to Section 8.1)

Check and select the diverse functions relating to measurement including intraocular pressure value or printing condition. Input the message wanted to be printed together with measurement data.

7.3. Manual Measurement Mode

As pushing toggle button 

of the Tracking mode button, it changes to sequentially.

If you change “AT2D 

/ AT3D 

” to “MT 

”, it will operate in the manual measurement mode.

① Adjustment of eye height.

Let the examinee sit in front of the machine.

CAUTION

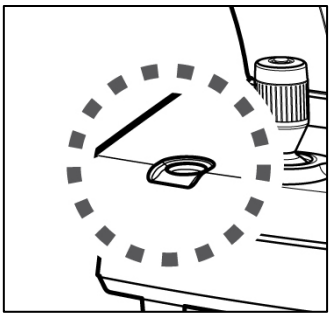
Make sure that the examinee should not put his or her hands or fingers under chin-rest. The hands or fingers can get injured.

For the prevention of infection, cleanse the forehead-rest with a solvent such as ethanol for every different examinee.

To keep it clean, change the chin rest paper for every different examinee.

- Let the patient sit comfortably by adjusting the table or chair or electric machine.
- Let the patient put his or her face on chinrest and his or forehead stick closely to the foreheadrest.
- Adjust the examinee`s eye height to Height Adjustment Mark on the head rest by pressing the chin rest up/down button in the touch screen.

② Adjustment of the safety distance between the examinee's eye and device



[Safety Button]

- Adjust the safety distance between the examinee`s eye and device by pressing the safety button as shown in the picture.
- Adjust the safety distance between the examinee's eye and device so that the distance is 8 to 10 mm.

Assurez-vous que le candidat ne doit pas mettre ses mains ou ses doigts sous la mentonnière. Les mains ou les doigts peuvent se blesser.
Pour la prévention des infections, nettoyez le repose-front avec un solvant tel que l'éthanol pour chaque candidat différent.

Pour le garder propre, changez le papier de mentonnière pour chaque candidat différent.

- Laissez le patient s'asseoir confortablement en ajustant la table ou la chaise ou la machine électrique.

- Laisser le patient poser son visage sur la mentonnière et son front coller étroitement au appui-tête.

- Ajustez la hauteur des yeux du candidat à la marque de réglage de la hauteur sur l'appui-tête en appuyant sur la
bouton de mentonnière haut / bas sur l'écran tactile.

⚠ WARNING

Be sure to check the safety distance before measurement.

If the safety distance is not secured, may touch and injury the patient's eye.

Assurez-vous de vérifier la distance de sécurité avant la mesure.
Si la distance de sécurité n'est pas sécurisée, peut toucher et blesser l'œil du patient.

③ Adjustment of Measurement Position and Focus.

⚠ CAUTION

Do not insert your hands or fingers between stage and base. Also, make sure that the examinee should not put his or her hands or fingers there. Hands or fingers can get injured.

- Pull body of equipment to the front of user by using joystick lever.
  If necessary, after secure a safety space so that the air nozzle does not the patient's eye, use to Safety button.

- Left the right side eye of examinee appears at the center of monitor screen by slowly pushing and rotating joystick lever. At this time, let the glittering bright dot come into the core of internal array ring.

- Ask the examinee to look at internal fixed target (green led).

- Adjust the focus so that the outline of bright dot can be apparent. If the focus is adjusted appropriately, the circle symbol appears on the bright dot.

- Height Adjustment: Adjust it by rotating joystick lever or chinrest button in the touch screen.

- Left/Right Adjustment: Move the operation joystick lever left and right so that outer alignment ring is aligned with the circle ring.

- Focus Adjustment: Adjust it to the bright dot by tilting the operation joystick lever forward/backward.

- Tirez le corps de l'équipement vers l'avant de l'utilisateur à l'aide du levier de commande.
Si nécessaire, après avoir sécurisé un espace de sécurité afin que la buse d'air ne soit pas dans l'œil du patient, utilisez le bouton de sécurité.

- L'œil gauche du candidat apparaît au centre de l'écran du moniteur en poussant et en tournant lentement le levier du joystick. À ce stade, laissez le point brillant scintillant pénétrer dans le noyau de l'anneau de réseau interne.

- Demandez au candidat de regarder la cible fixe interne (led verte).

- Ajustez la mise au point de sorte que le contour du point lumineux puisse être apparent. Si la mise au point est ajustée de manière appropriée, le symbole du cercle apparaît sur le point lumineux.

- Réglage de la hauteur: ajustez-le en tournant le levier du joystick ou le bouton de la mentonnière sur l'écran tactile.

- Réglage gauche / droite: déplacez le levier de commande vers la gauche et la droite de sorte que la bague d'alignement externe soit alignée avec la bague circulaire.

- Réglage de la mise au point: ajustez-le sur le point lumineux en inclinant le levier de commande vers l'avant / l'arrière.

- **HNT-1**



[Manual mode Measurement Screen]

NOTE

As the bright dot and pupil can not keep the same axis during the consecutive measurement, the error can be caused for measurement.

④ Measurement

- Push the measurement button on the joystick lever.

- Used to choose among 1 time(AS1), 3 times(AS3) and manual(MS) automatically in “Auto Shooting” mode in user SETUP mode and Measurement screen before taking measurement.

- As the measurement is completed, the measured result is to be indicated on the screen of monitor.

- In case of the consecutive measurement, the result of the previous measurement is indicated.

⑤ Repeated Measurement

- Measure repeatedly if necessary.

- The latest measured value is to be indicated every time new measurement is performed.

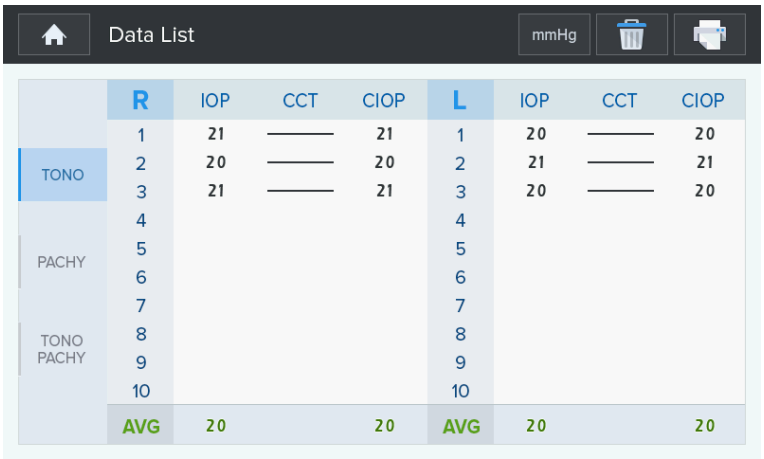
- It shall memorize the measured values by 10 times for each left/right eye (except for error). It can be seen on the screen of Result mode.

⑥ Measurement of Counter-side eye

- After measure the right-side eye, measure the left-side eye to the direction of right by operation the joystick lever.

- As measuring the left/right eyes, the value of intraocular pressure is to be indicated on the screen. In the case of HNT-1P, according to the measurement mode(Tono / Pachy / Tono-Pachy), measured values are displayed differently.

- Measurement can be done by continuing and the last three of data sets used for the averaging is displayed of the average data on the measurement screen. (Right /Left eye). On the Result mode screen, the last 10 of data sets is diaplayed sequentially.



	R	IOP	CCT	CIOP	L	IOP	CCT	CIOP
TONO	1	21	———	21	1	20	———	20
	2	20	———	20	2	21	———	21
	3	21	———	21	3	20	———	20
PACHY	4				4			
	5				5			
	6				6			
TONO PACHY	7				7			
	8				8			
	9				9			
	10				10			
	AVG	20		20	AVG	20		20

[Data List of Result Screen]

⑦ Print

- Print the measured result by pushing the PRINT button.

- The contents selected in SETUP mode is to be printed.

- Cut the printing paper off from the end of it while lifting it.

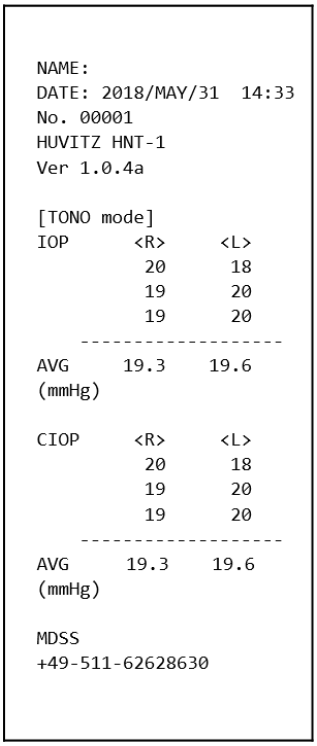
- Put the name of examinee in the blank of NAME if necessary.

NOTE

As it is printed, the values measured so far are to be removed.

As a thermal printing record, the printed characters are easy to be faded away. Please make it copied if you want to keep it for a long time.

- Printed page of HNT-1



```
NAME:
DATE: 2018/MAY/31  14:33
No. 00001
HUVITZ HNT-1
Ver 1.0.4a

[TONO mode]
IOP       <R>      <L>
           20       18
           19       20
           19       20
    -------------------
AVG      19.3     19.6
(mmHg)

CIOP      <R>      <L>
           20       18
           19       20
           19       20
    -------------------
AVG      19.3     19.6
(mmHg)

MDSS
+49-511-62628630
```

[Example of Print]

7.4. Auto Measurement Mode

As pushing toggle button 

of the Tracking mode button, it changes to sequentially.

If you change “MT 

” to “AT2D 

or AT3D 

”, it will operate in the Auto measurement mode.

AT2D mode: Auto tracking in the right and left up and down directions is actived.
AT3D mode: Auto tracking in the forward and backward, right and left, up and down directions is activated.

As the condition of good array between the machine and the measured eye is reached, the measurement is to be performed automatically without pushing the measurement button.

① Perform the ①, ② and ③ procedure of section 7.3 Manual Measurement Mode

② Measurement

- As the array and adjusting the focus is completed, the measurement is to be performed automatically.
- After the measurement of times (AS1(1times), AS3(3times) or MS(manual) measurement) designated in user SETUP mode is performed, the measured result appear on the screen of monitor.
- For each side of eyes-left and right, maximum of the last 10 of data is to be stored, and you can re-check them in Result mode.

• **HNT-1P**



[Auto Mode Measurement Screen]

③ Measurement of Another Eye

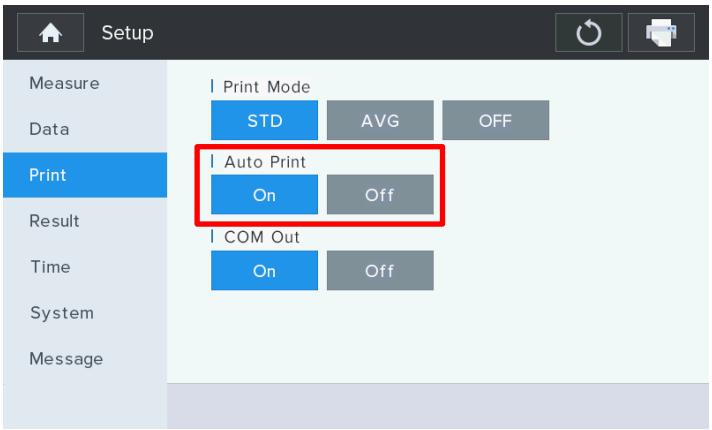
- Measure the left eye according to the same procedure by moving the stage to the right side.

- As the measurement to both eyes is completed, the value of intraocular pressure is to be indicated on the screen. In the case of HNT-1P, according to the measurement mode(Tono / Pachy / Tono-Pachy), measured values are displayed differently.

④ Print

- Push the PRINT button in case that the measurement is conducted to the one eye only.

- In case of selecting the condition of Print as “Auto Print - ON” in SETUP mode the measured result is to be printed automatically as the measurement of both eyes is completed.



["Auto Print" of the Setup mode]

- The message selected in SETUP mode is to be printed together with the measured data.

• Pachy mode of HNT-1P

```
NAME:
DATE: 2018/MAY/31  14:33
No. 00003
HUVITZ HNT-1P
Ver 1.0.4a

[PACHY mode]
CCT       <R>      <L>
          554      555
          553      554
          554      555
    -------------------
AVG     553.6    554.6
(μm)

MDSS
+49-511-62628630
```

[Example of Print]

- Tono mode of HNT-1P (Example)

```
NAME:
DATE: 2018/MAY/31  14:33
No. 00003
HUVITZ HNT-1P
Ver 1.0.4a

[TONO mode]
IOP       <R>      <L>
           20       18
           19       20
           19       20
     -------------------
AVG      19.3     19.6
(mmHg)

CIOP      <R>      <L>
           20       18
           19       20
           19       20
     -------------------
AVG      19.3     19.6
(mmHg)

MDSS
+49-511-62628630
```

- Tono-Pachy mode of HNT-1P (Example)

```
NAME:
DATE: 2018/MAY/31  14:33
No. 00003
HUVITZ HNT-1P
Ver 1.0.4a

[TONO-PACHY mode]
IOP       <R>      <L>
           20       18
           19       20
           19       20
     -------------------
AVG      19.3     19.6
(mmHg)

CIOP      <R>      <L>
           20       18
           19       20
           19       20
     -------------------
AVG      19.3     19.6
(mmHg)

CCT       <R>      <L>
          554      555
          553      554
          554      555
     -------------------
AVG     553.6    554.6
(μm)

MDSS
+49-511-62628630
```

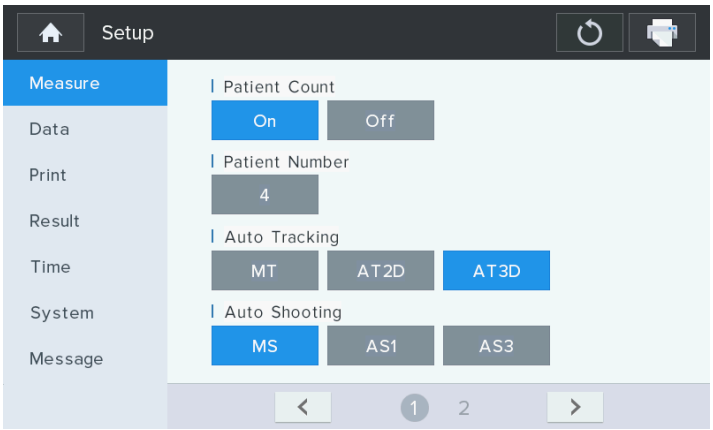
[Example of Print]

8

Other Modes

8.1. SETUP Mode

It is to perform many setups relating to measurement, print-out, etc. As pushing Set up Button  on the measurement screen, it entered SETUP mode.



[Setup mode Information (Measure – 1Page)]

[How to Change Tab]

As pushing left side`s tab button, it is to enter the tab items.

[How to Change Page]

As pushing bottom side`s arrow button  or page button , it is to enter the next page.

[How to change item and content]

Select the wanted item on the Screen, and to change he setting by touching on the category to be modified.

NOTE

Some need to be modified by using a different method. This setting modification procedure is

instructed below the explanation for each category.

 **[Exit Button]**

As pushing Exit button, return to the main measurement screen.

 **[Reload Button]**

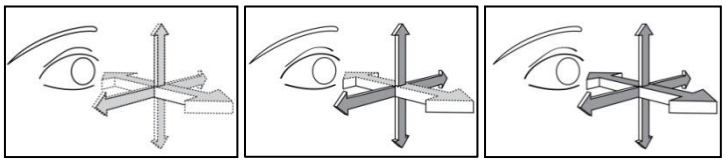
As pushing Reload button, revert to original values of all over the pages.

 **[Print Button]**

As pushing Print button, print the all over setup values.

- **Patient Count :** Patient measurement count On/Off
- **Patient Number :** Measurement patient number
- **Auto Tracking :**

  - MT - Manually align the device and bring the eye into focus.
  - AT2D (X, Y) - Right and left, up and down direction (Auto)
  - AT3D (X, Y, Z) - Forward and backward, right and left, up and down direction on one side.

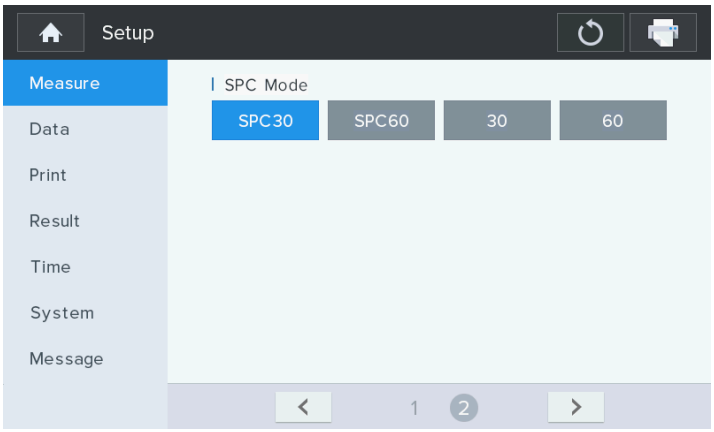


[Auto Tracking (MT, AT2D, AT3D)]

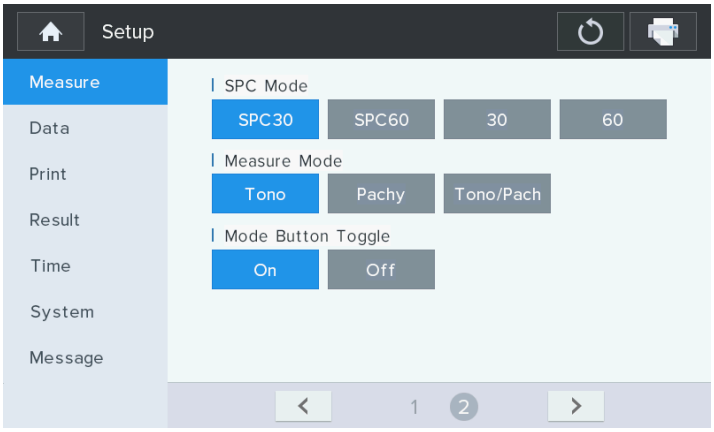
- **Auto Shooting:**

  - MS - Manual shot by measurement button
  - AS1 - 1 times auto shot
  - AS3 - 3 times consecutive auto shots

- **HNT-1**



- **HNT-1P**



[Setup mode Information (Measure - 2Page)]

- **SPC Mode :** Air Pressure automatic measurement by patient`s intraocular pressure.

  - **SPC 30** : The peak of the air pressue is automatically controlled within the range of 0 to 30 mmHg
  - **SPC 60** : 30 mmHg or more of intraocular pressure.
  - **30** : The peak of the air pressure is fixed within the range of 0 to 30 mmHg
  - **60** : The peak of the air pressure is fixed within the range of 0 to 60 mmHg

- **Measure Mode(Only in HNT-1P) :**
  Selects a measurement mode from Tono / Pachy / Tono-Pachy.

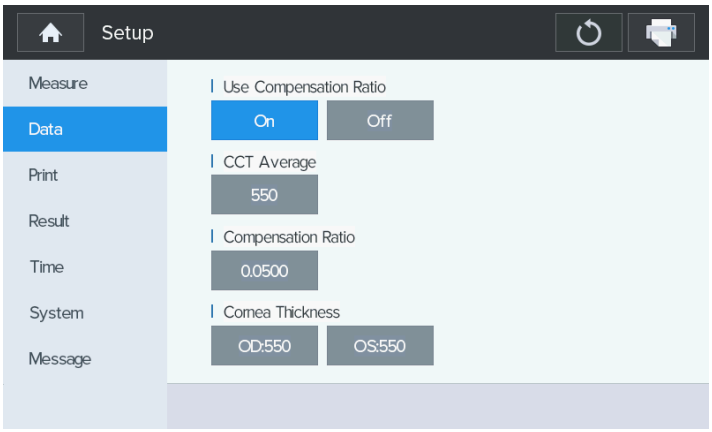
- **Mode Button Toggle(Only in HNT-1P) :**
  Differently display measure mode button on the Main Screen.

if ‘ON’ is selected, it will appear only one toggle button such as 

. Otherwise,

it will appear three button such as 

.



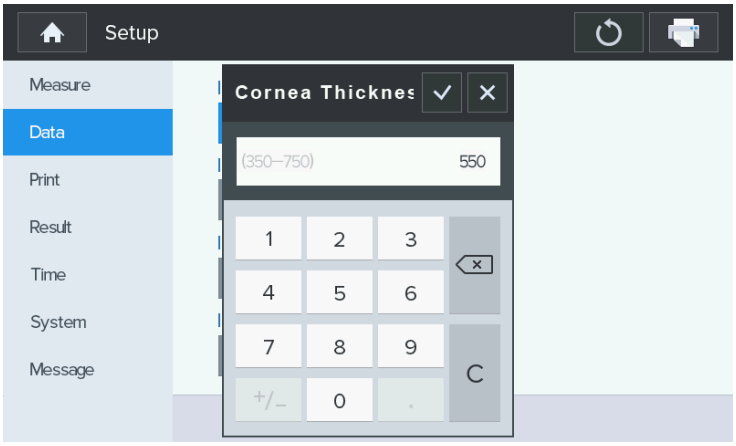
[Setup mode Information (Data)]

- **Use Compensation Ratio :** Set whether Corneal Thickness compensation should be applied or not.
- **CCT Average :** Setup of average value for Cornea Thickness(as reference)
- **Compensation Ratio :** Setup of Compensation ratio(0.0001~1.0000)

✓ CIOP(Compensated Intraocular Pressure) Formula
Compensation factor = (**CCT Average** – Pachy data) X **Compensation Ratio**
CIOP = IOP data + Compensation factor

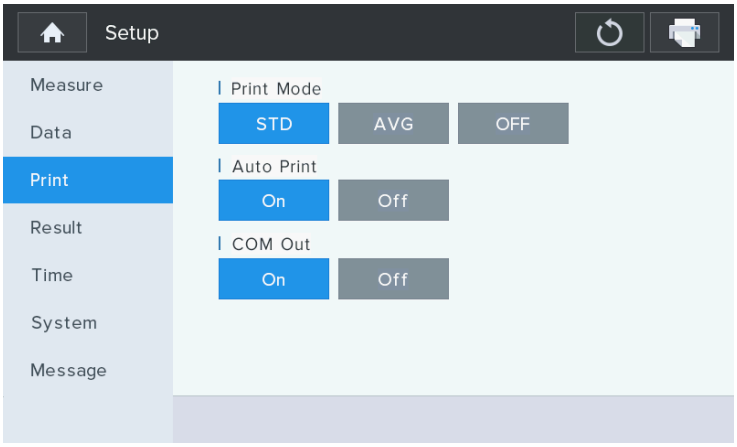
NOTE

If you select ‘Off’ for ‘Use Compensation Ratio’, ‘CCT Average’ and ‘Compensation Ratio’ item are displayed so that it can not be set. At this time, the CIOP value displayed on the Main measurement screen is displayed with the same value as the IOP value.



[Input data of Cornea Thickness]

- **Cornea Thickness :** Input data of Cornea Thickness (Left/Right)



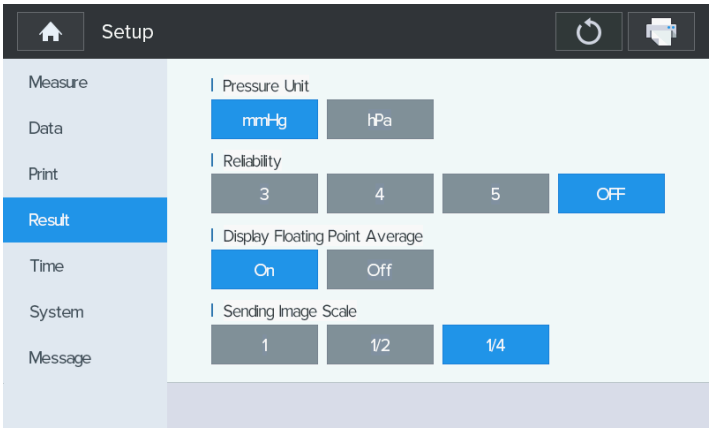
[Setup mode information (Print)]

- **Print Mode :**

  - STD : The measured result & built-in printer of max ten (10) times are to be printed out
  - AVG : Only average value is to be outputted printed out
  - OFF : It is not to be printed out

- **Auto print :** In case of measuring in Auto mode, it is to print out the measured result automatically as the each measurement to left / right eyes is completed one after the other.

- **COM Out :** Setup of transmission on/off(Communication to other machines)



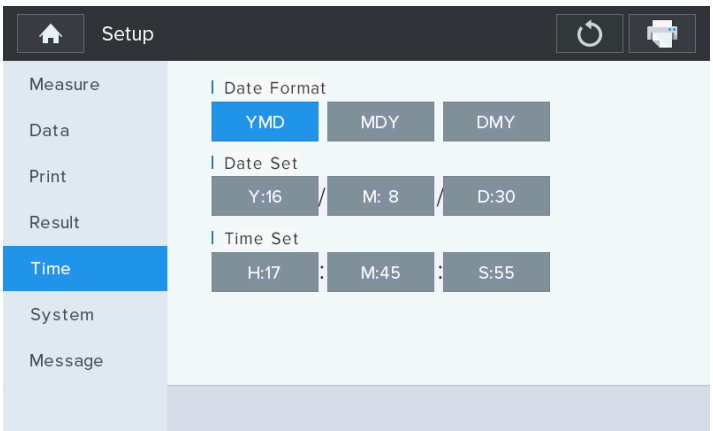
[Setup mode information (Result)]

- **Pressure Unit :** Selection of pressure unit (mmHg, hPa)

- **Reliability :** Set the reliable offset to remove unreliable IOP measured data. If any IOP measured data is out of reliable range (IOP measured average - reliable offset, IOP measured average + reliable offset), then it is considered unreliable.
  Unreliable data are marked with an '*' on the printed result, and they are excluded from calculating IOP average.
  If OFF is selected, checking reliability of IOP measured data is disabled.

- **Display Float Average :** Set the floating point display of average value. If you select 'On', display the floating point.

- **Sending Image Scale(Only in HNT-1P) :** Set the scale size of the sending image of pachymetry image and ACA(Anterior Chamber Angle) image.

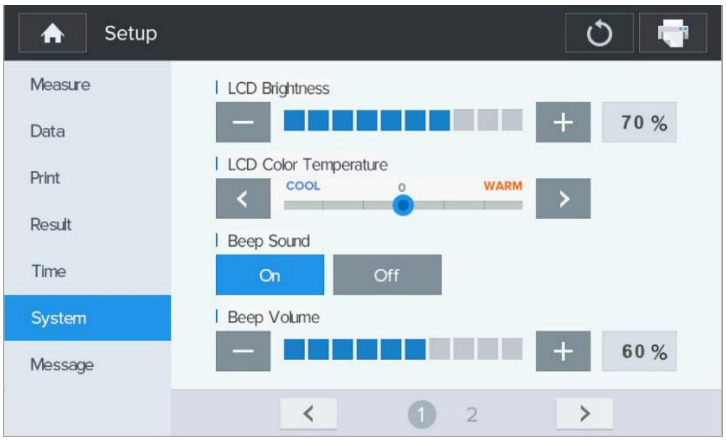


[Setup mode information (Time)]

- **Date Format**: Set up of indication sequence of year/month/date

- **Date Set:** Set of Y(Year)/M(Month)/D(Day)

- **Time Set:** Set of H(Hour)/M(Minutes)/S(Second)



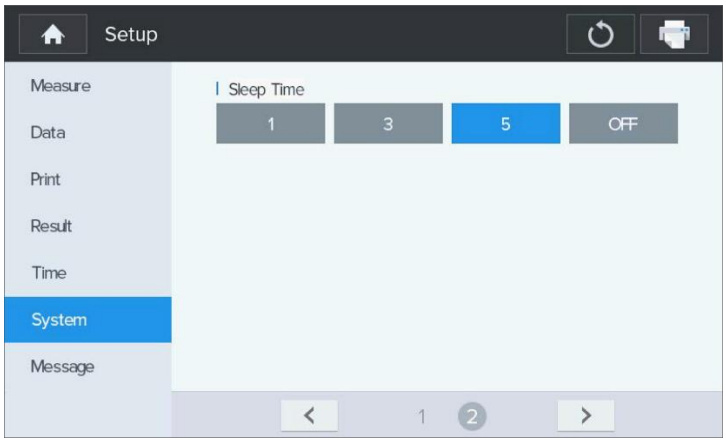
[Setup mode information (System- 1Page)]

- **LCD Brightness :** Adjust Brightness of LCD panel (10% ~ 100%).

- **LCD Color Temperature :** Adjust Color Temperature of LCD panel (Cool~Warm 7step).

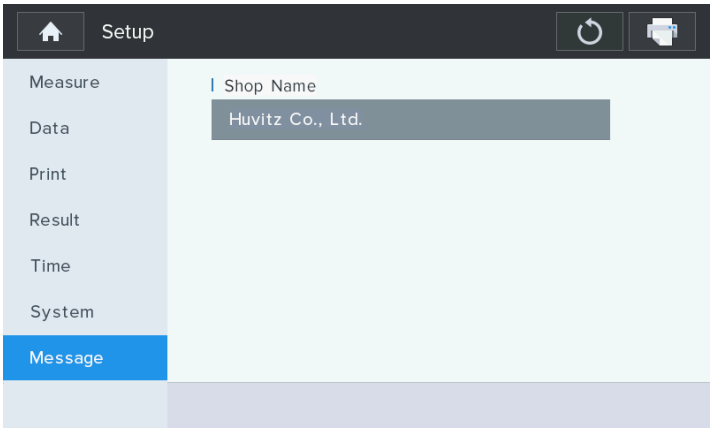
- **Beep Sound** : Set up Beep sound (on/off), Electric beeper sound is occured when the touch button is pressed and the measurement button is pressed. If it is normal, it sounds only once, If it can't be measured, it sounds twice in succession.

- **Beep Volume :** Set the beep sound volume. You can increase or decrease the volume by pressing the plus or minus buttons.

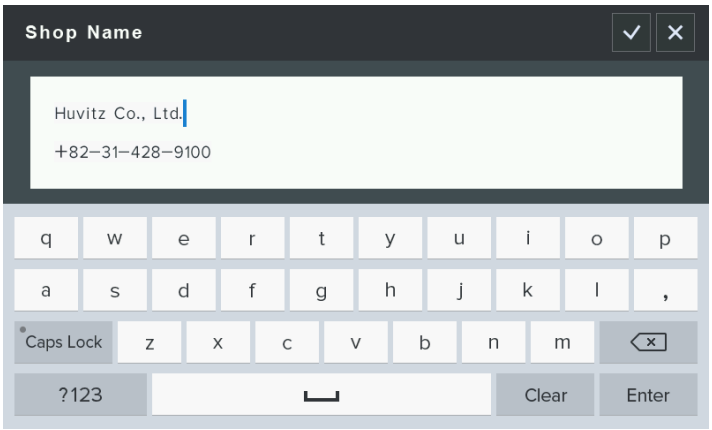


[Setup mode information (System- 2Page)]

- **Sleep Time:** Set the sleep time in minute for sleep mode to be turned on. If any user input doesn't happen during the sleep time chosen, HNT system enters into sleep mode. (LCD monitor is turned off, front LED light flickers to notify that HNT system is in sleep mode). If OFF is selected, sleep mode is disabled.



[Setup mode information (Message)]



[Virtual Keyboard]

[Character Input]

Clear : Erase of all input.

: Erase of text.

Enter : Change of line.

Caps Lock : Change of uppercase page.

?123 : Change of number and special character page.

: Save of information.

: Exit without save.

8.2. Result Mode

You can see the measured results (Max ten(10) units of data) stored in memory in this mode. As pushing R/L  button in the measurement mode, it can see measurement data.

NOTE

As pushing print button, the measured result stored in memory is to be printed out through the built-in printer, and it is removed completely for the new measurement

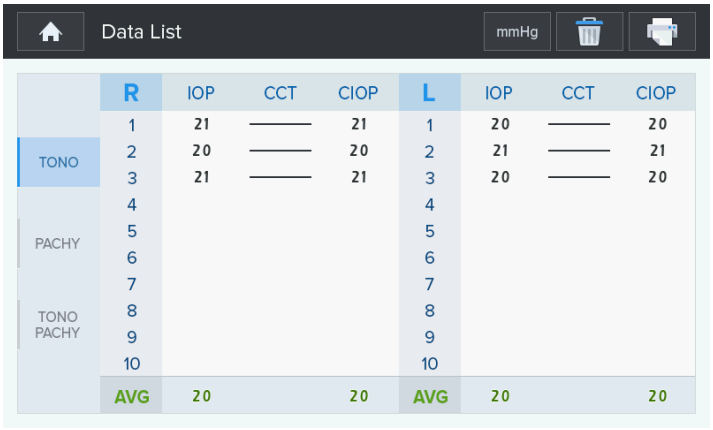
- It indicates measured Result of Intraocular Pressure, as well as CCT and CIOP value.
- It indicates the latest measured result of max amount of ten (10) times (Intraocular Pressure of left/right eyes).

- **HNT-1**



R	IOP	CCT	CIOP	L	IOP	CCT	CIOP
1	19	550	19	1	20	550	20
2	20	550	20	2	21	550	21
3	18	550	18	3	19	550	19
4				4			
5				5			
6				6			
7				7			
8				8			
9				9			
10				10			
AVG	19	550	19	AVG	20	550	20

- **HNT-1P**



[Result mode Screen]

NOTE

In case of HNT-1P, Data list are divided into each of the measurement mode as Tono, Pachy and Tono-Pachy. Measured data at each measurement mode is entered separately. It can be confirmed by pushing mode items on the left side.

[Exit Button]
As pushing Exit button, return to the main measurement screen.

mmHg hPa **[Unit Button]**
As pushing Unit button, change to value of measured IOP data.(mmHg <->hPa)

[Clear Button]
As pushing Clear button, clear the all measurement data.

[Print Button]
As pushing Print button, print the all over measurement data.

8.3. Pachy Image Mode (Only in HNT-1P)

In case of HNT-1P, If you measure the pachy data, you can see a thumbnail of a corneal slit image captured at the upper left corner of the measurement screen. The corneal slit image at last measurement is saved to memory with the measurement data.

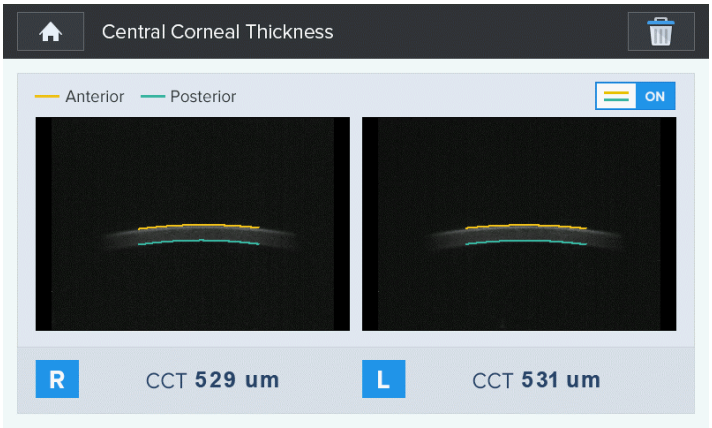


[Tono-Pachy measurement Screen]

When this thumbnail image button  is pressed, it entered Pachy Image mode screen. In the Pachy Image mode, you can see a larger pachy image. Pachy Image and average data are displayed according to the measured position of Right/Left side.

Pressing Fitting button 

, it is displayed the detected edge area. Depending on the color indicates the separation of the anterior, posterior of the cornewha.

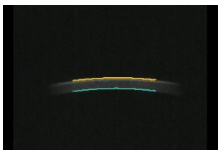


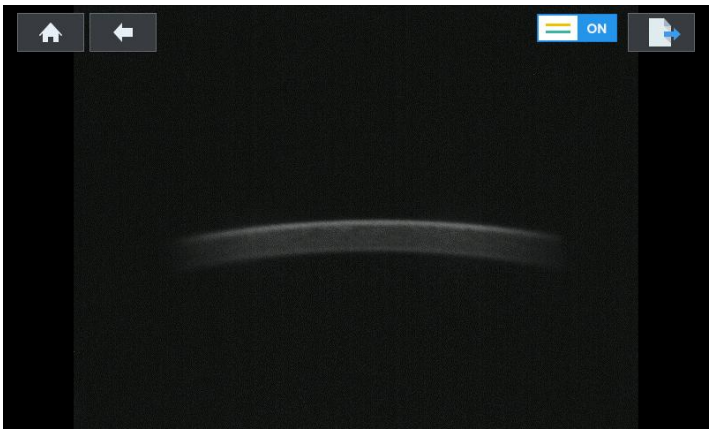
[Pachy Image mode Screen]

 **[Exit Button]**
As pushing Exit button, return to the main measurement screen.

 **[Fitting Button]**
As pushing Fitting button, display detected edge area of the cornea.

 **[Clear Button]**
As pushing Clear button, clear the measured image and data.

 **[Press Pachy Image]**
As pushing Pachy image, enter enlarged pachy image screen.



[Enlarged Pachy Image Screen]

 **[Exit Button]**
As pushing Exit button, return to the main measurement screen.

 **[Back Button]**
As pushing Back button, return to the pachy image mode screen.

 **[Send Button]**
As pushing Send button, send the pachy image to PC.
The HRK-mate PC software support pachymetry image receiving.



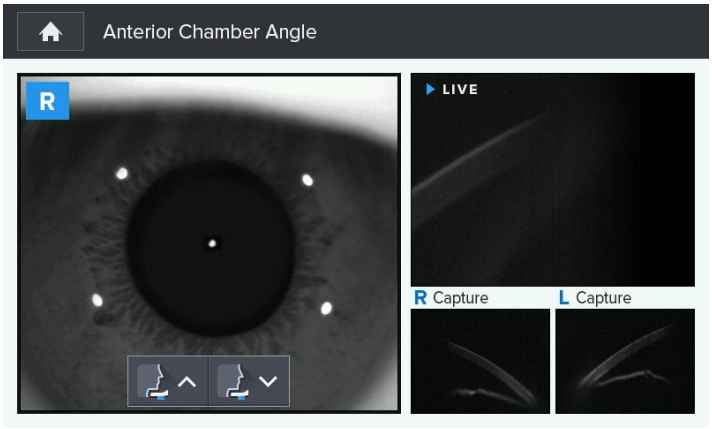
[Fitting Button]
As pushing Fitting button, display detected edge area of the cornea.

8.4. ACA Mode (Only in HNT-1P)

In case of HNT-1P, it has another feature of pachymetry. That's the ACA(Anterior Chamber Angle) function. The anterior chamber is the fluid-filled space inside the eye between the iris and the cornea's innermost surface. Glaucoma is main pathologies in this area. In glaucoma, blockage of the canal of schlemm prevents the normal outflow of aqueous humor, resulting in accumulation of fluid, increased intraocular pressure. Therefore, by measuring the anterior chamber angle of the cornea it can be found to increase the degree of intraocular pressure.

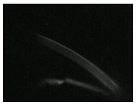
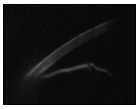
As pushing ACA button 

in the measurement mode, it can see ACA mode screen.
On the left side of the ACA mode screen, showing the camera live image of the front of the eye. On the right side, showing the ACA live image. If it align the measuring unit to the postion where the anterior chamber is diaplayed clearly by moving joystick lever,
push the measurement button on the joystick lever. According to the measured position of Right/Left side, it is displayed captured image on the bottom right of the ACA mode screen.

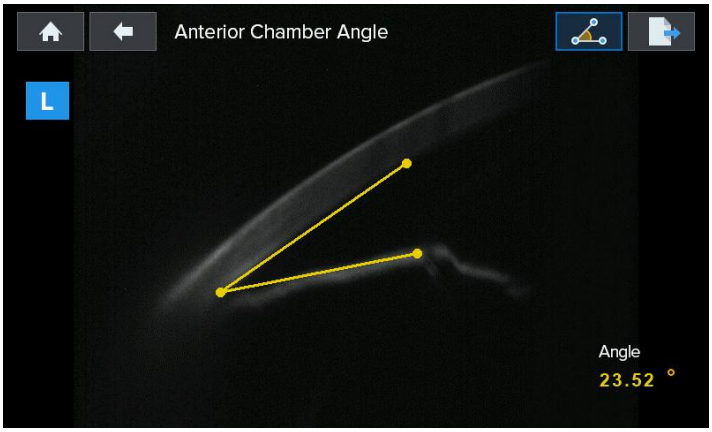


[ACA mode Screen]

8.4.1 Enlarged ACA Image Screen

When this captured thumbnail image button  or  is pressed, it entered ACA Image screen. In the ACA Image screen, you can see a full ACA image.

Pressing Angle tool button , and measure angle by touching the screen with three points of the angle sequentially. it is displayed the angle value on the bottom right of the screen.



[ACA Image Screen]

 **[Exit Button]**
As pushing Exit button, return to the main measurement screen.

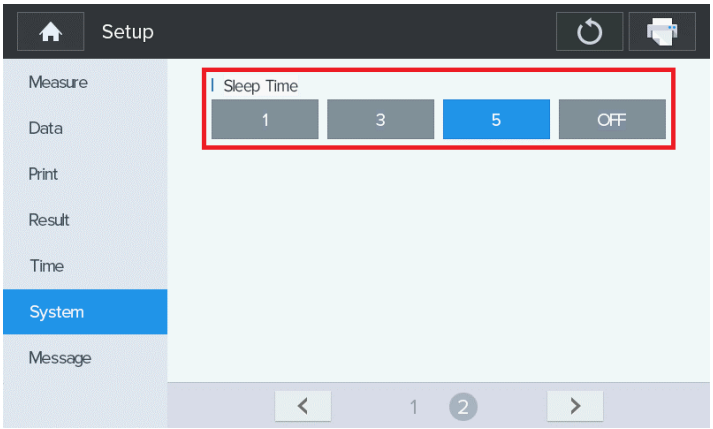
 **[Back Button]**
As pushing Back button, return to the ACA mode screen.

 **[Angle tool Button]**
As pushing Angle tool button, measure angle by touching the screen with three points.

 **[Send Button]**
As pushing Send button, send the ACA image to PC.
The HRK-mate PC software support ACA image receiving.

8.5. Power saving Mode

The power saving function begins to operate if you do not operate the machine at all for three (1/3/5) minutes or so. It is to return to the measurement mode as pushing any button or touch optionally in saving mode. It is possible to adjust the power saving time when you select the “Sleep Time” on the user SETUP mode.



[“Sleep Time” of the Setup mode]

9

Maintenance

9.1. Maintenance Items

To ensure safe and correct use of the HNT-1(P), the following must be checked before and after use.

9.1.1. User Maintenance Items

Item	Period	Description
Check up	Before using	● Power cord and plug for damage ● Connection to AC outlet ● Function of Safety lock ● Defect of Main unit include outside cover, glass part of air nozzle and etc.
Cleaning	When the part is stained	● Outside cover, LCD ● Glass part of air nozzle ● Pachy. Window(HNT-1P only) ● Etc.
Replacement	As required	● Fuse ● Print paper ● Chin rest paper

9.1.2. Manufacturer Maintenance Items

Item	Period	Description
Calibration	When necessary Within 1 year	● Tonomety(IOP) function ● Pachymetry function
Device	When necessary Within 1 year	● Check the main unit operation

9.2. Calibration

We recommend that calibrate the HNT-1/P periodically.
If the difference between HNT-1/P and goldmann contact tonometer(is known as a gold standard) is more than 5mmHg frequently, we recommend that calibrate the HNT-1/P.
Calibration is not allowed by a user because of the technical issues.
Contact to the Huvitz's authorized distributor or Huvitz Co.,Ltd.
If the period of calibration is resticted by the local law, follow up the local law.

9.3. Before calling for serviceman

In case that abnormality happens or the machine operates abnormally, a warning sign is to be indicated. In this case, perform the settlements below.
If the machine does not return to the normal condition in spite of the measures below, contact to the agent where you bought the machine after switching the power off.

9.3.1. Symptom and solution

Symptom	Cause / solution
The touch screen does not turn on	✓ The power cord may not be connected. Check the connection of the power cord. ✓ The power switch may not be turned on. Check if the power switch is turned on. ✓ The system may be in Sleep mode. Restore the system from Sleep mode by touching the screen.
The main unit cannot be moved horizontally	✓ The main unit may be locked with the Stage fixation lever. Pull the lever to unlock the main unit..

9.3.2. Error Message and solution

Stage	Error message	Cause	solution
Self – test	LOAD SYSTEM DATA ... FAILED	failed to load system configuration data	1. Touch the screen or press joystick button 2. Load and Save default settings. 3. Setup setting and turn off the device 4. If same error message is displayed again, turn off the device and contact Huvitz or your authorized distributor
Tono mode	EYE NOT FOUND	Eye position is not align clearly	1. Clean the glass part around air nozzle and try again. 2. If same error message is displayed again, tu rn off the device and contact Huvitz or your aut horized distributor.
	EYELID COVERED	Eye closed.	1. Try again. 2. If same error message is displayed again, turn off the device and contact Huvitz or your authorized distributor
	APPL WEAK	Applanation signal is weak.	
	APPL OVER	Applanation signal is strong	
	IOP OVER	the result of calculated data is over the measurement range	1. Change the measurement range (60, SPC 60) and retry 2. If same error message is displayed again, turn off the device and contact Huvitz or your authorized distributor.
	WEAK PRESS	Pressure of solenoid is weak.	
	SETUP INVALID	IOP Setup data is not valid.	1. Turn off the device and contact Huvitz or your authorized distributor
Pachy mode	IMAGE NOT FOUND	The detection of the corneal thickness area is not available	1. Reduce the brightness of circumstance and try again. 2. If same error message is displayed again, turn off the device and contact Huvitz or your authorized distributor.
	PACHY INVALID	the result of calculated pachy data is not valid.	1. Try again. 2. If same error message is displayed again, turn off the device and contact Huvitz or your authorized distributor
	P-SETUP INVALID	Pachy Setup data is not valid.	
	RANGE OVER	the result of calculated data is over the measurement range	
	TOO NEAR	the CCT area of captured image is located in above	1.Try again 2. If same error message is displayed again, turn off the device and contact Huvitz or your authorized distributor
	TOO FAR	the CCT area of captured image is located in below	

9.4. Replacement

9.4.1 Printer paper

As red line appears on the paper, immediately change the print paper with new one.

① Open the printer cover

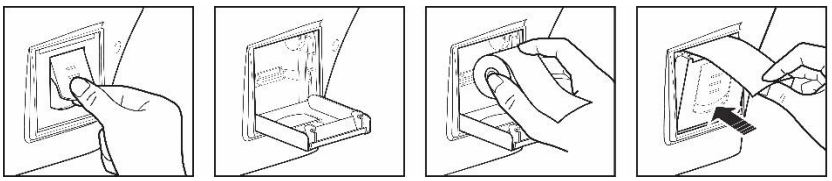
② Cut the paper inserted in the printer, and take it away from it. Take paper roll together with shaft out of the printer, and pull the rotating shaft away from paper roll.

③ Put the rotating shaft in to the new roll.

④ Put the paper inserted with the rotating shaft into the printer case.

⑤ Fix the paper onto the printer. At this time, adjust the length of paper so that it can come out from the paper outlet of the printer cover.

⑥ Close the cover after inserting the end of paper into the hole of cover.



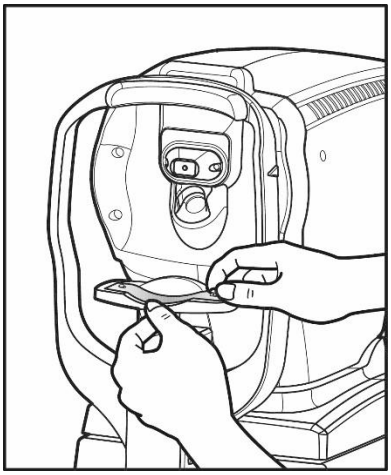
[Replacement Paper]

9.4.2 Chinrest paper

① Pull two(2) pins out of the chinrest.

② Push the pins into the holes of chinrest paper. You can put 50 sheets of it on.

③ Insert the pins into each one of two (2) holes in the chinrest.



[Replacement Chinrest paper]

NOTE

Please use the chinrest paper that provided by Huvitz Co.,Ltd.

9.4.3 Replacing Fuse

① Turn off and raise the Non-Contact Tonometer HNT-1/1P with two arm carefully.

② Remove the Power cord

③ Pick the fuse holder out from the Power inlet

④ Exchange the fuses

⑤ Insert the fuse folder

9.5. Cleaning

To protect infection and contamination, equipment must be kept clean at all times.

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.

1. Pachy window and glass part of air nozzle
   ① Check the pachy window and glass part of air nozzle from an oblique direction for any contamination such as dust or soil.
   ② Remove dust on the surface of pachy window or glass part of air nozzle with wind-blower and a dry and soft cloth.
   ③ For sever stains, Wipe with a clean cloth such a gauze dampened with an alcohol

2. Operator contact parts(Power switch, LCD, Covers, Joystick, Print cover, Chin rest, Safety button)
   ① Power switch
      A. Wipe with a dry and soft cloth.
   ② LCD, Covers, Joystick, Print cover, Chin rest, and Safety button
      A. When dirty or stained things on surface, wipe with a dry and soft cloth
      B. For sever stains, Wipe with a clean cloth such a gauze dampened with neutral detergent or alcohol.

3. Patient contact parts (Chinrest paper and headrest rubber)
   ① Always clean the patient contact parts (such as chin rest paper and headrest rubber) before measuring each patient.
   ② Remove a single sheet of chinrest paper if the chinrest paper is used.
   ③ Before or after the measurement, wipe the headrest rubber with a soft cloth or gauze with an alcohol.

9.6. As changing the installation place of the equipment

① Off the power switch of main body.

② Take the power connection cable apart.

③ Move it while maintain the horizontality of it by holding the bottom of the main body.

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Service Information

Repair: If the problem is not solved in spite of the settlement according to the contents of chapter 9, please contact to Huvitz's agent with the information on the following items.

- Name of Equipment Type: Non-Contact Tonometer HNT-1/1P
- Typical No.of Equipment: Typical number consisted of 8 digits and characters written on its name plate.
- Explanation on its symptom: Description in detail.

Supply of parts required for repair:

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

Normal life span of the device is :

- 7 years from delivery when a regular maintenance is performed.

Parts to be repaired by qualified service manpower:

- 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.
- Back up battery for clerk and data.

⚠ CAUTION

As this device use lithium battery, the reckless abandon of the machine itself or the lithium battery can cause the environmental pollution. Please contact to the professional waste disposal company.

Comme cet appareil utilise une batterie au lithium, l'abandon imprudent de la machine elle-même ou de la batterie au lithium peut provoquer une pollution de l'environnement. Veuillez contacter la société professionnelle d'élimination des déchets

■ **How to Contact Huvitz Co., Ltd.**

■ **Huvitz Co., Ltd.**

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11

EMC (Electromagnetic Compatibility) Information

Manufacturer announcement – electromagnetic waves trouble

- **Electromagnetic waves trouble**

  HNT-1/1P should be used in the below mentioned electromagnetic wave environment. HNT-1/1P purchaser or user needs to confirm whether HNT-1/1P 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**

  HNT-1/1P is to be used in the below designated electromagnetic wave environment. HNT-1/1P customer and user need to guarantee that the HNT-1/1P 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 *U*T is the a.c. power voltage for before approving the test level.		

- **Electromagnetic waves tolerance**

  HNT-1/1P is to be used in the below mentioned electromagnetic wave environment. HNT-1/1P purchaser or user needs to confirm whether HNT-1/1P 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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Specifications

- **Intraocular pressure**

Intraocular Pressure Measurement Mode (AT3D (X, Y, Z), AT2D(X, Y), MT(Manual))	
Measurable range	0~60mmHg
Measurement Mode	SPC30, SPC60, 30, 60
Measurement value	1mmHg step (Average:0.1mmHg step)
Measurement Accuracy	±5mmHg
Smart Puffing Control(SPC) Feature	SPC30(0 to 30mmHg) or SPC60(0 to 60mmHg)
Central Cornea Thickness Compensation Function	Yes

- **Central Cornea Thickness Measurement (HNT-1P only)**

Pachymetry Measurement Mode (AT3D (X, Y, Z), AT2D(X, Y), MT(Manual))	
Measurable range	150~1300um
Measurement value	1um step
Measurement Accuracy	±5um

- **Common(HNT-1, HNT-1P)**

Type	Non-contact
Working Distance	11mm
Data display	10 measurement data
Screen	7inch TFT LCD
Printer	Thermal Line printer
Power saving function(Sleep Mode)	1/3/5 minutes
Electrical Power	AC100 - 240V, 50/60Hz
Current	1.0 - 0.7A
External I/O	RS-232C (in/out)
Dimension & Weight	514(W) x 262(D) x 435(H)mm 17.5Kg(HNT-1), 18.5Kg(HNT-1P)

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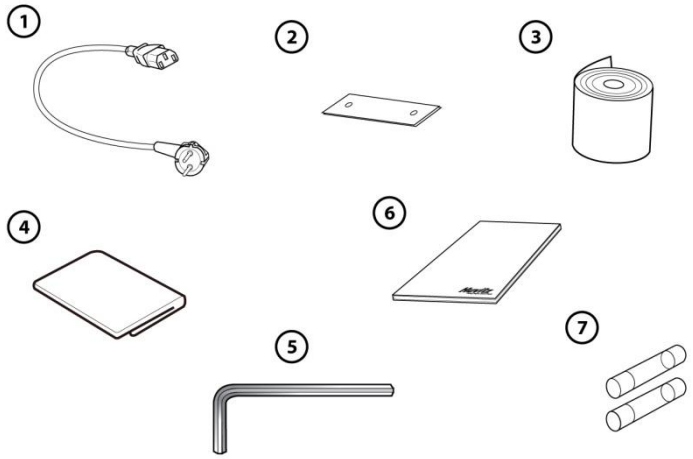
Accessories

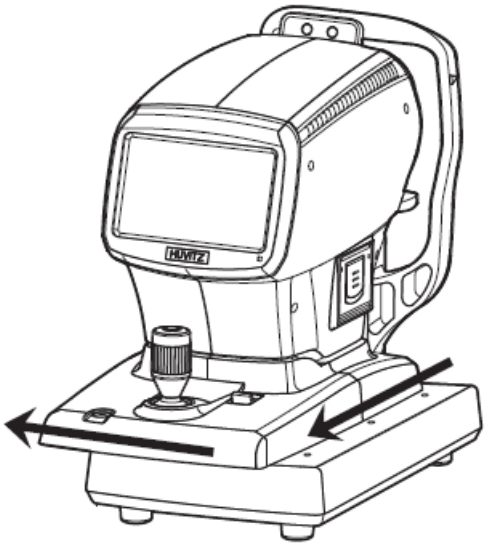


No.	Accessory name	Part number	Quantity
1	Power cable	7550PAC0516-A	1 unit
	Power cable (For use only 110V)	7550PAC0005-A	1 unit
2	Chin rest paper	9350A000043-A	100 sheet
3	Print paper	9010A000001-A	2 rolls
4	Dust cover	9320A000001-A	1 piece
5	Wrench (2.5mm)	9340A00LW25-A	1 piece
6	Operation's Manual	9000ENG0030-D	1volume
7	Spare Fuse (250V, T 3.15AL)	7610S005031-A	2 units

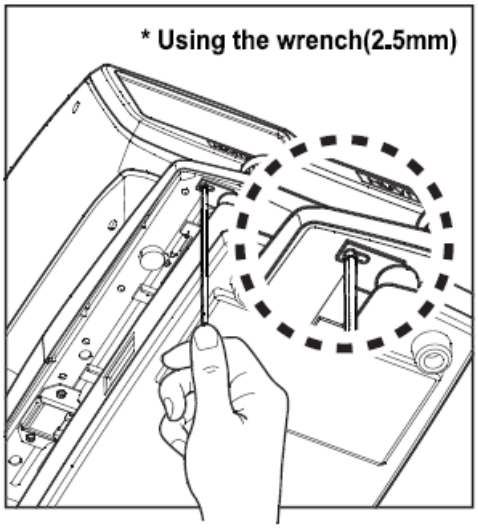
✓ Accessories can be purchased separately. Please contact your local Huvitz representative or Huvitz customer service.

Safety Module Unlock

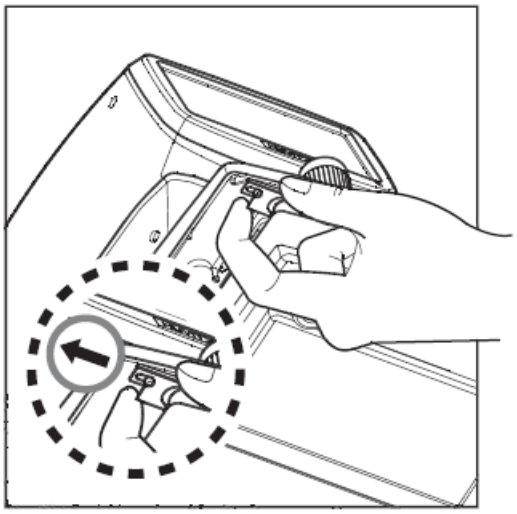
1. **Move the frame**



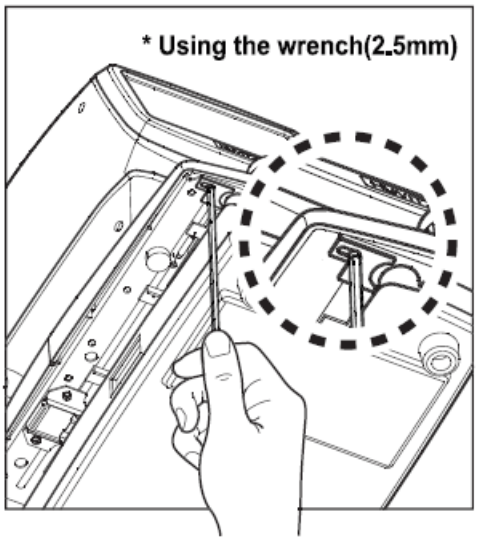
2. **Loosened the screw**



3. **Pull the safety packing lock**



4. **Tighten the screw**



Appendix A

RS-232C Interface Specification for HNT-1 & 1P

Introduction

In order to transmit measured data to external PC or device, HNT-1&1P system(HNT) supports data communication protocol via RS-232C serial interface. This protocol is a kind of one-way transfer without requesting any response from the other side. To enable the data transmission, turn on COM Out menu in user setup in HNT system.

Safety Information

External equipment intended for connection to signal input, signal output or other connectors, shall comply with relevant IEC Standard (e.g., IEC60950 for IT equipment and IEC60601-1 series for medical electrical equipment). In addition, all such combination-system-shall comply with the standard IEC60601-1 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.

Basic Hardware Configuration of RS-232C Interface

	One-sided direction's
Action	After Printing
Baud Rate	115200
Data Bit	8 Bit
Parity	No
Stop Bit	1 Bit

Data Format

:One-way protocol

If there is any measured result in HNT system, pressing Print key causes printing it on paper, and then transmits it. Data printing or transmission is canceled if each menu item is disabled in User setup.

This data communication with external PC or device is not mutual. HNT system transmits each data packet written in ASCII codes one by one as the following data format without waiting any response like conventional ACK, NAK, and STX, etc.

Even though there is no programming implementation, the overall contents of data communication can be easily confirmed in any terminal software like DNW.

```
\r\n
NO:⌒21\r\n
DATE:⌒2016/12/14 12:35\r\n
VER:⌒1.0.0\r\n
T-R01:⌒10\r\n
T-R02:⌒18*\r\n
T-R03:⌒10*\r\n
T-R-A:⌒10.0\r\n
P-R01:⌒513\r\n
P-R02:⌒504\r\n
P-R03:⌒476*\r\n
P-R-A:⌒508.5\r\n
T-L01:⌒18\r\n
T-L02:⌒18\r\n
T-L03:⌒16\r\n
T-L04:⌒16\r\n
T-L-A:⌒17.0\r\n
P-L01:⌒531\r\n
P-L02:⌒524\r\n
P-L03:⌒527\r\n
P-L03:⌒528\r\n
P-L-A:⌒527.5\r\n
\r\n
```

(‘⌒’: Space character, ‘\r’: Carriage return, ‘\n’: Line feed)

At start and end packet of data transmission, a pair of carriage return and line feed character is sent to notify the connected device of start-up and close-up of communication. Also, the pair is sent as ending of each data packet.

The number of data packets is variable according to the number of measured data on both sides (Right or Left). If there is no measured data, data communication doesn’t happen without any transmission.

Packet	Description
\r\n	Start-up of data transmission
NO: 21	Patient number(Maximum 5 digits)
DATE: 2016/12/14 12:35	Date and Time(year/month/day hour:minute) → Data format depends on Date menu option in User setup
VER: 1.0.0	Software version
T-R01: 10 P-L01: 531	Measure Type('T(Tono)' or 'P(Pachy)'), Measure Side('R' or 'L'), Measure Count(01~10), Measure Data(Tono or Pachy data)
T-R02: 18* P-R03: 476*	Measure Type('T(Tono)' or 'P(Pachy)'), Measure Side('R' or 'L'), Measure Count(01~10), Measure Data,Asterisk(Unreliability Mark)
T-R-A: 10.0 P-L-A: 527.5	Measure Type('T(Tono)' or 'P(Pachy)'), Measure Side('R' or 'L'), Average Measure Data → If there is an Asterisk among the measured data, it is not included in the average data. → The floating point of the average data depends on the 'Float Average' option in User Setup.
\r\n	End of data transmission