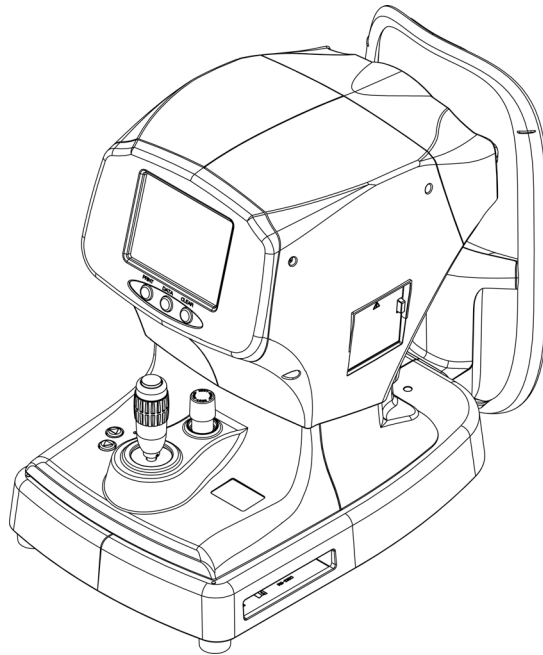


INSTRUCTION MANUAL

AUTO REFKERATOMETER RC-800



Read this manual thoroughly before using the instrument to ensure proper and safe operation. Contact Tomey Corporation or our local distributor if you have any questions or you encounter any problems during operation.

Note

- Always follow the operation procedures described in this manual.
- Keep this manual in a readily accessible location while operating the instrument.
- Contact our local distributor if you lose this manual.



To our customers

This is a medical instrument used to measure the objective refraction and radius of corneal curvature.

Although PD measurement, corneal diameter/pupil diameter measurement, and CL base curve diameter measurement features are loaded as optional functions, the validity of those measurements is not guaranteed.

It is recommended that those measurements be performed with dedicated instruments.

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i Important Safety Information



- *Do not install this instrument in a location where explosives or inflammable substances are used or stored. Otherwise, fire or explosion may occur.*
- *Do not remove the cover of the instrument. You may be directly exposed to high voltage sections.*
- *Do not disassemble or modify the instrument. You may be directly exposed to high voltage sections.*



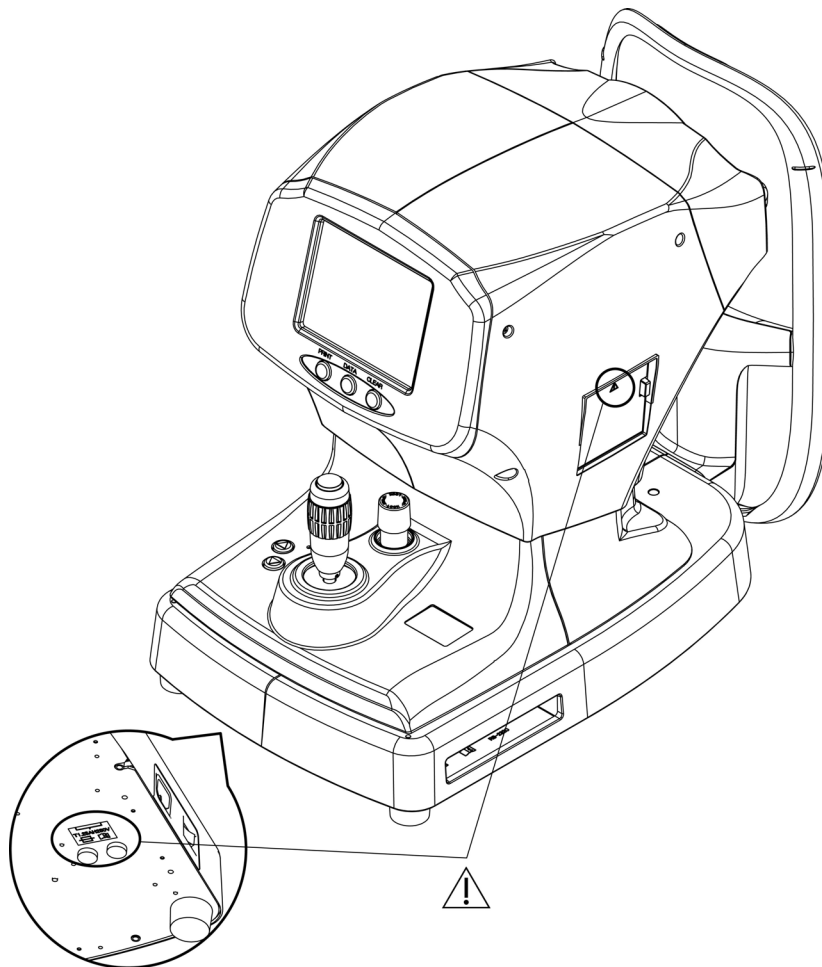
- *Disconnect the power cord from the instrument before servicing the instrument. Otherwise, you may get an electric shock.*



- *Do not place water or chemicals on the instrument. Any water or chemicals entering the instrument may cause an electric shock or failure.*
- *Only use the specified terminal for connection of the instrument. Using another type of terminal may result in failure of the instrument.*
- *This instrument is a diagnostic/measuring device specially designed for ophthalmology. Never use the instrument for other purposes.*
- *The external output terminal is not isolated from the internal circuit. Inappropriate wiring may damage the internal circuit. Never touch any of these terminals and the patient at the same time. Be sure to contact Tomey or our local distributor before using the external output terminal.*
- *When operating this instrument connected to other devices, only use devices that satisfy IEC60601-1 or equivalent safety requirements, or that conform to IEC60950 and whose power source is insulated with an isolation transformer, in order to satisfy the relevant safety requirements for medical equipment.*



- **Never mark or damage the caution labels on the instrument. Caution labels are provided on the side and at the bottom of the main unit (1 in each location).**
- **Contact Tomey or our local distributor when a label is damaged or becomes illegible.**



ii How to read this manual

Outline

This manual is structured as follows.

1. PRIOR TO USE

Describes safety precautions and important information to be understood before installing and using the instrument.

2. NAMES AND FUNCTIONS

Describes names and functions of each section of the instrument.

3. OPERATION PROCEDURES

Describes information required for installing and using the instrument.

4. TECHNICAL INFORMATION

Describes useful technical information about the instrument.

5. INSPECTION AND MAINTENANCE

Describes procedures for replacing consumable parts, etc. that the user of the instrument should normally conduct.

6. TROUBLESHOOTING

Describes how to solve problems.

7. CONSUMABLES

Describes consumable parts and optional equipment.

8. SPECIFICATIONS

Describes the specifications of the instrument.

9. INDEX

Refer to the index when needed.

SYMBOLS USED IN THIS MANUAL

Sentences accompanied with the symbols below indicate the following:



- *This is a precaution that, if unheeded, will result in a hazardous situation where there is an imminent danger of serious injury or death.*



- *This is a precaution that, if unheeded, could result in a hazardous situation where there is a possibility of serious injury or death.*



- *This is a precaution that, if unheeded, may result in a situation where there is a possibility of minor or moderate injury or damage to property.*



- *This is an additional instruction which may contain a special precaution on company policy related, either directly or indirectly, to the safety of personnel or to the protection of property.*

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1. PRIOR TO USE

Note

- *Read this manual thoroughly before using this instrument to ensure proper and safe operation.*
- *Always follow the operation procedures described in this manual.*
- *Check that there are no devices that generate strong magnetic field near the instrument. A strong magnetic field may cause noise and affect measurement.*
- *Do not place any other objects on this instrument.*

1.1 Precautions for operation

- *Only allow qualified operators to use the instrument.*

- *Precautions when installing the instrument*



- *Install the instrument in a location free of water or chemicals. Any water or chemicals entering the instrument may cause an electric shock or failure.*
- *Do not install the instrument in a location where chemicals are stored or gases may occur. Spilt chemicals or vapor may enter the instrument and result in fire.*
- *Check that the frequency, voltage, and allowable current (or power consumption) of the power source are appropriate. Otherwise, fire or electric shock may occur.*
- *Connect the power plug to a grounded 3-pin outlet. Otherwise, a short circuit due to failure of the instrument may result in electric shock.*
- *Do not place any heavy object on the power cord or squash the power cord. Fire or electric shock may occur.*
- *Fully insert the power plug into the outlet. Faulty contact, allowing any metal to contact the exposed terminal of the plug, or dust accumulated on the exposed terminal of the plug may result in fire or electric shock.*
- *Conduct grounding work correctly. Otherwise you may get an electric shock.*
- *Do not connect a device with data transmission specifications that are not compatible. Fire or electric shock may occur. Contact Tomey*

Corporation or our local distributor before using the instrument while connected to another device.



- Install the instrument in a location not subject to direct sunlight, high temperature and humidity, or air containing dust, salt, and/or sulfur. Otherwise, failure or malfunction may occur.
- Install the instrument in a leveled stable location free of vibration or mechanical impact. Otherwise, measurement cannot be conducted correctly. Also, the instrument may topple over or fall down, resulting in fire or a serious accident.
- Check the battery power source (discharge condition, polarity, etc.).
- Do not hold the head, chin rest, forehead pad, or joystick when moving the instrument. These components are detachable and the instrument may drop, resulting in injuries.

■ **Precautions before using the instrument**



- Check that the instrument works properly by inspecting switch and button operations, display, and printing.
- Check that the instrument is correctly grounded.
- Check that all cables are connected correctly.
- Check the sections that the patient will directly touch.
- Peel off the top sheet of chin rest paper and clean the forehead pad with a cloth dampened with alcohol before measurement.
- Check that the date set in the instrument conforms to the actual operation date and time.

■ **Precautions during operation**



- Do not place any container with liquid in it on the instrument. Any liquid entering the instrument may cause electric shock or failure.
- Do not allow the patient to touch the terminals for connecting the instrument to external devices.
- If a measurement of the radius of corneal curvature which is considered questionable due to the following is used to select intraocular lenses, further surgery might be required. In this case, it is necessary to review the of examination result by analyzing the shape of the cornea.
 - The error code (E) is added to the measured value.

-
- *There is a significant difference between the radii of corneal curvature of the left eye and the right eye.*
 - *The degree of the calculated intraocular lenses is one that is less frequently used, or is out of the normal range.*
 - *Note that if diopter is used as the measurement unit for the radius of corneal curvature, the measured value may differ depending on the cornea equivalent refractive index.*

This instrument uses the value $n = 1.3375$.

If an incorrect value is used to select intraocular lenses, further surgery might be required.

- *Be sure to press the CLEAR button on the main unit to delete the measurement data of the previous patient before measuring a new patient. If new measurement is started without deleting the previous data, the measurement data for the previous patient may be included.*



- *When moving the measuring head and/or chin rest of the instrument, pay attention to the position of the patient's face, hands, and fingers. The patient may be injured by the moving section of the instrument.*
- *Do not allow any person to place their hands or fingers in the clearance of the moving section of the main unit or the section immediately under the chin rest. Their hands or fingers may be caught and injured.*
- *Do not lean on the instrument or press the instrument from the top. The instrument may topple over, resulting in mechanical failure or injuries.*
- *Be extremely careful not to delay measurement unnecessarily, as this can stress the patient.*
- *Always check that there is no problem with the instrument and patient to ensure safety.*
- *This is an eye measurement instrument used to measure the eye refractive power and radius of corneal curvature. Although PD measurement, corneal diameter/pupil diameter measurement, and CL base curve diameter measurement features are loaded as optional functions, the validity of those measurements is not guaranteed. It is recommended that those measurements be performed with special purpose instruments.*
- *If any problem is found with the instrument or patient, take appropriate action, such as stopping operation, to maintain patient safety.*

-
- *Do not use the refractive power, radius of corneal curvature, PD value, residual astigmatism, and base curve measurement for contact lenses directly to prescribe glasses or contact lenses. This could cause eye strain or corneal disorder. Other examination methods should also be used in conjunction with the above.*
 - *Never touch the cutter in the printer. Touching this can cause injuries.*
 - *Peel off the top sheet of chin paper and clean the forehead pad with a clean cloth before measuring the next patient. Clean the forehead pad and chin rest with a cloth dampened with alcohol as needed.*
 - *If any smoke, offensive odor, or abnormal sound occurs, turn off the instrument immediately, disconnect the power plug from the outlet, and contact our local distributor or Tomey Corporation.*

■ **Precautions after operation**



- *Do not place any container with liquid in it on the instrument. Any liquid entering the instrument may cause electric shock or failure.*



- *Do not use organic solvents such as thinner, benzene, or acetone to clean the instrument. Fire or electric shock may occur. (They may also corrode the resin or coating of the cover of the instrument.)*
- *When disconnecting cords, do not apply excessive force on them; for example, do not hold and pull the cord to disconnect it. Disconnect the power cord from the outlet to ensure safety when the instrument is not operated for 1 month or longer.*
- *Hold the plug when disconnecting the power plug from the outlet to avoid placing excessive force on the cord. Pulling the cord may damage the inner core wires, resulting in electric shock or fire.*
- *Refer to “5.6 Storing” for instructions on the storage of the instrument.*

-
- ***If any failure occurs in the instrument, immediately stop operation, indicate the failure in the instrument, and contact our local distributor for repairs.***



- *Do not modify the instrument. Doing so may cause electric shock or failure of the instrument. There is a high-voltage section in the instrument. Touching this section will result in death or serious injuries.*
- *Disconnect the power cord from the outlet when replacing fuses. Otherwise, you may get an electric shock, resulting in death or serious injuries.*



- *Use the power cord and fuses provided with the instrument or specified by Tomey to ensure safety. Also, do not use the accessories provided with the instrument for other equipment.*



- *Conduct regular inspections of the instrument.*
- *When the instrument is not used for 1 month or longer, check that the instrument is operating correctly and safely before starting operation. Refer to “5.3 Inspection” in this manual for the relevant procedures.*

1.2 Checking package contents

Open the package and check that the required quantity of the following items is included and they are not damaged. If any item is missing or damaged, contact our local distributor as soon as possible.



■ *Keep the box and packing materials for use when moving or transporting the instrument.*

■ *When taking the instrument out of the box, pull the outer box upward and then remove the packing materials. Be careful not to lift the instrument by directly holding the measuring head, chin rest, forehead pad, or joystick. The instrument may be damaged.*

- Main unit AUTO REFKERATOMETER RC-800 1
- Power cord..... 1
- Model eye 1
- Fuse (2 fuses are installed in the main unit)..... 4
- Chin rest paper 1
- Pins for chin rest paper 2
- Printer Paper (One is already installed) 3
- CL holder 1
- Dust cover 1
- Instruction manual (this manual)..... 1
- DATA Transfer installation CD 1
- DATA Transfer installation guide 1

1.3 Glossary

[A / AX / AXIS]	: Astigmatism axial angle [0° - 180°] Represents the direction where a degree of astigmatism is present; the degree will be applied where it intersects at right angles with the astigmatism axis.
[AS]	: Auto Shot
[AVG]	The average radius of corneal curvature taken from the major and minor meridians. [mm or D]
[C/CYL]	: Cylindrical refractive power [D]
[CAT mode]	: Cataract eye measurement mode in refractometer measurement
[CL mode]	: The mode used when measuring the base curve of hard contact lenses
[CORNEA]	: Shows the corneal diameter in the [DIA] mode for corneal diameter measurement/pupil diameter measurement.
[DATA Transfer]	: System to output the examination data created by TOMEY products as a file
[IOL mode]	: The mode used for eyes wearing IOL during refractometer measurement
[K1]	: Radius of corneal curvature of minor meridian [mm or D]
[K2]	: Radius of corneal curvature of major meridian [mm or D]
[PD]	: Pupil distance [mm].
[PUPIL]	: Shows the pupil diameter in the [DIA] mode for corneal diameter measurement/pupil diameter measurement.
[RA]	: Residual astigmatism (see “Residual astigmatism”)
[S/SPH]	: Spherical refractive power [D]
[SE]	: Equivalent spherical degree (see “Equivalent spherical degree”).
[Temporary]	: Function to temporarily change the measuring condition(s)

[TOMEY Link]	: Digital medical record system to control the data measured with Tomey products
[VD]	: Vertex distance [mm] Represents the distance between the corneal vertex and the posterior surface of the lenses to be prescribed. When (VD=CL), vertex distance is calculated as 0 mm.
[Auto Shot]	: Function to automatically perform measurement when the sight in the up/down/right/left/focus directions becomes optimum
[Auto power off function]	: Function to automatically turn the LCD off, with only the power lamp flashing, when the instrument is not operated for the specified time (Auto Power Off mode). Touch any button to return to Normal mode.
[High-speed mode]	: Cloudy fog is automatically applied when starting refractometer measurement. The actual measurements are performed consecutively while maintaining the cloudy fog. This is effective for patients with unstable sight.
[Auto Fogging]	: Method used to intentionally defocus the fixation target to remove adjustment of the crystal lens.
[Touch panel]	: Allows you to make various settings by directly touching the monitor.
[Target center-point]	: Name of the reflection in the center of cornea
[Residual astigmatism]	: Degree of astigmatism calculated as residual, by assuming that the patient is wearing virtual hard contact lenses calculated from auto-refractometer and keratometer values. Therefore, the value may differ from "total astigmatism - corneal astigmatism."
[Equivalent spherical degree]	: Calculated from the refractometer value $SPH + CYL/2$

1.4 Overview

This is an objective refractive power measuring instrument used for measuring the spherical refractive degree, cylindrical refractive degree, and astigmatism axial angle of the patient's eyes. An ophthalmometer function for measuring the radius of corneal curvature is also provided.

The patient places her chin on the chin rest and looks into the fixation target in the measurement window. The physician observes the patient's eyes from the monitor, and aligns up/down/right/left/focus directions with the joystick. After aligning, press the measurement button to start the measurement.

It also has an Auto Shot function which starts measurement automatically if the patient's eyes are within the measuring range.

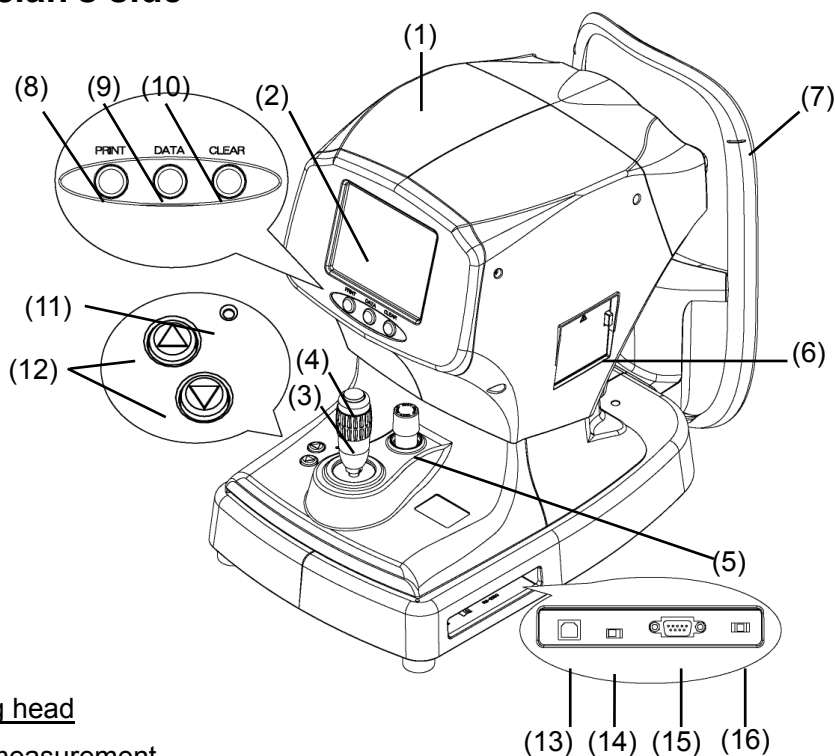
When measurement starts, infrared light for measurement is emitted, in order to calculate the refractive degree and the radius of corneal curvature of the patient's eyes.

Press the PRINT button to print out the measured values.

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2. NAMES AND FUNCTIONS

2.1 Physician's side



(1) Measuring head

Conducts measurement

(2) Monitor / touch panel

Displays the measurement screen and various setting screens. Touch the touch panel buttons shown on the LCD to make various settings and operate the instrument (see “2.3 Measurement screen”).

(3) Joystick

Moves the measuring head in all directions (see “2.4 Operation of the joystick”).

(4) Joystick button

Starts measurement.

(5) Measurement section stopper

Locks the main unit when moving and/or transporting it.

(6) Printer

Prints measurements.

(7) Eye level mark

Reference for adjusting height of patient's eye

(8) PRINT button

Manually prints the measurement results.

(9) TOMEY Link button

Connects to TOMEY Link or other instruments.

(10) CLEAR button

Deletes the measurements.

(11) Power lamp

Stays lit when the instrument is turned on.

(12) Chin rest button

Pressing the UP “▲” and DOWN “▼” buttons moves the chin rest up and down respectively.

(13) USB connector

Connection terminal to connect an external instrument via USB

(14) Connector selection switch

Select either the USB connector or RS-232C connector to be activated. When the switch is set to the left, the USB connector is active; when the switch is set to the right, the RS-232C connector is active.

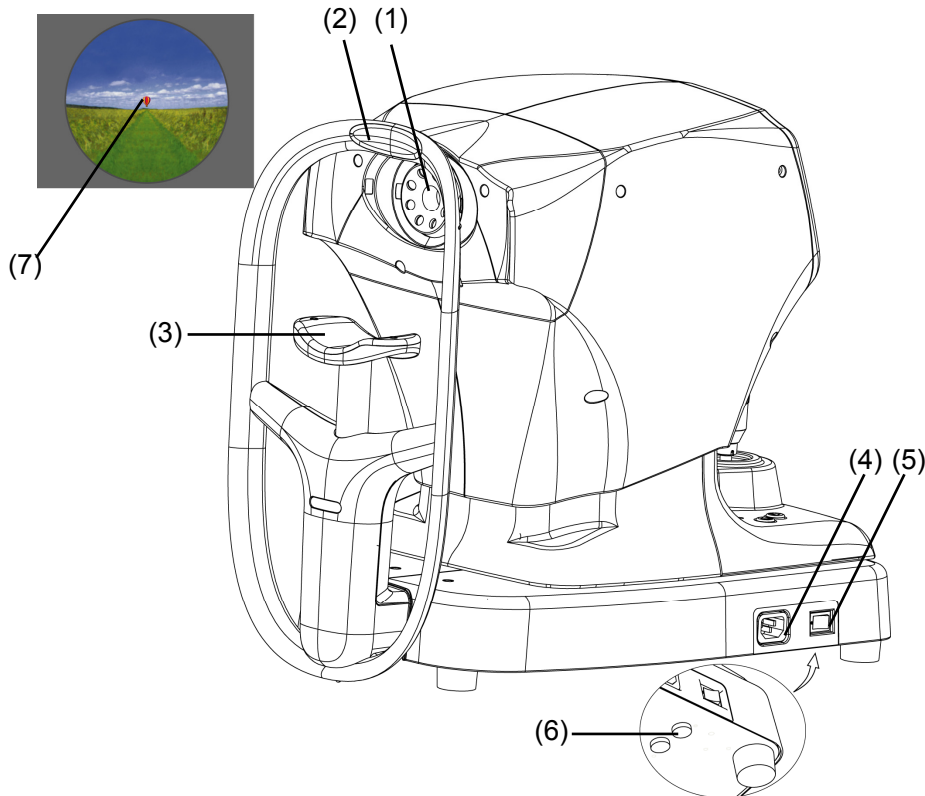
(15) RS-232C connector

Connection terminal to connect an external instrument via RS-232C

(16) Service mode selection switch

Our service personnel use this switch for maintenance. Do not change the setting.

2.2 Patient's side



(1) Measurement window

The window from which the patient looks at the fixation target

(2) Forehead pad (attachment section)

The patient presses their forehead against this pad.

(3) Chin rest (attachment section)

The patient places their chin on this rest.

(4) Power connector

Connects a power cord.

(5) Power switch

Pressing the [I (ON)] side turns the instrument on and the [O (OFF)] side turns the instrument off.

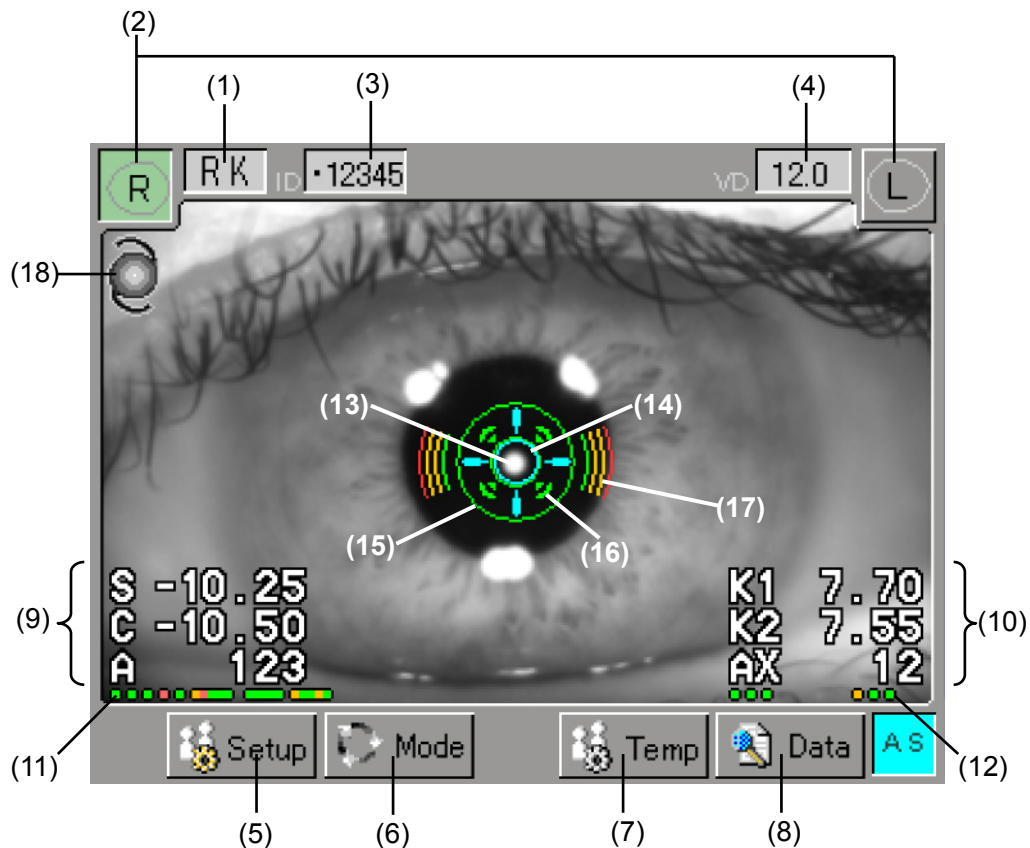
(6) Fuse holder

Insert the fuses here.

(7) Fixation target

Located in the measurement window to direct the patient's sight to fix on it.

2.3 Measurement screen



(1) Measurement mode display “RK”/“REF”/“KRT”/“DIA”/“CL”

Measurement mode (Refkeratometer measurement “RK”/Refractometer measurement “REF”/Keratometer measurement “KRT”/Corneal diameter, pupil diameter measurement “DIA”/ Contact lens base curve measurement “CL”) is displayed.

(2) Eye display button [R]/[L]

Displays which side (left or right eye) the head is placed on in colors.

(3) Exam No.

The examination number is displayed. The number increases by 1 when a new measurement is started.

(4) Vertex distance is displayed [CL]/[12.0]/[13.5]/[14.0]/[15.5]/[16.0]

Displays the distance between the vertex of the cornea to the rear surface of the glass lens (mm). [CL] means that the vertex distance (VD) is 0 mm.

(5) “Setup” button

Sets operation conditions of individual functions.

(6) "Mode" button

Switches the measurement mode.

(7) "Temp" (temporary setting) button

Sets the temporary measurement conditions only for one examination.

(8) "Data" button

Recalls the data saved in the memory.

(9) Refractometer measurement value

Current refractometer measurement value is displayed.

S: Spherical refractive power

C: Cylindrical refractive power

A: Astigmatism axial angle

(10) Keratometer values

Current keratometer measurement value is displayed.

K1: Minor meridian

K2: Major meridian

AX: Corneal astigmatism axial angle

(11) Stored data

The dot corresponding to the number of the stored data turns green, yellow, or red according to reliability. "Green" is regarded as the most reliable and "red" as the least reliable.

(12) Reliability of the previous measurement value

The dot corresponding to the number of the keratometer data measured immediately before turns green, yellow, or red to indicate reliability. "Green" is regarded as the most reliable and "red" as the least reliable.

(13) Target center-point

Indicates the position of the cornea vertex.

(14) Target ring

Index reference used when aligning the patient's eye position for measurement.

(15) Minimum pupil size ring

Indicates the minimum pupil size.

(16) Auto Shot mark

Displayed when Auto Shot is ON.

(17) Focus indicator

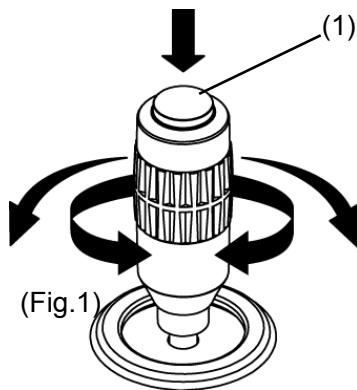
Displays the distance between the measuring head and the patient's eye. If there is a bar on the sides, move the head toward the patient. If there are bars above and below, move the head toward you and adjust the focus.

(18) IOL/CAT mode display

The IOL icon is shown when in IOL mode, and an icon representing the crystal lens is shown when in CAT mode.

2.4 Operation of the joystick

The measuring head can be moved in all directions by operating the joystick. The measurement button is located on the top of the joystick.



<Moving the head>

Forward, backward, right, and left

Hold the joystick and slide the body to move the head in the corresponding direction.

Tilt the joystick in the desired direction to fine-adjust the head position.

Up and down

Turn the entire joystick.

Clockwise: The head rises.

Counterclockwise: The head lowers.

<Measurement start>

Press the joy stick button (1) to start the measurement.

2.5 Symbols



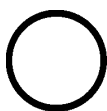
Refer to instruction manual.



Caution



Power ON



Power OFF



Type B applied part



Protective earthing



Dangerous voltage

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3. OPERATION PROCEDURES

3.1 Safety precautions

3.1.1 Precautions for installing the instrument



- *Install the instrument in a location free of water or chemicals. Any water or chemicals entering the instrument may cause an electric shock or failure.*
- *Do not install the instrument in a location where chemicals are stored or gases may occur. Spilt chemicals or vapor may enter the instrument and result in fire.*
- *Do not hold the chin rest or forehead pad when lifting the instrument. These components are detachable and the instrument may drop, resulting in injuries.*



- *Install the instrument in a location not subject to direct sunlight, high temperature and humidity, or air containing dust, salt, and/or sulfur. Otherwise, failure or malfunction may occur.*
- *Install the instrument in a leveled stable location free of vibration or mechanical impact. Otherwise, measurement cannot be conducted correctly. Also, the instrument may topple over or fall down, resulting in fire or a serious accident.*

3.1.2 Precautions for connecting the power cord

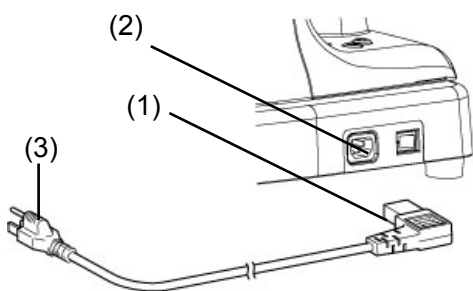


- *Check that the frequency, voltage, and allowable current (or power consumption) of the power source are appropriate. Otherwise, fire or electric shock may occur.*
- *Connect the power plug to a grounded 3-pin outlet. Otherwise, a short circuit due to failure of the instrument may result in electric shock.*
- *Do not place any heavy object on the power cord or squash the power cord. Fire or electric shock may occur.*
- *Fully insert the power plug into the outlet. Otherwise, faulty contact, metal contacting the exposed terminal of the plug, or dust accumulating on the exposed terminal of the plug may result in fire or electric shock.*

3.1.3 Connecting the power cord



- *The connector needs to be inserted in a specific direction. Check the direction and firmly insert the connector.*



(Fig.1)

Insert the connector (1) of the power cord into the power socket (2) on the side of the main unit in the correct direction.

On the plug side, connect all three pins (3).

3.1.4 Checking the printer paper



- ***Never touch the cutter in the printer. Touching this can cause injuries.***

Remove the printer cover and check that the paper is installed correctly. Refer to “5.5.1 Printer paper” for details on how to remove the cover, etc.

3.1.5 Connecting optional components

An external ID input device, personal computer, and TOMEY Link LAN adapter can be connected to the main unit using connectors. When TOMEY Link is used, measurement data can be output to a personal computer. (See “3.6 Data communication using TOMEY Link and DATA Transfer.”)

Contact our local distributor for details.



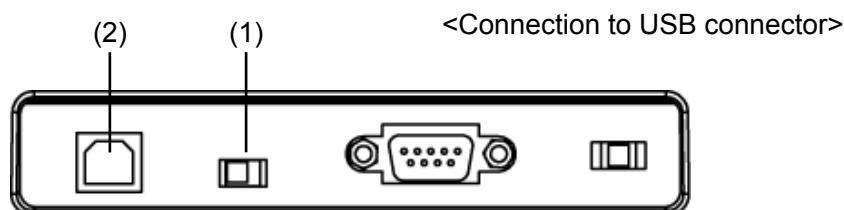
- ***When operating this instrument connected to other devices, only use devices that comply with IEC60601-1 or that comply with IEC60950-1 and whose power source is isolated with an isolation transformer. Furthermore, all devices should be configured to comply with the standard IEC60601-1 ME system. Anyone that connects any additional device to the USB connector or RS-232C connector will be considered a person configuring a medical system, and is therefore responsible for complying with the requirements of an IEC60601-1 ME system.***

Contact our local distributor or Tomey Corporation if you have any questions.



- ***The cable and connector must be inserted in the correct direction. Make sure that the orientation is correct.***

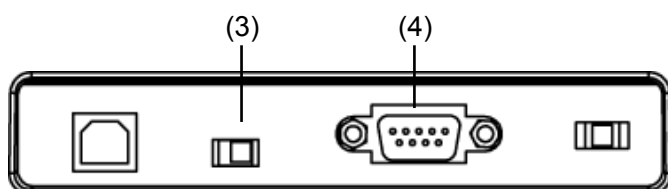
■ **Turn off the power switch of the instrument before changing connected devices. Otherwise, failure or malfunction may occur.**



(Fig.1)

Check that the connector selection switch (1) located at the bottom on the right side when viewed from the physician's side of the main unit is set to the left. Then, insert the connector of the external ID input device, personal computer, and/or LAN adapter in the correct direction into the USB connector terminal (2) located on the right side of the main unit when viewed from the physician's side.

<Connection to RS-232C connector>



(Fig.2)

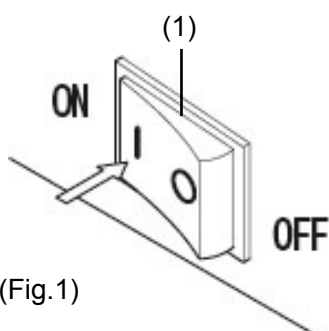
Check that the connector selection switch (3) is set to the right side. Then, insert the connector of the external ID input device, personal computer, and/or LAN adapter in the correct direction into the RS-232C connector terminal (4) located on the right side of the main unit when viewed from the physician's side.

3.2 Preparation before use

3.2.1 Startup

Note

■ *When restarting the instrument, turn the power off, wait for ten seconds or so, and turn it on again.*



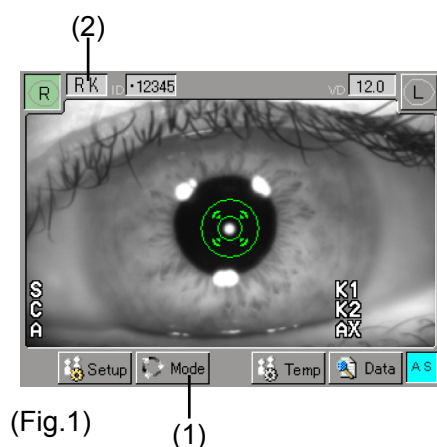
(Fig.1)

Turn on the power switch (1).

The power lamp lights and the measurement screen appears.

When the power is turned on, the instrument starts in the measurement mode selected when the power was last turned off.

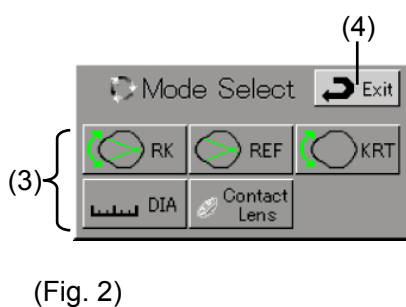
3.2.2 Selecting the mode and setting measurement conditions



The mode can be selected using the “Mode” button (1) on the touch panel. Touch the “Mode” button (1) to display the Mode Select screen (Fig. 2). Use the setting button (3) to select a mode.

Touching the “Exit” button (4) returns you to the previous screen without changing any settings.

The selected mode is shown on the mode display (2) on the Measurement screen (Fig. 1).



Display	Measurement mode
RK	Eye refractive power/keratometry mode
REF	Eye refractive power measurement mode
KRT	Keratometry mode
DIA	Corneal/pupil diameter measurement mode
Contact Lens	Contact lens measurement mode

<Measurement conditions>

Refer to “3.8 Setting measurement conditions” and set the measurement conditions.

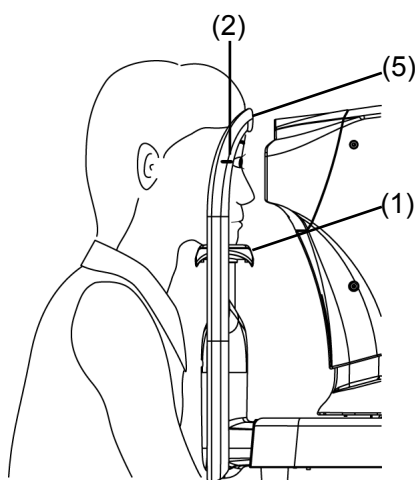
3.2.3 Adjusting patient position

Note ■ Be sure to press the **CLEAR** button on the right side under the LCD to delete the measurement data of the previous patient before starting measurement for a new patient. If new measurement is started without deleting the previous data, the measurement data for the previous patient may be included.

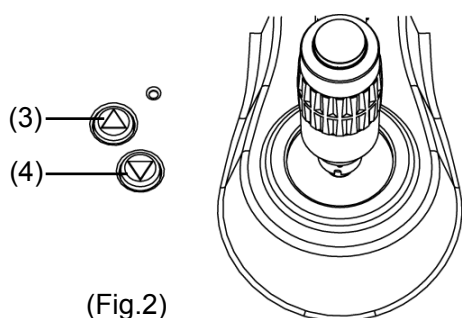
■ The chin rest paper is provided to keep the chin rest clean. It is recommended to use this paper for the chin rest so the patient may use this instrument comfortably.

■ Peel off the top sheet of chin paper and clean the forehead pad with a clean cloth before measuring a new patient. Clean the forehead pad and chin rest with a cloth dampened with alcohol as needed.

■ Ask the patient to look at the fixation target in the measurement window. If the patient looks in a different direction or moves, the measurement may not be conducted correctly.



(Fig.1)



(Fig.2)

Have the patient place their face on the chin rest (1). Adjust the chin rest height so that the height of the corner of the eye is aligned with the eye level mark (2). Press the chin rest UP button (3) provided on the side of the joystick to raise the chin rest; or the chin rest DOWN button (4) to lower the chin rest.

When the patient's eye height is set, lightly push the patient's forehead against the forehead pad (5) to secure the patient's position.

3.2.4 Auto Shot

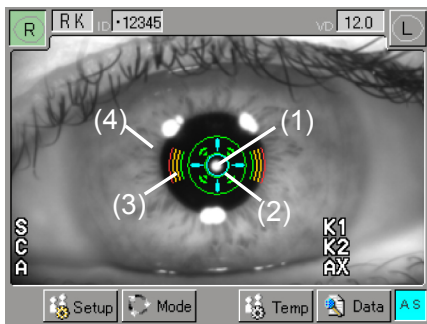


- *When moving the measuring head and/or chin rest of the instrument, pay attention to the position of the patient's face, hands, and fingers. The patient may be injured by the moving section of the instrument.*

- *Do not allow any person to place their hands or fingers in the clearance of the moving section of the main unit or the section immediately under the chin rest. Their hands or fingers may be caught and injured.*

Note

- *If the movement of the patient's eyes is excessive, the Auto Shot may not be able to follow them. Operate the joystick so that the center-point of the cornea enters the target ring.*
- *Auto Shot may not work if the patient is blinking too much, or if there are anomalies on the surface of the cornea, such as corneal disorders.*



(Fig.1)

The Auto Shot function automatically performs measurement when the sight in the up/down/right/left /focus directions becomes optimum.

If the Auto Shot function is turned on, the background of the letters [AS] on the lower right of the screen turns blue.

Operate the joystick so the center-point (1) located in the center of the cornea enters the target ring (2). Tilt the joystick back and forth so that the focus indicator (3) becomes smaller. When the focus indicator (3) appears horizontally, the head is too far from the patient's eye; when the focus indicator appears vertically, the head is too close to the patient's eye. When the focus indicator (3) does not appear, align the focus with the target center-point (1) or the iris (4).

If the Auto Shot function is turned off, the background of the letters [AS] on the lower right of the screen turns gray.

See “3.8.1 Setup” for settings for Auto Shot.

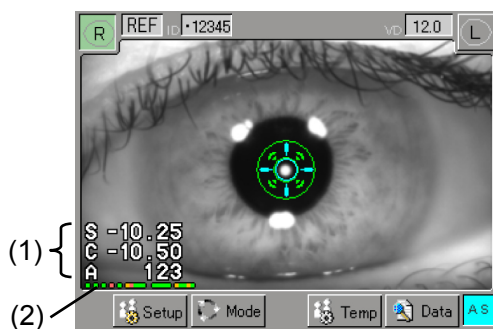
3.3 Measurement

Note

■ **Ask the patient to stop blinking during measurement.**

■ **Auto Shot may not be able to make a measurement if the eyes are blinking too much, or if there are anomalies on the surface of the cornea, such as corneal disorders. In this case, perform a manual measurement.**

3.3.1 Eye refractive power (refractometer) measurement



(Fig.1)

<Refractometer screen>

The latest measurements (1) appear in the lower left of the screen.

These represent:

S: Spherical refractive power

C: Cylindrical refractive power

A: Astigmatism axial angle

respectively.

Values are shown in white, yellow, or red in order of higher reliability.

Dots under the value represent the stored data (2). The dot color changes from the left as the number of measurements increases. Green, yellow, and red indicate the reliability of the measurement, with green regarded as the most reliable result.

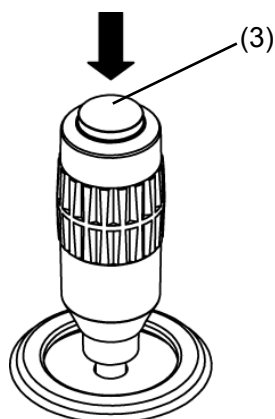
These colors are equivalent to “No mark,” “e,” and “E” on the error shown on the printout.

In refractometer measurement, up to 20 data points per eye can be recorded. If further data are obtained, old data are deleted in the order corresponding to reliability - that means, data with lower reliability, “Red” and “Yellow,” are deleted first.

<Measurement procedures>

- 1) Change the measurement mode to "REF." (See "3.2.2 Selecting the mode and setting measurement conditions.")

- 2) Use the joystick to position the patient's eye on the screen.



(Fig.2)

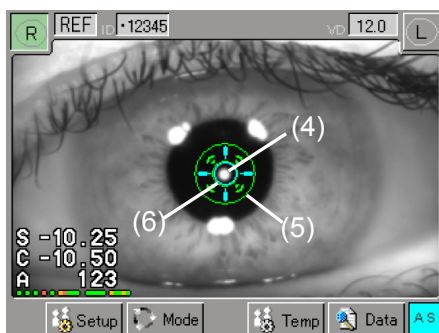
- 3) Allow the target center-point to enter the target ring. When Auto Shot is ON, measurement starts automatically once optimum focus is achieved, and the specified number of measurements (three or five) are taken.

Press the joystick button (3) when taking measurements manually.

- 4) Once the measurements are complete, the screen shows "Measurement Complete." If Auto Shot was used for measurement, the Auto Shot setting is disabled, and the background of the letters [AS] changes from blue to gray.

<When measurement is difficult>

When measurement cannot be performed or an error is shown for the measurement result, one of the problems listed below may have occurred. Conduct appropriate measures described below according to possible causes.



(Fig.3)

• Blinking or nystagmus

Ask the patient to look into the fixation target to steady their eye and start the measurement again. If the eye moves frequently due to nystagmus, etc. and Auto Shot is disabled, press the joystick button (3) when the target center-point (4) is visible to perform measurement immediately (manual measurement). However, a measurement error may occur if accurate

alignment is not performed; manual measurement, therefore, should only be performed when the patient's sight is too unstable.

- Eyelids and eyelashes are covering the minimum pupil size ring.

Ask the patient to open their eyes wide or have the physician lightly hold the patient's upper eyelid with their fingers, and conduct measurement again.

- Pupils are too small

If the pupils are smaller than the minimum pupil size ring (5), the measurement may not be taken properly.

- Pupils are decentered

If the pupils are blocking the minimum pupil size ring (5), the measurement may not be taken properly. Disable the Auto Shot function, and manually take the measurement when the pupils and the target ring (6) are concentric.

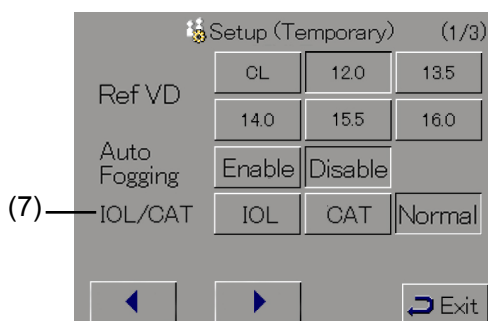
- Optic media is unclear, and ocular fundus reflex light is extremely low

If the intermediate optic medium is unclear due to disorders such as cataracts or vitreous hemorrhage, the measurement may not be taken properly.

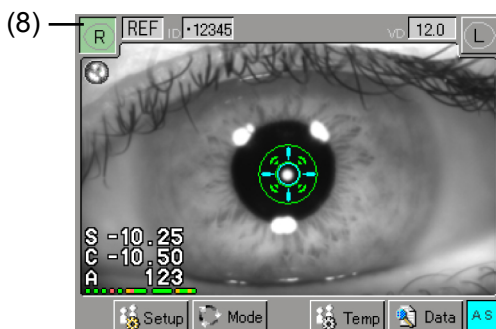
Press the "Temp (temporary setting)" button at the bottom of the screen and select CAT mode from the IOL/CAT option (7) before taking a measurement. A mark (8) appears on the screen as shown in Fig. 5.

- Undesired light, such as reflection on the surface of IOL, is present

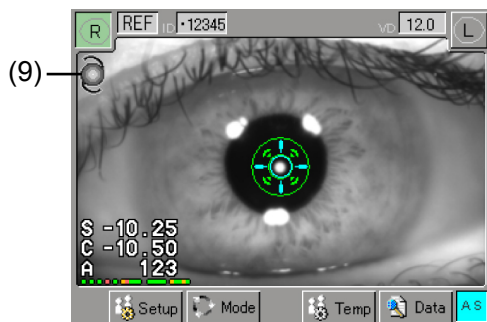
Press the "Temp (temporary setting)" button at the bottom of the screen and select IOL mode from the IOL/CAT option (7) before taking a measurement. A mark (9) appears on the screen as shown in Fig. 6.



(Fig. 4)



(Fig.5)

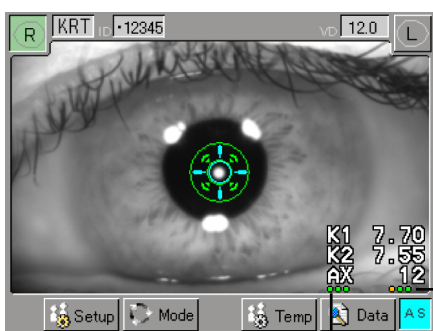


(Fig.6)

- Optical accommodation is in progress

The measurement may not be accurate when optical accommodation is in progress, such as immediately after removing corrective lenses, or just after performing tasks that require hard use of the eyes. Try again after a certain amount of time, or instruct the patient to look far away.

3.3.2 Measuring the radius of corneal curvature (keratometry)



(Fig.1)

<Keratometer screen>

The following items are displayed on the lower right of the monitor

- Current measurement value - (1)
- Dots showing the number of data items stored - (2)
- Dots showing the number of previous data items, including (1) - (3)

The measurement values (1) is shown in yellow if its reliability is low, with eyelids or eyelashes covering some portion of the measurement point. Stored data (2) and dots for previous data items (3) are also shown in yellow.

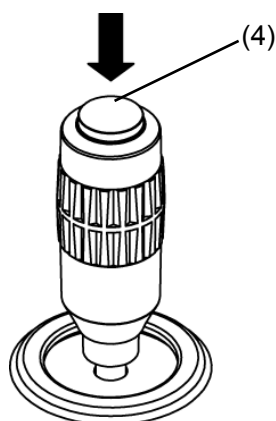
If reliability is significantly low, the measurement value (1) is shown in red. If measurement fails, a red “E” appears at the position for (1), and no measurement value will be displayed.

In keratometric measurement, up to 6 data items per eye can be recorded. If further data are obtained, old data are deleted in the order corresponding to reliability - that means, data with lower reliability, “Red” and “Yellow,” are deleted first.

(See “3.5 Showing and deleting data in memory.”)

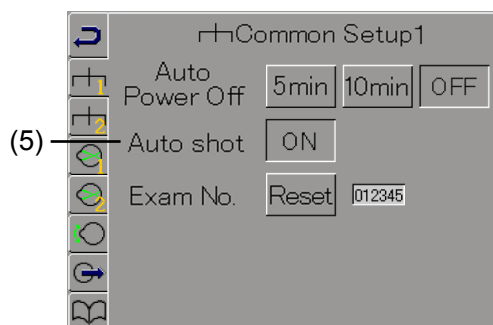
<Measurement procedures>

- 1) Change the measurement mode to "KRT." (See "3.2.2 Selecting the mode and setting measurement conditions.")
- 2) Use the joystick to position the patient's eye on the screen.



(Fig.2)

- 3) Align the target center-point with the center of the target ring. When Auto Shot is ON, measurement starts automatically once optimum focus is achieved, and measurements are performed continuously for the specified number of times (once or three times). After measurement, Auto Shot is disabled regardless of whether measurement values were obtained or not. Press the joystick button (4) when taking measurements manually.

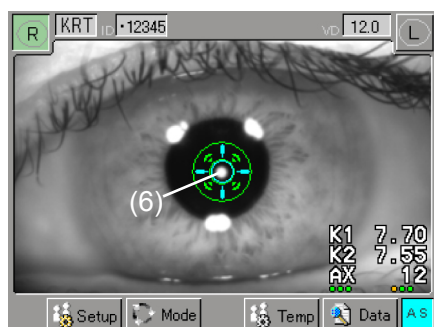


(Fig. 3)

- 4) The screen shows "Measurement Complete" once all values are obtained for the specified number of measurements. If for some reason, the specified number of measurements could not be performed, the screen shows "KRT?" In this case, touch the "Setup" button shown at the bottom of the screen, turn ON "Auto Shot" (5) on the Common Setup 1 screen (Fig. 3), and perform measurement again. Or, press the joystick button (4) and perform measurement manually.

<When measurement is difficult>

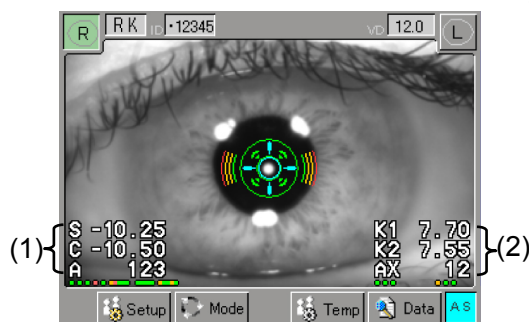
When measurement cannot be performed or an error is shown for the measurement result, the problems listed below may have occurred. Conduct appropriate measures described below according to possible causes.



(Fig.4)

- Blinking or nystagmus
Ask the patient to look into the lamp to steady their eye and start the measurement again. If the eye of the patient moves frequently due to nystagmus, etc. and Auto Shot is disabled, press the joystick button (4) when the target center-point (6) is visible. Measurement is performed immediately (manual measurement). However, a measurement error may occur if accurate alignment is not achieved; manual measurement, therefore, should only be performed when the patient's sight is very unstable.
- Eyelids and eyelashes are covering the minimum pupil size ring.
Ask the patient to open their eyes wide or have the physician lightly hold the patient's upper eyelid with their fingers, and conduct measurement again.
- There is a reflection on the IOL surface
When measuring an eye with an IOL, reflection on the IOL surface may make it difficult to get an accurate measurement.
- Patients eyes are exposed to outside light, such as bright illumination
Make sure that the patient's eyes are not exposed to outside lights, and try measuring again.
- There is an anomaly on the surface of the cornea, such as a corneal disorder
Perform manual measurement. However, if the disorder is severe, the manual measurement may be in error.

3.3.3 Measuring the eye refractive power and radius of corneal curvature (refkeratometer measurement)



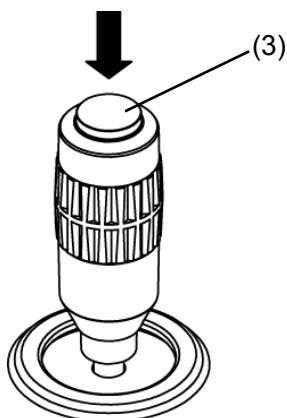
(Fig.1)

<Refkeratometer measurement screen>

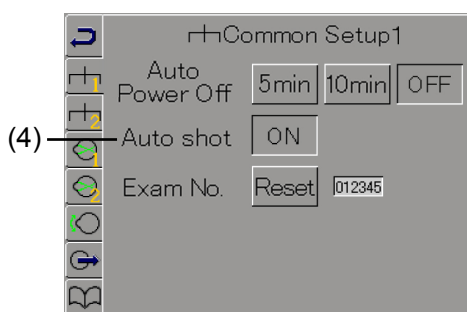
On the lower left of the monitor is the refractometer measurement value (1), and on the lower right is the keratometer measurement value (2). For details of refractometer measurement, see “3.3.1 Eye refractive power (refractometer) measurement mode,” and for details of the keratometer measurement value, refer to “3.3.2 Radius of corneal curvature (keratometry) measurement mode.”

<Measurement procedures>

- 1) Change the measurement mode to “RK.” (See “3.2.2 Selecting the mode and setting measurement conditions.”)
- 2) Use the joystick to position the patient's eye on the screen.
- 3) Align the target center-point with the center of the target ring. If Auto Shot is turned on, measurement starts automatically once optimum focus is achieved. Press the joystick button (3) when taking measurements manually. The keratometric measurement is performed first, followed by the refractometer measurement.



(Fig.2)



(Fig. 3)

- 4) After the specified number of refractometer measurement values has been obtained, the screen shows either “Measurement Complete” or “KRT?,” after which Auto Shot is disabled.
- 5) The message “Measurement Complete” means that the specified number of measurements and data for keratometric measurement and refractometer measurement has been obtained.

When the specified number of keratometric measurement values could not be obtained, the screen displays “KRT?” Touch the “Setup” button shown at the bottom of the screen without changing the measurement mode, turn ON “Auto Shot” (4) on the Common Setup 1 screen, and perform measurement again. Or, manually adjust the focus using the joystick and press the joystick button (3) to perform measurement.

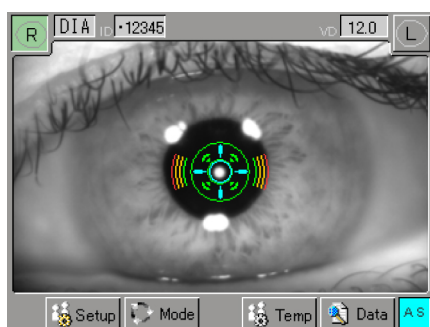
<When measurement is difficult>

For details on the refractometer measurement, see “3.3.1 Eye refractive power (refractometer) measurement mode,” and for details on the keratometer measurement, refer to “3.3.2 Radius of corneal curvature (keratometry) measurement mode.”

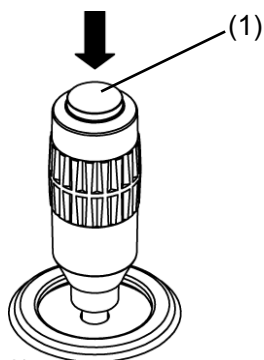
3.3.4 Corneal diameter and pupil diameter measurement

This function enables you to acquire the image on the anterior eye segment, align the cursor to the pupil or to both sides of the cornea, and measure the distance between cursors to figure out the size of the pupil and cornea.

<Measurement procedures>



(Fig.1)

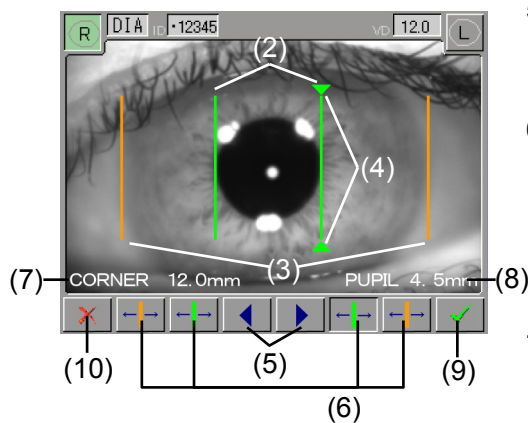


(Fig.2)

- 1) Change the measurement mode to "DIA." (See "3.2.2 Selecting the measurement mode and setting measurement conditions.")
- 2) Use the joystick to position the patient's eye on the screen.
- 3) Align the target center-point with the center of the target ring. If Auto Shot is turned on, an image is acquired automatically once optimum focus is achieved.

To take measurement manually, press the joystick button (1) and acquire an image of the anterior chamber.

- 4) Once an image is acquired, the cursor used to measure the pupil diameter (2) is shown in green, while the cursor used to measure the corneal diameter (2) is shown in orange (Fig 3). Adjust the cursors so that they are fit the sizes of the pupil and cornea. The active cursor will have an active mark (4) displayed above and below the cursor; also, when you press the cursor movement button (5), you can move the cursor to either side.



(Fig.3)

- 5) Touch the cursor selection button (6) to switch the active cursor.
- 6) The distance between the cursors measuring the corneal diameter is shown in CORNEA (7), and the distance between the cursors measuring the pupil diameter is shown in PUPIL (8).
- 7) Touch the "OK" button (9) to save the measurement results in the memory and return to the previous screen (Fig 1). Touching the "Cancel" button returns you to the previous screen (Fig. 1) without changing any settings.
- 8) Touching the "OK" button (9) then the "PRINT" button will print out the measurement results.

3.3.5 Contact lens measurement

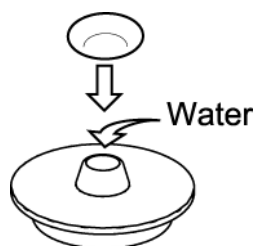
The function used when measuring the base curve of hard contact lenses.

Note

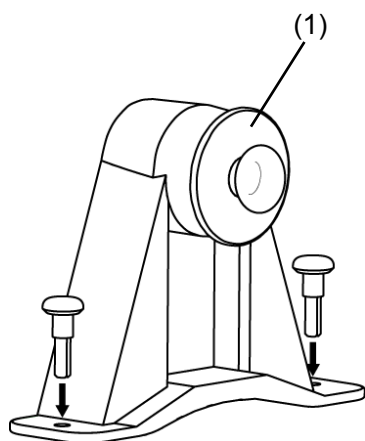
■ ***Make sure that the concave side of the contact lens holder does not have air bubbles.***

■ ***Be careful not to wet or stain the measurement surface.***

■ ***Auto Shot cannot be used.***

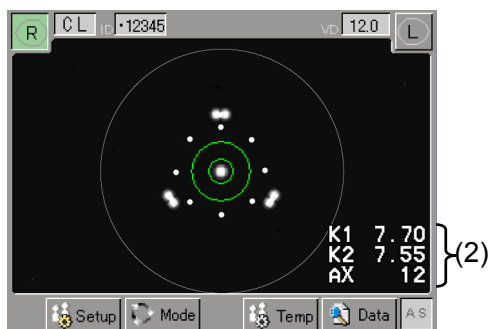


(Fig.1)



(Fig.2)

- 1) Put some water on the concave side of the contact lens holder.
- 2) With the concave side of the contact lens facing up as shown in Fig. 1, put it at the center of the concave side of the holder.
- 3) Fix the model eye to the chin rest.
- 4) Attach the contact lens holder to the model eye as shown in (1). Adjust the contact lenses so that they are parallel to the measuring window.
- 5) Change the measurement mode to "CL." (See "3.2.2 Selecting the mode and setting measurement conditions.")
- 6) Press the joystick button at the position where the measurement center-point comes into focus to take a measurement. The base curve value of the contact lens is shown in the keratometer value display position (2).



(Fig.3)

3.4 Printout

3.4.1 Printing procedures

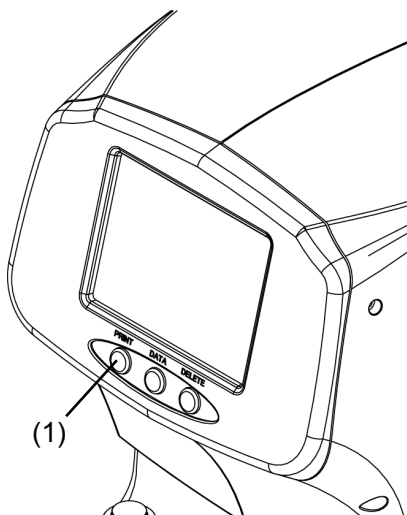
Note

■ Check that the paper roll is set in the built-in printer. (See “5.5.1 Printer paper.”)

■ When Print for the built-in printer is turned off on the Output Setup screen, printing cannot be performed. Refer to “3.8.1 Setup” to turn on the Print setting for the built-in printer.

■ When the next measurement is conducted after printing, the measured data is automatically deleted and the exam number increases by one.

■ The printer in this instrument is thermosensitive. This means the measurements printed on the paper will fade over time. Make a copy when storing measurement results for long periods.



(Fig.1)

After the measurement is taken, touch the “Print” button (1) at the bottom of the screen to print out. If Auto Print is turned on, measurement results are automatically printed when measurement of both eyes is successfully completed for the specified number of times in Auto Shot. However, data is not automatically printed if the instrument considers any additional measurements to be required or attempted:

- When the measurement mode is switched during the measurement
- When measurement is taken by pressing the joystick button
- When Auto Shot was not used
- Valid data is not obtained within the specified number of measurements due to errors.

See “3.8.1 Setup” for settings for Auto Print.

3.4.2 Printing format

Contents to be printed can be selected. Set the Print Form settings on the Output Setup screen. See “3.8.1 Setup.”

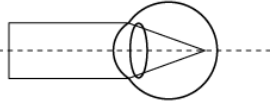
Printing item (* indicates initial setting upon delivery.)

Item	Descriptions	
Left/right separation	Enable *	Prints measurement values for right eye and left eye separately.
	No mark	Prints measurement values by measurement mode.
Date/Time	Enable *	Prints the date and time.
	No mark	Does not print the name of the product.
Date Form	Y/M/D *	Shows the year, month, and date in this order.
	M/D/Y	Shows the month, date, and year in this order.
	D/M/Y	Shows the date, month, and year in this order.
Examination number	Enable *	Prints the examination number.
	No mark	Does not print the name of the product.
Name	Enable *	Prints the patient's name.
	No mark	Does not print the patient's name.
Refraction data	All *	Prints all the data in the memory.
	Representative value	Prints only the representative value.
	Average value	Prints only the average value.
	+ Representative value	Prints the representative value with an asterisk (*)
	+ AVG	Prints the measured value and average value.
Refractometer confidence coefficient	Enable *	Prints the confidence coefficient.
	No mark	Does not print the name of the product.
Equivalent spherical degree	Enable *	Prints the equivalent spherical degree.
	No mark	Does not print the name of the product.

Keratometer data	All *	Prints all the data in the memory.
	Representative value	Prints only the representative value.
	Average value	Prints only the average value.
	+ Representative value	Prints the representative value with an asterisk (*).
	+ AVG	Prints the measured value and average value.
Keratometer data format	Normal *	Prints K1K2, AVG, CYL/AXIS.
	K1K2	Prints K1K2, CYL/AXIS.
	AVG	Prints AVG, CYL/AXIS.
Residual astigmatism	Enable *	Prints the residual astigmatism.
	No mark	Does not print the name of the product.
Pupil distance	Enable *	Prints the pupil distance.
	No mark	Does not print the name of the product.
Eye diagram	Enable	Prints the eye diagram.
	Disable *	Does not print the name of the product.
Product Name	Enable *	Prints the name of the product.
	No mark	Does not print the name of the product.
Line Space	Normal *	Prints with normal line spacing.
	Narrow	Prints with narrower line spacing.

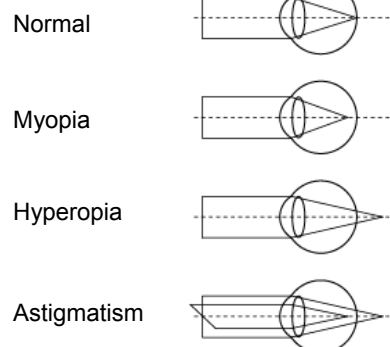
<Example printout A> Printing all items

(1) — NAME: _____
 (2) — ID : _____
 (3) — DATE: Oct. 26, 2012 11:45
 (4) — No. : 000001
 (5) — <RIGHT>
 (6) — [REF VD=12.0mm] _____ (7)
 (8) — [SPH CYL AXIS
 +0.50 -1.50 91 0 — (10)
 (9) — * +0.50 -1.50 91 C E 0 — (11)
 +0.50 -1.50 91 L E 0
 < +0.50 -1.50 91 0 > (12)
 (13) — * SE -0.25 D

(14) — 
 (15) — [KRT]
 (16) — [K1 mm D AXIS
 K2 8.16 41.36 16
 (17) — AVG 8.29 40.71 E (11)
 (18) — CYL -1.23 106
 K1 8.41 40.13 106
 K2 8.16 41.36 16
 AVG 8.29 40.71 e
 CYL -1.23 106
 K1 8.41 40.13 106
 K2 8.16 41.36 16
 AVG 8.29 40.71 E
 CYL -1.23 106
 < K1 8.41 40.13 106 >
 < K2 8.16 41.36 16 >
 < AVG 8.29 40.71 >
 < CYL -1.23 106 >

(19) — [RA]
 BC P RA AXIS
 7.85 -5.75 +0.38 39
 [DIA]
 (20) — PUPIL CORNEA — (21)
 5.6mm 13.3mm
 PD=62mm — (22)
 TOMEY CORP. RC-800 — (23)

- (1) Patient's name field
 (2) ID
 (3) Measurement date and time
 (4) Exam No.
 (5) Measuring eye
 (6) Refractometer display
 (7) Vertex distance
 (8) Refractometer measurement value
 (9) Representative value
 (10) Confidence coefficient
 Displayed in 10 steps, from 0 to 9.
 The smaller the value, the higher the confidence.
 (11) Error display
 Data with somewhat low confidence
 -> "e"
 Data with low confidence -> "E"
 (12) IOL/CAT mode display
 CAT mode -> "C"
 IOL mode -> "L"
 (13) Equivalent spherical degree display
 (14) Eye diagram



- (15) Keratometer display
 (16) Keratometer values
 (17) Keratometer average value
 (18) Corneal astigmatism
 (19) Residual astigmatism display (RA represents the residual astigmatism degree)
 (20) Pupil diameter
 (21) Corneal diameter
 (22) Pupil distance
 (23) Product name

<Example printout B> When the following items are selected

Left/right separation -> Disabled

Refractometer data -> +Representative value

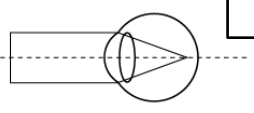
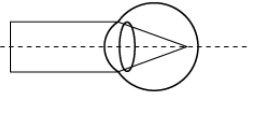
Keratometer data -> +Representative value

Keratometer data format -> K1K2

Residual astigmatism -> Disabled

```

(1) NAME: _____
(2) ID : _____
(3) DATE: Oct. 26, 2012 11:45
(4) No. : 000001

(5) [REF VD=12.0mm] _____(7)
(6) <RIGHT>
(8) SPH CYL AXIS
    +0.50 -1.50 91 0 (10)
(9) * +0.50 -1.50 91 0 (11)
    +0.50 -1.50 91 0
(13)  (12)
    <LEFT>
        SPH CYL AXIS
        +0.50 -1.50 91 0
        * +0.50 -1.50 91 0
        +0.50 -1.50 91 0
        

(6) [KRT]
    <RIGHT>
(14) K1 K2 CYL AXIS
      mm mm D deg
      8.28 8.23 -0.25 99
      8.28 8.23 -0.25 99
(9) * 8.28 8.23 -0.25 99
    * AVG 8.28 mm
    <LEFT>
(15) K1 K2 CYL AXIS
      mm mm D deg
      8.28 8.23 -0.25 99
      8.28 8.23 -0.25 99
    * 8.28 8.23 -0.25 99
    * AVG 8.28 mm

(16) TOMEY CORP. RC-800
  
```

(1) Physician's name field

(2) ID

(3) Measurement date and time

(4) Exam No.

(5) Refractometer display

(6) Measuring eye

(7) Vertex distance

(8) Refractometer measurement value

(9) Representative value

(10) Confidence coefficient

Displayed in 10 steps, from 0 to 9.

The smaller the value, the higher the confidence.

(11) Error display

Data with somewhat low confidence
-> "e"

Data with low confidence -> "E"

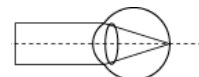
(12) IOL/CAT mode display

CAT mode -> "C"

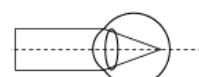
IOL mode -> "L"

(13) Eye diagram

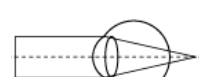
Normal



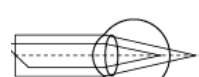
Myopia



Hyperopia



Astigmatism



(14) Keratometer display

(15) Keratometer average value

(16) Product name

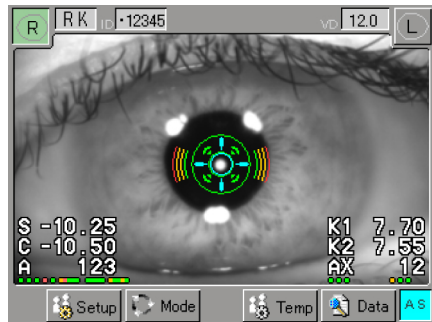
3.5 Showing and deleting data in memory

This function is used to recall various measurement values stored in the memory.

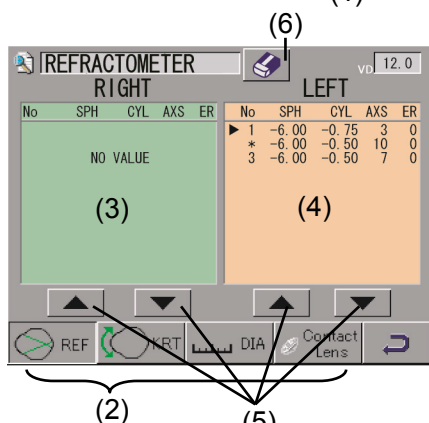
Note

■ Press the **CLEAR** button to delete all data stored in the memory.

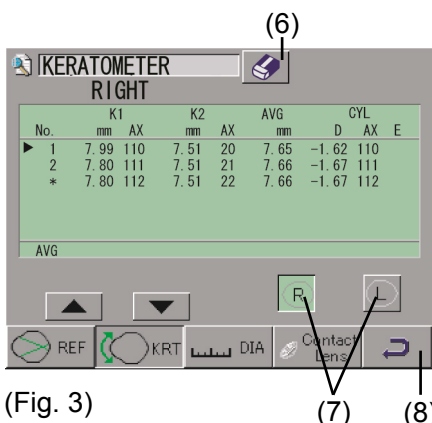
■ When the next measurement is conducted after printing the measurement data, the printed data is deleted from the memory.



(Fig. 1)



(Fig. 2)



(Fig. 3)

- 1) Touch the “Data” button (1) on the touch panel to display the measurement value list screen (Fig. 2).
- 2) Select the type of measurement values using the mode selection button (2) shown at the bottom of the screen. Selected measurement values are shown. When no corresponding data is saved in the memory, “NO VALUE” is displayed.
- 3) Touching the UP/DOWN arrow buttons (5) moves the triangle mark shown at the beginning of the data line. The data line indicated by the triangle mark can be deleted by touching the eraser button (6).
- 4) Touch the “R” or “L” button (7) on the keratometer data screen (Fig. 3) to recall the right-eye data screen or left-eye data screen respectively.
- 5) Touch the back button (8) to return to the previous screen (Fig. 1).

3.6 Data communication using TOMEY Link and DATA Transfer

The measurement data can be sent to a computer using the “TOMEY Link” network support system (optional) or the “DATA Transfer” inspection data receiving software (included in the package).

In addition, the patient ID can be entered via magnetic cards or barcodes when a card reader or barcode reader is connected to the LAN adapter (optional) or personal computer (for TOMEY Link) or to the personal computer (for DATA Transfer). TOMEY Link also manages the measurement data according to the entered patient ID. Refer to the instruction manual of TOMEY Link or DATA Transfer for details.

Note

- *The network support system “TOMEY Link” (optional) or the inspection data receiving software “DATA Transfer” (included in the package) is required for data communication with the instrument.*
- *Refer to the corresponding operation manual for the TOMEY Link and DATA Transfer settings.*
- *Appropriate settings are required for connection with TOMEY Link and DATA Transfer. Refer to “3.8.1 e) Output Setup” to make the setting.*

3.6.1 Entering patient information

Note

■ The network support system “TOMEY Link” (optional) is required to use the patient information query function. “DATA Transfer” provided with the instrument is not available for query of the patient data.

■ For details on the TOMEY Link Server settings, refer to the TOMEY Link instruction manual.

■ If the patient information is already entered for the measurement data and you wish to replace the patient information, make sure that both the patient information and existing measurement data belong to the same patient.

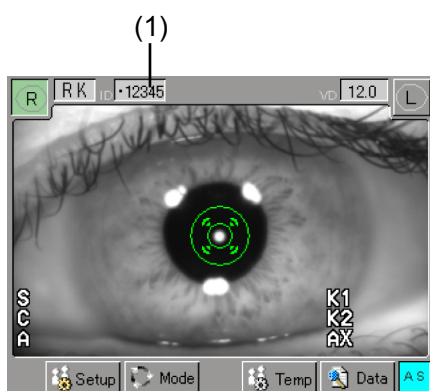
■ It is recommended to enter ID numbers when sending data. The data can be sent without ID numbers entered; however, the corresponding patient may not be traced from the inspection data output from DATA Transfer. When the data was sent without entering the ID number, check the inspection data immediately after sending the data, and move and save the file in an appropriate location.

■ When the data is sent to TOMEY Link without entering an ID number, TOMEY Link recognizes that all the received data belongs to the same patient. Be extremely careful not to mishandle the data.

■ Only the last 14 digits of the ID number are displayed in the ID field of the measurement screen. Check that the ID number is correct on the patient information confirmation screen.

Patient's Information

(Fig. 1)



(Fig.2)

Patient's Information

 A screenshot of the 'Patient's Info' screen. At the top, it says 'Patient's Info' and 'Machine # : 1'. Below this are input fields for 'ID' and 'Name'. Under 'Name', there are two buttons labeled 'male' and 'female'. Below these is the text 'Please input D'. At the bottom, there are three buttons: 'Inquiry' (labeled (4)), 'Ok' (labeled (5) with a green checkmark icon), and 'Cancel' (labeled (6) with a red X icon). The 'ID' field is labeled (1), the 'Name' field is labeled (2), the 'male' button is labeled (3), and the 'female' button is labeled (3).

(Fig. 3)

 A screenshot of a keypad interface. At the top, there is a text field containing 'TOMEY CORP. RC-800'. Below this is a grid of buttons. The first row contains 'A↔a', 'A', 'B', 'C', 'D', 'E', 'F', 'G', '7', '8', '9'. The second row contains 'H', 'I', 'J', 'K', 'L', 'M', 'N', '4', '5', '6'. The third row contains 'O', 'P', 'Q', 'R', 'S', 'T', 'U', '1', '2', '3'. The fourth row contains 'V', 'W', 'X', 'Y', 'Z', '-', '0', '.'. The bottom row contains 'Clear', a left arrow, a right arrow, 'Cancel' (with a red X), and 'Ok' (with a green checkmark).

(Fig.4)

- 1) The Patient's Info screen (Fig. 1) appears after the following operation when "connection" on the TOMEY Link setting screen is set to "ON," "ID input" to "Essentially," and "priority for operation" to "ID input."

- Immediately after the instrument startup
- Immediately after the CLEAR button is pressed
- Immediately after the measurement data is sent
- Immediately after setting the connection of TOMEY Link/DATA Transfer to "ON"

Touching the ID number field (1) on the measurement screen (Fig. 2) displays the patient data input screen (Fig. 3).

- 2) ID numbers entered by TOMEY Link or DATA Transfer can be loaded to the instrument on the Patient's Info screen.

- 3) Touching the field of the item to be entered displays the keypad shown in Fig. 4 and allows you to enter the ID number from the instrument.

A period (.) and space are not acceptable for the ID number. Sex of the patient is set by touching either the "Male" button (2) or the "Female" button (3).

- 4) After entering the ID of the patient, touch the "Query" button (4) to query the patient information. When the function for automatic query to TOMEY Link is set to "ON," the patient information is automatically queried.

When query of the patient information is completed, the patient information is displayed.

When the query process is not completed properly, a continuous buzzer goes off and the message "Error!" appears.

- 5) When the patient ID is re-entered, press the "Query" button (4) to start query of the patient information again.

6) Touch the “OK” button (5) to define the entered patient information and return to the measurement screen. Touching the “Cancel” button (6) cancels what has been entered and returns you to the measurement screen.

3.6.2 Sending examination data

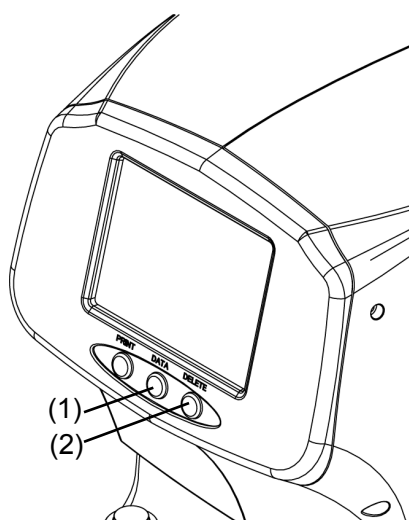
Note

■ Check that the ID number is correct before sending the inspection data. If the ID number is incorrect, the data may be misunderstood as the data of another patient.

■ It is recommended to enter ID numbers when sending data.

The data can be sent without ID numbers entered; however, the corresponding patient may not be traced from the inspection data output from DATA Transfer. When the data was sent without entering the ID number, check the inspection data immediately after sending the data, and move and save the file in an appropriate location.

■ When the data is sent to TOMEY Link without entering an ID number, TOMEY Link recognizes that all the received data belongs to the same patient. Be extremely careful not to mishandle the data.



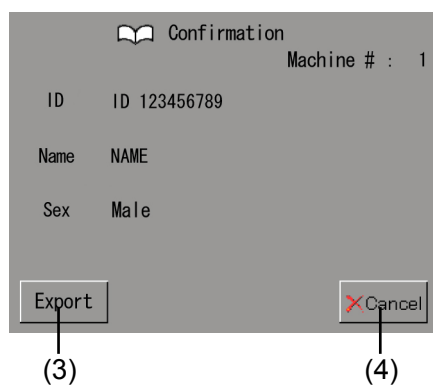
(Fig.1)

1) After measurement is completed, press the DATA button (1) under the touch panel (Fig. 1) to call the transfer Confirmation (Fig. 2). When the auto print function is activated, the transfer confirmation screen (Fig. 2) appears automatically after printing is completed. Press the CLEAR button (2) to delete the patient information and measurement data, and to call the Patient's Info screen.

2) The ID number, patient's name, and sex distinction are shown on the Confirmation screen (Fig. 2).

3) Touch the "Export" button (3) to define the patient data currently displayed and to send the patient information and measurement data. When the data is correctly

Confirmation



(Fig. 2)

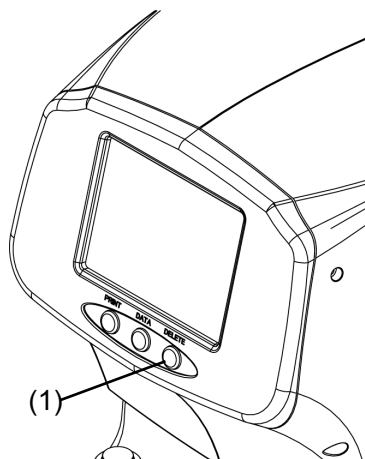
sent, the message “Sending completed” appears and the previous screen appears.

- 4) When it is found that incorrect patient information was entered before sending the data, touch the “Cancel” button (4) to return to the measurement screen without validating change(s) to the patient information.

3.6.3 All clear of measurement data (preparation for measuring a new patient)

Note

■ *The deleted data cannot be restored. Carefully check the data before deleting it.*

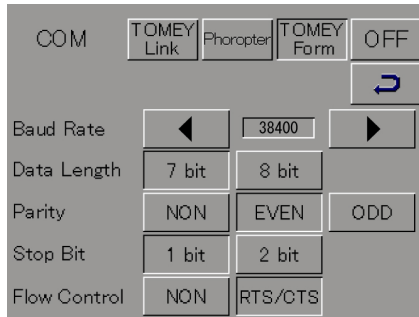


(Fig.1)

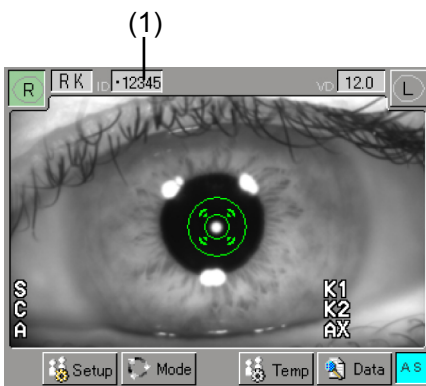
Press the CLEAR button (1) under the touch panel (Fig. 1). The patient information (ID, number, name, and sex) and measured data are all deleted, the inspection number increases by 1, and the new measurement screen appears.

Performing the next measurement without pressing the CLEAR button (1) will start a measurement with the same measurement number.

3.7 Data communication using TOMEY FORM



(Fig. 1)



(Fig. 2)



(Fig. 3)

TOMEY Form, one of the COM options, allows you to send the measurement data via RS-232C under the communication settings shown in Fig. 1.

Touching the ID number display field (1) on the measurement screen (Fig. 2) displays the keypad shown in Fig. 3, allowing you to enter the ID number.

When measurement is completed, the measurement data and ID is output at about the same time as printing.

Contact Tomey Corporation for details.

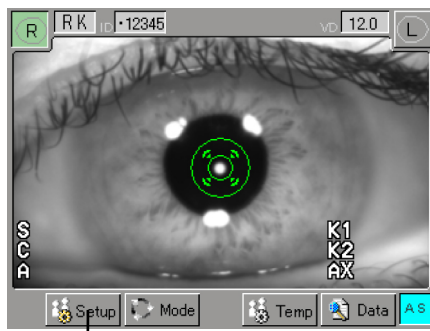
3.8 Setting measurement conditions

3.8.1 Setup

Set operation conditions on this screen. Any settings made here are effective unless directly changed.

Note

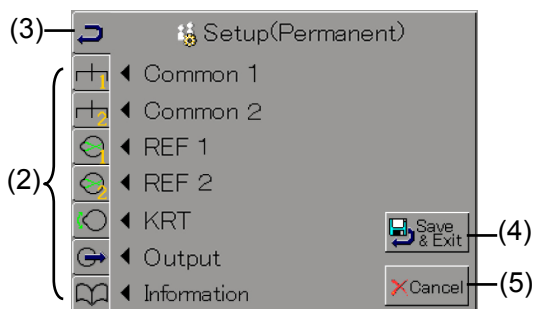
■ **After changing the settings, be sure to touch the “Save & Exit” button to exit the screen. If the “Cancel” button is touched, changes to the settings are not applied and the previous setting remains effective.**



(1)
(Fig. 1)

Touch the “Setup” button (1) on the touch panel to display the Setup (Permanent) screen (Fig. 2). Touch one of the icons (2) listed on the left of the screen to select the setting item and set conditions as needed on the corresponding screen.

Touch the icon (3) when settings are completed and recall the Setup (Permanent) screen (Fig. 2). Touch the “Save & Exit” button (4) to save the new settings and return to the measurement screen. Touching the “Cancel” button (5) returns you to the previous screen without changing any settings.



(Fig. 2)

- Common 1: Items commonly applicable to various measurements
- Common 2: Items commonly applicable to various measurements
- REF 1: Items related to refractometer measurement
- REF 2: Items related to refractometer measurement
- KRT: Items related to keratometer measurement
- Output: Items related to data output
- Information: Product information

a) Common 1

Items commonly applicable to various measurements are set on this screen.



(Fig. 1)

Auto Power Off

5 minutes: Enters Auto Power Off mode when the instrument is not operated for 5 minutes.

10 minutes: Enters Auto Power Off mode when the instrument is not operated for 10 minutes.

OFF: Disables the Auto Power Off function.

Auto Shot

ON: Enables the Auto Shot function. When enabled, the background of the [AS] on the lower right of the measurement screen turns blue.

OFF: Disables the Auto Shot function. When enabled, the background of [AS] on the lower right of the measurement screen turns gray.

Examination number

Reset: Resets the examination number to “000001.”

b) Common 2

Items commonly applicable to various measurements are set on this screen.

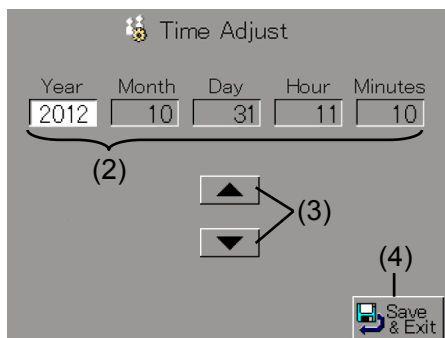


(Fig. 1)

Time Adjust

Adj.: Sets the date and time.

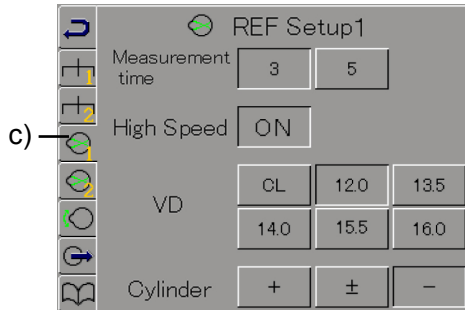
Touch the "Adj." button (1) to display the Time Adjust screen (Fig. 2). The setting in each field (2) can be changed when touched. Touch the up/down arrow buttons (3) and set the date. Touch the "Save & Exit" button (4) to save the change and return to the Common 2 screen (Fig. 1).



(Fig. 2)

c) REF Setup

Sets the measurement conditions.



(Fig. 1)

Measurement time

3: Conducts measurement three times continuously when Auto Shot is ON.

5: Conducts measurement five times continuously when Auto Shot is ON.

High Speed (high speed measurement)

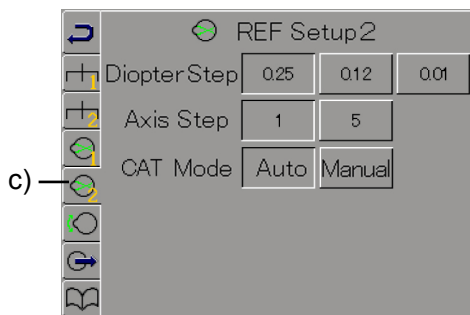
ON: Enables High-speed mode.

OFF: Disables High-speed mode.

VD (vertex distance)

Sets the vertex distance.

CL / 12.0 / 13.5 / 14.0 / 15.5 / 16.0



(Fig. 2)

Cylinder

Sets how to display cylindrical refractive power (astigmatism degree).

+ / ± / -

Diopter Step

Sets the display units for the measurement.

0.25 / 0.12 / 0.01

Axis Step

Sets the display units for the astigmatism axial angle.

1 / 5

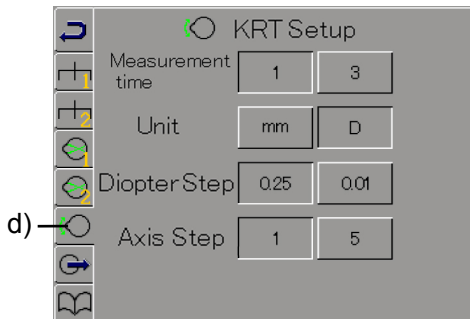
CAT Mode

Sets automatic transition to the Cataract mode.

Automatic / Manual

d) KRT Setup

Sets the keratometer measurement conditions.



(Fig. 1)

Measurement time

- 1: Conducts measurement once when Auto Shot is ON.
- 3: Conducts measurement three times continuously when Auto Shot is ON.

Unit

- mm: Displays the keratometer value in millimeters.
- D: Displays the keratometer value in diopters.

Diopter Step

Sets the display units for the measurement value of corneal refractive power.

0.25 / 0.01

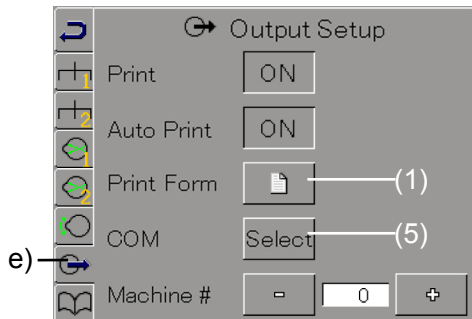
Axis Step

Sets the display units for the corneal astigmatism axial angle.

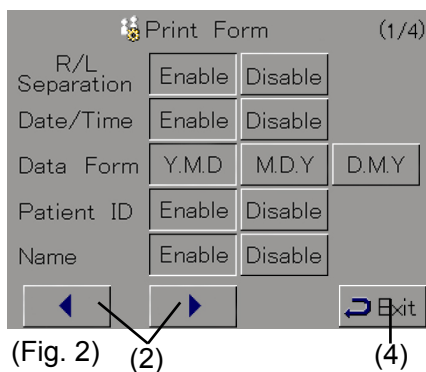
1 / 5

e) Output Setup

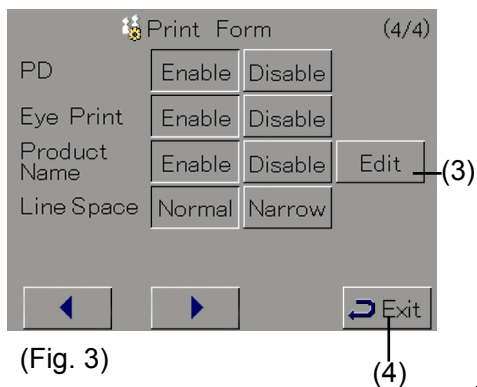
Specifies output settings for measurement values.



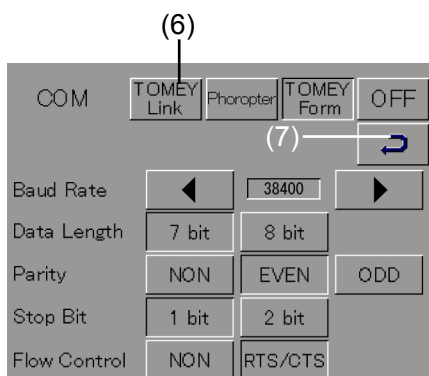
(Fig. 1)



(Fig. 2)



(Fig. 3)



(Fig. 4)

Print

ON: Prints the measurement data using the built-in printer.

OFF: Does not print the measurement data using the built-in printer.

Auto Print

ON: Enables the Auto Print function.

OFF: Disables the Auto Print function.

Print Form

Sets the printing format for the built-in printer.

Touch the print form button (1) to display the Print Form screen (Fig. 2). There are 16 items to set, which are divided into 4 screens. Use the arrow button (2) to move to another screen. The current screen is displayed on the upper part of the screen. Refer to “3.4.2 Printing format” for details of each setting item.

Touching the Edit button (3) of the Product Name options on the 4/4 screen (Fig 5) will enable you to specify any product name. Touch the “Exit” button (4) to return to the Output Setup screen (Fig. 1).

COM

Sets the format for external communication.

Touch the “Select” button (5) to display the COM selection screen (Fig. 4).

TOMEY Link: Connects to TOMEY Link / DATA Transfer to send/receive data.

Phoropter: Connects to Ref Tester to transmit data.

TOMEY Form: Transmits the data using a simple communication protocol.

OFF: Does not connect to any external device.

Machine No.

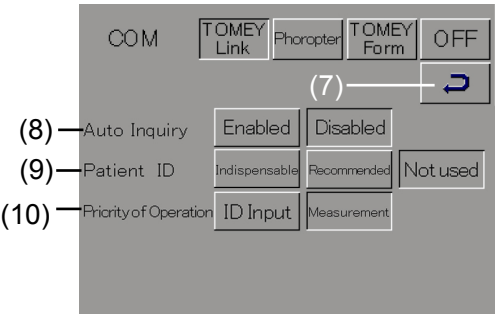
Any number can be set.

TOMEY Link settings

Note

■ *It is recommended to enter the ID number to correctly match the measurement data with the patient.*

Touch the “TOMEY Link” button in the COM options to display the setup screen (Fig. 5). Touch the exit button (7) to return to the Output Setup screen (Fig. 1).



(Fig. 5)

Auto Inquiry (8)

Sets whether to automatically query the patient information when entering ID numbers.

Enabled: Automatically queries the patient information to TOMEY Link when the ID number is defined.

Disabled: Automatic query is not performed when the ID number is defined.

Patient ID (9)

Sets whether the patient’s ID is required or not when the data is measured with this instrument and the measured data is output by printing or data communication, regardless of connection with TOMEY Link.

Indispensable: ID numbers are always required. In other words, no measured data is printed or sent without entering the ID.

Recommended: ID numbers are required, as a

rule; however, the data may be sent without the ID when, for example, the patient's ID is not yet determined. In this case, "No ID" is prepared as the ID number.

Not used: ID numbers are not used. Therefore, the Patient's Info screen that requests the ID number does not automatically appear. When entering the ID, touch the ID number display field on the measurement screen and enter the ID on the patient's information input screen.

Priority of Operation (10)

Select when to enter the ID, before or after measurement, if the setting is made to require the patient ID for measuring data with this instrument and for printing or sending the measured data, regardless of connection with TOMEY Link.

ID Input: The priority is given to entry of the ID. The Patient's Info screen appears when the instrument is started or after the data of the previous patient is output, and the instrument waits for entry of an ID number.

Measurement:: The priority is given to measurement. The measurement screen appears when the instrument is started or after the data of the previous patient is output, and the instrument waits for measurement.

f) Information

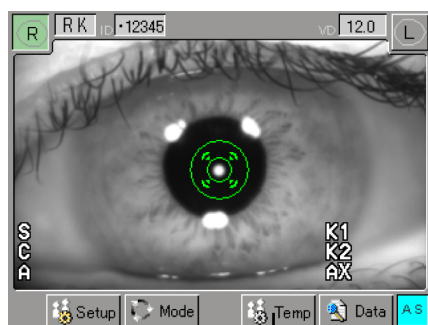
Displays the product information.

3.8.2 Temporary setup

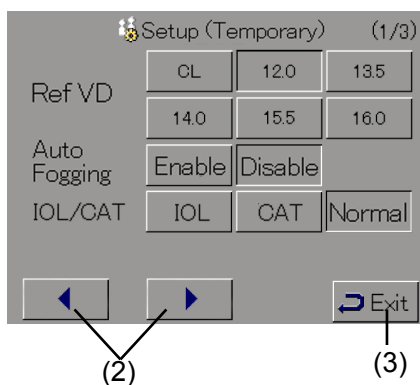
Note

■ *CL are used for reference when selecting trial lenses, before prescribing contact lenses. Prescription of contact lenses should be determined after performing fitting exams.*

■ *Temporary disabling of Auto Fogging should only be used when adjustment intervention can be ignored. In all other cases, adjustment intervention is likely to be carried out during refractometer measurement. This function shortens measurement time, thereby facilitating the refraction measurement; however, Auto Fogging is an important method for alleviating adjustment intervention.*



(Fig. 1)



(Fig. 2)

Set conditions for a specific measurement only. When doing a printout (or a communication output), or when pressing the Clear button, the instrument will start preparing for the next patient, and will disable the settings. Refer to “3.8.1 Setup” for settings for continuous operation.

Touch the “Temp” button (1) in Fig. 1. There are 7 items to set, which are divided into 3 screens. Use the arrow button (2) to move to another screen.

Once setting is done, touch the “Exit” button (3). The changes are reflected in the settings and the screen returns to the measurement screen.

Ref VD

Vertex distance can be temporarily changed in the refractometer measurement.

CL / 12.0 / 13.5 / 14.0 / 15.5 / 16.0

Auto Fogging

Auto Fogging, applied to alleviate adjustment intervention during refractometer measurement, can be disabled temporarily. Refraction measurement may not be carried out easily if the patient's eyes are moving frequently due to nystagmus or unstable sight. Should that be the case, disable the Auto Fogging temporarily to shorten the time required for refractometer measurement.

Disable: Auto Fogging is temporarily disabled.

Enable: Auto Fogging is turned ON.

IOL/CAT

Switches the mode for refractometer measurement.

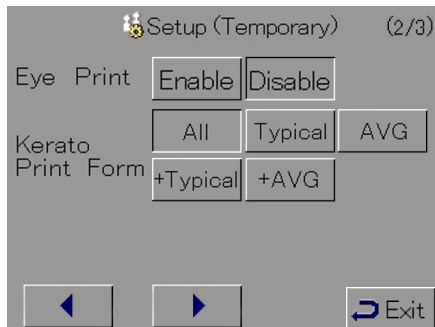
IOL / CAT / Normal

Eye Print

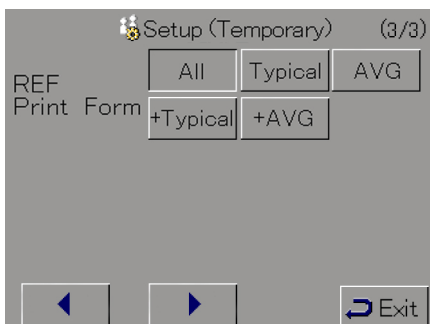
Refer to “3.4.2 Printing format.”

Kerato Print Form

Refer to “3.4.2 Printing format.”



(Fig. 3)



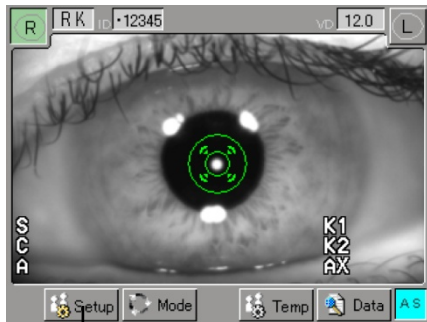
(Fig. 4)

REF Print Form

Refer to “3.4.2 Printing format.”

3.9 Language selection

RC-800 has Multilanguage function. You can select your favorite one from "English", "Japanese", "German", "Chinese", "Spanish", "Spanish Latin America", "Italian", "Portuguese", "French" and "Russian".



(Fig.1)

Press the Setup button (1) in the Touch Panel to change the screen to the Setup screen. Next, press the icon located in left bottom (2) to go Information screen.

Keep the "Language" button (3) pressed till screen is switched to Select Language.

Select the your favorite language and then press Save&Exit button (4) to change language. It is required to reboot main unit to save this change. Please follow the instruction displayed in screen after this change. Pressing the Cancel button (5) makes no change on language setting, but reboot of main unit is also required for cancel procedure.



(Fig.2)

(1)



(Fig.3)

(4)

(5)

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4. TECHNICAL INFORMATION

Cornea equivalent refractive index used to calculate corneal refractive power

Although corneal refractive index is originally $n=1.376$, this instrument uses the corneal conversion refractive index of $n=1.3375$, which is used in many keratometers.

The total refractive index of the cornea is determined by the sum of the refractive powers of the front and rear sides. However, since this instrument measures the radius of corneal curvature of the front surface of the cornea, the refractive power of the entire cornea cannot be calculated.

Therefore, this cornea equivalent refractive index is used clinically to analogize the total refractive power of the cornea.

Calculating residual astigmatism

When a patient is wearing hard contact lenses, tear film between the cornea and contact lens acts as a lens to correct corneal astigmatism. The astigmatism degree of the tear lens can be calculated by assuming that the keratometer value and the reverse curve of the hard contact lenses are spherical.

With respect to total astigmatism obtained from the auto refractometer measurement, this instrument calculates the astigmatism degree which could not be completely corrected by tear lenses as residual astigmatism.

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5. INSPECTION AND MAINTENANCE

5.1 Warranty

One-Year Limited Warranty

The seller warrants this product to be free from defects in material and workmanship under the normal use of this product for one (1) year or other term complying with local regulations from the date of invoice issued by Seller to the original purchaser.

Lamps, paper and other consumable items shall not be covered by this warranty.

This warranty also shall NOT apply if the product has not been installed, operated or maintained in accordance with the INSTRUCTION MANUAL of Tomey Corporation (here in after called "Tomey"). Neither seller nor Tomey shall be liable for any damages caused by purchaser's failure to follow instruction for proper installation, use and maintenance of product.

This warranty is only applicable to the new product and DOES NOT cover any damage resulting from or caused by accident or negligence, abuse, misuse, mishandling, improper modification of this product, by persons other than personnel duly authorized by Tomey, not to a product whose serial number or batch number is removed, altered or effaced.

THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY AND ALL OTHER WARRANTIES, EXPRESS OR IMPLIED (INCLUDING SPECIFICALLY, WITHOUT LIMITING THE GENERALITY OF THE FOREGOING, ALL WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE), AND ALL OTHER OBLIGATION AND LIABILITY ON THE PART OF SELLER AND TOMEY. NEITHER SELLER NOR TOMEY SHALL BE LIABLE FOR INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES UNDER ANY CIRCUMSTANCES OR FOR MORE THAN REPAIR, REPLACEMENT OR REFUND OF THE PURCHASE PRICE OF DEFECTIVE GOODS.

5.2 Operation life

This instrument is designed to have an operation life of 8 years when operated under the appropriate environment and adequately inspected and serviced.

5.3 Inspection

Note ■ *When measuring the imitation eyes, check that there is no dust or stain on them.*

To make sure that the internal functions operate correctly and performance is maintained, use the imitation eyes to check the accuracy before using the instrument.

Inspect method

Use the chin rest pins to fix the imitation eyes to the chin rest. Perform measurement in the same manner as measuring a patient's eyes.

Make sure that the measured values (refractometer value and keratometer value) are within the range specified by the model eyes.

Note ■ *When compensation setting is enabled in the refractometer measurement, the value measured by refractometer measurement may not fall within the range specified by the model eyes. Record the refractometer value of the model eyes when setting the compensation. That value will be used as the reference value..*

5.4 Routine maintenance



- *Hold the plug when disconnecting the power cord from the outlet to avoid placing excessive force on the cord. Pulling the cord may damage the inner core wires, resulting in electric shock or fire.*



- *Do not use organic solvents such as thinner, benzene, or acetone to clean the instrument. Fire or electric shock may occur.*

- *Clean the inner surface of the measurement window with a soft cloth from time to time. The measurement accuracy will deteriorate significantly if the optical section in the instrument becomes dirty.*

- *Place the dust cover over the main unit when not being used. The measurement accuracy will deteriorate significantly if the optical section in the instrument becomes dirty.*

- *Use soft, dry cloth to clean the instrument. When very dirty, clean the surface using a cloth dampened with diluted neutral detergent and thoroughly wrung out, and then wipe the surface with a dry cloth.*

- *Wipe the sections that come into direct contact with the patients, such as the forehead pad and chin rest, with a cloth dampened with ethanol to sterilize it.*

- *Disconnect the power cord and place the dust cover over the main unit when the instrument is not operated for 1 month or longer.*

- *Clean the monitor of the main unit using a soft cloth with glass cleaner applied.*

5.5 Replacing consumables

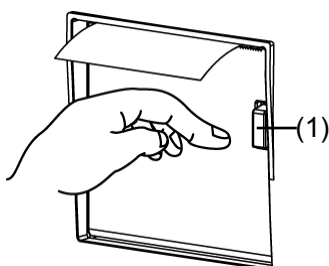
5.5.1 Printer paper



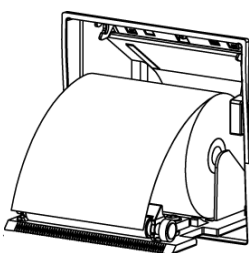
- **Never touch the cutter in the printer. Also, never allow patients to touch the cutter. Touching this can cause injuries.**



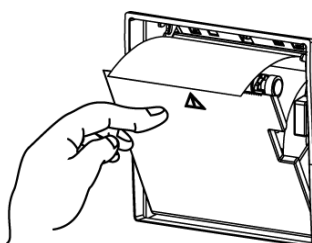
- **Use the specified paper for the printer. Using other types of paper may cause printer failure.**
- **Do not start printing without paper set in the printer. The printer head may be damaged.**
- **Do not pull paper forcibly. Trying to pull the paper out may cause printer failure. Touch the “PRINT” button without any data stored to feed blank paper.**



(Fig.1)



(Fig.2,



(Fig.3)

Replace the paper roll when red lines appear on the sides of the printer paper.

- 1) Press the button (1) to lift the printer cover.
- 2) Take out the old roll of printer paper.
- 3) Install a new roll of printer paper. If the paper roll is installed in the wrong direction, nothing will be printed. (Refer to Fig. 2.)
- 4) Close the printer cover with the end of the paper protruding from the outlet. Press the cover firmly until you hear a click.
- 5) Cut off any unnecessary paper.

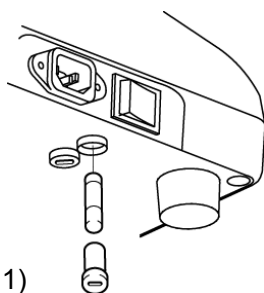
5.5.2 Fuses



- **Disconnect the power cord from the outlet when replacing fuses. Otherwise, you may get an electric shock, resulting in death or serious injuries.**



- **Use fuses specifically designed for the RC-800.**
- **When the instrument does not work correctly after fuses have been replaced, there may be other causes of the problem. Turn off the instrument immediately and contact our local distributor.**

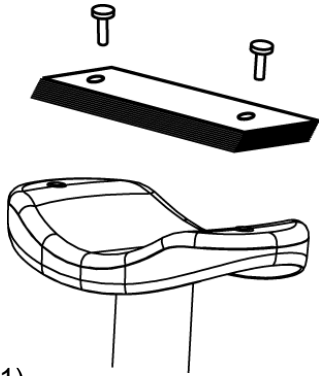


(Fig.1)

- 1) Turn off the power switch.
- 2) Disconnect the power cord from the outlet.
- 3) Insert a coin or similar into the slot on the fuse case located at the bottom of the main unit. Turn the screw counterclockwise to remove it.
- 4) Replace the blown fuse with a new one.
- 5) Reverse the procedure above to install the fuse holder.

When the instrument does not work correctly after fuses are replaced, there may be other causes of the problem. Turn off the instrument immediately and contact our local distributor.

5.5.3 Chin rest paper



- 1) Remove the two chin rest paper pins.
- 2) Place new chin rest paper on the chin rest and secure the paper with the paper pins.

(Fig.1)

5.6 Storing



- *Install the instrument in a location free of water or chemicals. Any water or chemicals entering the instrument may cause an electric shock or failure.*



- *Do not store the instrument in a location where chemicals are stored or gases may occur. Spilt chemicals or vapor may enter the instrument and result in fire.*
- *Do not hold the chin rest or forehead pad when lifting the instrument. These components are detachable and the instrument may drop, resulting in injuries.*
- *Disconnect the power cord from the outlet to ensure safety when the instrument is not operated for 1 month or longer.*
- *Store the instrument in a location not subject to direct sunlight, high temperature and humidity, or air with significant dust, salt, and/or sulfur content. Otherwise, failure or malfunction may occur.*
- *Store the instrument in a leveled stable place free of vibration or mechanical impact. Otherwise, measurement cannot be conducted correctly. Also, the instrument may topple over or fall down, resulting in fire or a serious accident.*



- *Place the dust cover over the main unit when not being used. The measurement accuracy will deteriorate significantly if the optical section in the instrument becomes dirty.*

5.7 Disposal

Note

- *Keep the box and packing materials for use when moving or transporting the instrument.*
- *Keep the packing materials and the box together.*
- *When disposing of the packing materials, sort them by type and dispose of them as directed by relevant laws and local rules and regulations.*
- *A lithium battery is used in the instrument. Handling of the lithium battery varies depending on governing bodies. Follow relevant laws and local rules and regulations, or contact our local distributor.*

6. TROUBLESHOOTING

Check the following first when you encounter any problems. If the problem is not solved even after checking the applicable item listed below, contact our local distributor.



- ***Do not remove the cover of the instrument. You may be directly exposed to high voltage sections.***

Note

- ***Do not take any actions other than those specified below.***
- ***If the problem is not solved even after checking the applicable item listed below, contact our local distributor to request inspection and/or repair.***

- The power lamp or monitor does not turn on when the power switch is turned on.

? Cause 1 Problem with the power plug

Solution ➡ Check that the power plug is firmly connected to the main unit and outlet.
Check that there is no problem with the power cord, such as cracks or tears.

? Cause 2 Power is not supplied.

Solution ➡ Check that power is supplied to the outlet to which the power cord is connected.

? Cause 3 Blown fuse

Solution ➡ Check that fuses are not blown. If blown, replace the fuse (refer to “5.3.2 Fuses”). When the new fuse is blown again, the instrument may be out of order. Contact our local distributor to request inspection and/or repair.

- The monitor is dark when the power switch is turned on.

? Cause 1 The auto power off function, which automatically turns off the screen when the instrument is not operated for the specified time, has activated.

Solution ➡ Touch the LCD

- The data cannot be printed by the built-in printer.

? Cause 1 The printer has run out of paper. The error message “No paper” is displayed.

Solution ➡ Check the amount of printer paper remaining. (Refer to “5.3.1 Printer paper.”)

? Cause 2 The printer cover is open. The error message “Printer cover open” is displayed.

Solution ➡ Check that the printer cover is completely closed.

? Cause 3 The printer paper is not set in the correct direction.

Solution ➡ Check that the printer paper is set correctly. (Refer to “5.3.1 Printer paper.”)

-
- The error message “Printer error” is displayed.

? Cause 1 There is a problem with the printer.

Solution ➡ Contact our local distributor.

- Stable measurement results are not obtained. The measured value is inappropriate or greatly deviates from the previous value.

? Cause 1 The measurement window is dirty.

Solution ➡ Check that the measurement window is clean.

- The error message “Internal error” is displayed.

? Cause 1 There are problems with the internal functions of the instrument.

Solution ➡ Stop using the instrument and contact our local distributor.

- The error message “Internal battery expired” is displayed.

? Cause 1 The internal battery has expired.

Solution ➡ Contact our local distributor and have the internal battery replaced.

- The error message “Date/clock function error” is displayed.

? Cause 1 There are problems with the date/clock function.

Solution ➡ Contact our local distributor.

-
- The error message “Refractometer error” is displayed.

? Cause 1 There are problems with the refractometer functions of the instrument.

Solution ➡ Contact our local distributor.

- The error message “Keratometer error” is displayed.

? Cause 1 There are problems with the keratometer functions of the instrument.

Solution ➡ Contact our local distributor.

- The error message “Chin rest error” is displayed.

? Cause 1 There are problems with the function that moves the chin rest up and down.

Solution ➡ Contact our local distributor.

- The error message “Joystick error” is displayed.

? Cause 1 There are problems with the joystick.

Solution ➡ Contact our local distributor.

- The error message “Unknown error” is displayed.

? Cause 1 An error of unknown origin has occurred.

Solution ➡ Stop using the instrument and contact our local distributor.

7. CONSUMABLES

The following consumable parts are available from our local distributor. Contact our local distributor to order them.

- Built-in printer paper

Specify the paper type as “Built-in printer paper for RC-800.”

- Chin rest paper (100 sheets/set)

- Fuse

Specify the fuse type as “Fuse for RC-800.”

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8. SPECIFICATIONS

8.1 Specifications

8.1.1 Refractive power measurement

- Spherical refractive power (S)
 - Measurement range: -25.00D to +22.00D (at VD=12.0mm)
 - Display unit: 0.01D / 0.12D / 0.25D
- Cylindrical refractive power (C)
 - Measurement range: 0D to $\pm 10.00D$ (at VD=12.0mm)
 - Display unit: 0.01D / 0.12D / 0.25D
- Astigmatism axial angle (A)
 - Measurement range: 0° to 180°
 - Display unit: 1° / 5°
- Minimum pupil diameter: $\Phi 2.0\text{mm}$
- Vertex distance: 0 mm / 12.0 mm / 13.5 mm / 14.0 mm / 15.5 mm / 16.0 mm
- Measurement time: 0.2 second/single eye (data taking time)

8.1.2 Corneal curvature measurement

- Corneal curvature (K1, K2, AVG)
 - Measurement range: 5.00mm to 11.00mm
 - Display unit: 0.01mm
- Corneal refractive power (K1, K2, AVG)
 - Measurement range: 30.68D to 67.50D ($n=1.3375$)
 - Display unit: 0.01D / 0.25D
- Corneal astigmatism (CYL)
 - Measurement range: 0D to 10D ($n=1.3375$)
 - Display unit: 0.01D
- Corneal astigmatic (AXS)
 - Measurement range: 0° to 180°
 - Display unit: 1° / 5°
- Measurement area: Cornea: $\Phi 3\text{mm}$
(at 8.00mm corneal curvature)
- Measurement time: 0.1 second/single eye (data taking time)

8.1.3 Pupillary distance measurement

- Measurement range: 50 to 86mm
- Display unit: 1mm

8.1.4 Corneal diameter and pupillary diameter measurement

Corneal diameter measurement

- Measurement range: 10.0 to 14.0mm
- Display unit: 0.1mm

Pupillary diameter measurement

- Measurement range: 1.0 to 10.0mm
- Display unit: 0.1mm

8.1.5 Observation range

Approx. 15mm × 9mm

8.1.6 Main unit

- Built-in printer Thermal printer
- Data output type: RS232C/USB
- Display 5.7 inch color liquid crystal display
- Dimensions: 297(W)×500(L)×448(H)mm
- Weight: Approx. 17kg

8.1.7 Power source

- Voltage: AC 100V to 240V
- Frequency: 50 / 60 Hz
- Consumption power: From 80VA to 100VA

8.2 Environmental conditions

This instrument shall be used in the following environmental conditions.

- Installing place: indoors where the instrument is free from direct sunbeams.
- Temperature: +10 to +40°C
- Humidity: 30 to 75 %
- Atmospheric pressure: 800 to 1060 hPa
- Power modulation: Less than $\pm 10\%$ of nominal voltage

Store and transport this instrument in the instrument's box under the following environmental conditions.

- Temperature: -20 to +60°C
- Humidity: 10 to 95 %

8.3 Classification

- Protection against electrical shock: Class I ME equipment
- Applied parts: B applied parts (Forehead pad, Chin rest)
- IP Code: IP20
- Mode of Operation: Continuous operation

8.4 Declaration of conformity to EMC

Caution : Medical electrical equipment.

EMC (Electro Magnetic Compatibility) must be considered before any medical electrical equipment is installed or put into service. Follow the information in the accompanying documentation when installing and operating the RC-800.

Caution: Portable or mobile RF communication equipment can effect Medical Electrical equipment.

Guidance and manufacturer's declaration - electromagnetic emissions

Table 201

The RC-800 is intended for use in the electromagnetic environment specified below.

The customer or the user of the RC-800 should assure that it is used in such an environment.

Emissions test	Compliance	Electromagnetic environment - guidance
RF emissions CISPR 11	Group 1	The RC-800 uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emission CISPR 11	Class B	The RC-800 is suitable for use in all establishments, including domestic establishments and those directly connected to the public low voltage power supply network that supplies buildings used for domestic purposes.
Harmonic emissions IEC 61000-3-2	Class A	
Voltage fluctuation/ flicker emissions IEC 61000-3-3	Complies	

Guidance and manufacturer's declaration - electromagnetic immunity

Table 202

The RC-800 is intended for use in the electromagnetic environment specified below. The customer or the user of the RC-800 should assure that it is used in such an environment.

Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment - guidance
Electrostatic Discharge(ESD) IEC 61000-4-2	± 6kV contact ± 8kV air	± 6kV contact ± 8kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/ Burst IEC 61000-4-4	± 2kV for power supply lines ± 1kV for input/output lines	± 2kV for power supply lines ± 1kV for input/output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	± 1kV line(s) to line(s) ± 2kV line(s) to earth	± 1kV line(s) to line(s) ± 2kV line(s) to earth	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips , short interruptions and voltage variations on power supply input lines IEC 61000-4-11	< 5 % UT (> 95 % dip in UT) for 0,5 cycle 40 % UT (60 % dip in UT) for 5 cycles 70 % UT (30 % dip in UT) for 25 cycles < 5 % UT (> 95 % dip in UT) for 5 sec	< 5 % UT (> 95 % dip in UT) for 0,5 cycle 40 % UT (60 % dip in UT) for 5 cycles 70 % UT (30 % dip in UT) for 25 cycles < 5 % UT (> 95 % dip in UT) for 5 sec	Mains power quality should be that of a typical commercial or hospital environment. If the user of the RC-800 requires continued operation during power mains interruptions, it is recommended that the RC-800 is powered from an uninterruptible power supply or a battery.
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.

NOTE: UT is the a.c. mains voltage prior to application of the test level.

Guidance and manufacturer's declaration electromagnetic immunity

Table 204

The RC-800 is intended for use in the electromagnetic environment specified below.
The customer or the user of the RC-800 should assure that it is used in such an environment.

Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment - guidance
Conducted RF IEC 61000-4-6	3 V rms 150kHz to 80MHz	3 V rms	Portable and mobile RF communication equipment should be used no closer to any part of the RC-800, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended separation distance $d = 1.2\sqrt{P}$ $d = 1.2\sqrt{P} \quad 80 \text{ MHz to } 800 \text{ MHz}$ $d = 2.3\sqrt{P} \quad 800 \text{ MHz to } 2.5 \text{ GHz}$
Radiated RF IEC 61000-4-3	3 V/m 80MHz to 2,5GHz	3 V/m	Where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in meters (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey, a should be less than the compliance level in each frequency range. B Interference may occur in the vicinity of equipment marked with the following symbol: 

Note1: At 80MHz and 800MHz, the higher frequency range applies.

Note2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

^a Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy.

To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the RC-800 is used exceeds the applicable RF compliance level above, the RC-800 should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the RC-800.

^b Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.

Recommended separation distances between portable and mobile RF communications equipment and the RC-800

Table 206

The RC-800 is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the RC-800 can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the RC-800 as recommended below, according to the maximum output power of the communications equipment.

Rated maximum output power of transmitter W	Separation distance according to frequency of transmitter m		
	150 kHz to 80 MHz $d = 1.2\sqrt{P}$	80 MHz to 800 MHz $d = 1.2\sqrt{P}$	800 MHz to 2.5 GHz $d = 2.3\sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23

For transmitters rated at a maximum output power not listed above, the recommended separation distance d in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

NOTE 1: At 80MHz and 800MHz, the separation distance for the higher frequency range applies.

NOTE 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

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