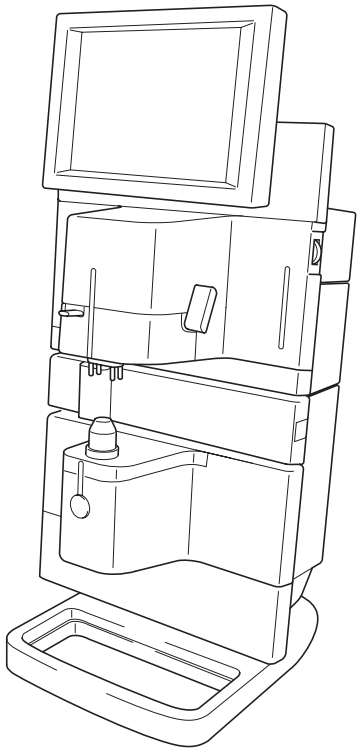
INSTRUCTION MANUAL

AUTO LENSMETER

TL-5000



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 find any problems during operation.

Note

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

TOMEY

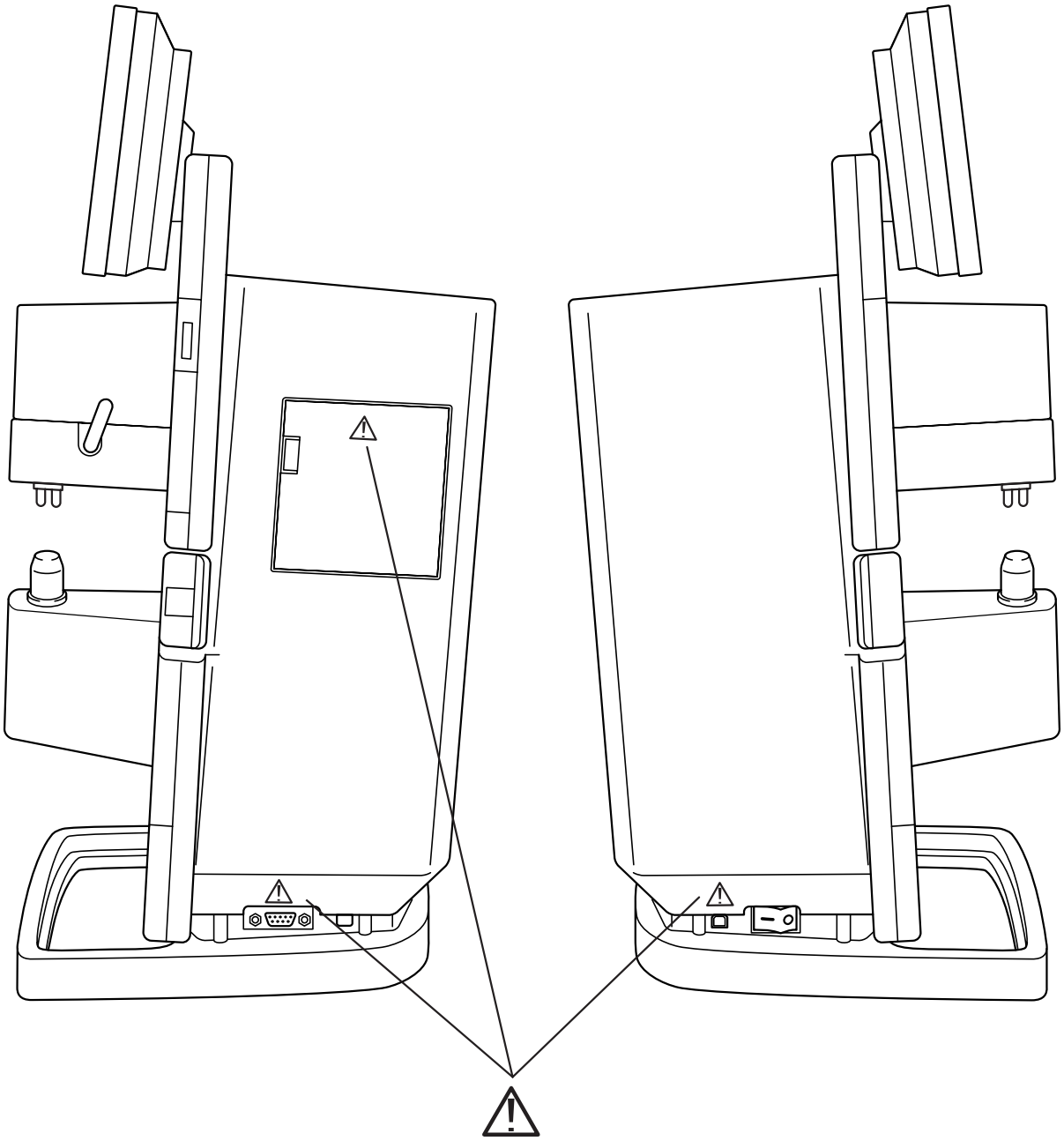
24GA9090-10

- ***Do not install this instrument in a location where explosives or inflammable substances are used or stored. Otherwise, fires or explosion may occur.***
- ***Do not remove the cover of the instrument. Otherwise, you may be directly exposed to high voltage sections.***
- ***Do not disassemble or modify the instrument. Otherwise, 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 measuring device used in optical glasses shops and ophthalmology. Do not use this instrument for any purpose other than measurement of optical glasses or contact lenses.***
- ***A saw-tooth-edged blade is attached to the top of the printer cover to cut the printer paper. Do not touch this blade directly.***
- ***The external output terminal is not isolated from the internal circuit. Inappropriate wiring may damage the internal circuit. Be sure to contact Tomey or our local distributor before using the external output terminal.***
- ***Light emitted by the instrument's built-in lamp includes light in the UV wavelength range. This lamp may affect eyes and/or human bodies. Observe the following precautions during use.***
  - *Do not look directly at the measurement luminous flux while operating the instrument.*
  - *The measurement luminous flux is irradiated from the projector (upper section of the instrument) toward the nose piece. Do not insert a mirror, etc. between the projector and nose piece. The mirror may reflect the measurement luminous flux and the flux may be irradiated directly into the eyes.*

- ***Never mark or damage caution labels provided on the instrument. A warning label is provided on the printer cover (right side of the main unit) and both sides of the lower section.***
- ***Contact Tomey or our local distributor when a label is damaged or becomes illegible.***



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 OF PARTS AND COMPONENTS
   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 AND OPTIONAL EQUIPMENT
   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

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 the 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.***

1.1 Precautions for operation

- ***Only allow qualified operators to use the instrument.***
- ***Precautions when installing the instrument***

WARNING

- *Install the instrument in a place 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 place where chemicals are stored or gases may occur. Spilt chemicals or vapor may enter the instrument and result in fire.*
- *Check the frequency, voltage, and allowable current (or power consumption) of the power source. Otherwise, fire or electric shock may occur.*
- *Connect the power plug to a grounded 3-pin outlet. Otherwise, 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. Otherwise, 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.*
- *Do not connect a device with data transmission specifications that are not compatible. Connecting such a device may cause fire or electric shock. Be sure to contact our local distributor before connecting the instrument with a communication connector.*
- *Conduct grounding work correctly. Otherwise you may get an electric shock.*

Caution

- *Do not hold the display when transporting the instrument. The display may be disconnected 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, fire or electric shock may occur.*
– *Install the instrument in a level 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 fatal accident.*
– *Check the power source (discharge condition, polarity, etc.).*
– *Check that the date set in the instrument conforms to the actual operation date and time.*

■ *Precautions before using the instrument*

– *Check the electrical contact of switches, etc. and that the instrument works correctly.*
– *Check that all cables are connected correctly.*
– *Check the power source (discharge condition, polarity, etc.).*
– *Check that the instrument is correctly grounded.*
– *Check that the date set in the instrument conforms to the actual operation date and time.*
– *Always keep the nose piece tip clean. If the nose piece tip has dust on it, the lens may be damaged.*

■ *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 lean on the instrument or press the instrument from the top. The instrument may topple over, resulting in mechanical failure or injuries.*
– *If any problem is found with the instrument, take appropriate action such as stopping operation.*
– *If problems such as smoke, offensive odor, or abnormal sound occur, immediately turn off the instrument, disconnect the power plug from the outlet, and contact Tomey or our local distributor.*
– *When cutting the printer paper, pull the paper downward to apply it to the cutter blade and then draw the paper sidewise. If the paper is not applied to the blade appropriately, the paper may become jammed or the printer may be damaged.*

■ *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. Solvents such as these may cause fire or electric shock (they may also corrode the resin or coating of the cover of the instrument).*
– *Follow the specified procedures to return the instrument to its original condition and turn it off.*
– *Hold the plug when disconnecting the power cord from the outlet to avoid placing excessive force on the cord. Pulling the cord may damage inner core wires, resulting in electric shock or fire.*
– *Refer to "5.6 Storing" for instructions on storing the instrument.*
– *Clean and neatly arrange the accessories and cables.*
– *Clean the instrument appropriately at the end of operation to be ready for the next operation.*
– *Do not cover the instrument with the dust cover while the instrument is turned on.*

■ ***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.*
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– *When any failure occurs in the instrument, indicate the failure in the instrument and contact our local distributor for inspection and repairs. Do not attempt to repair the instrument yourself.*
– *Conduct regular inspections of the instrument and components.*
– *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 checking procedures.*

1.2 Checking package contents

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

Note

- ***Keep the box and packing materials for use when moving or transporting the instrument.***
- ***Check that the guarantee certificate has all the necessary items entered, and store it in a safe place.***
- ***If the descriptions on the certificate are not correct, the free repair guarantee may not be granted. Contact our local distributor if you find any problem with the guarantee certificate.***
- ***Never lift the instrument by the display when taking the instrument out of the packing box. The instrument may be damaged.***
- ***Ink may leak from the ink cartridge of the point marker due to vibration during transportation or environmental changes during storage. Check the marker tip when opening the package. If the tip is smeared with ink or ink has leaked, wipe off the ink with paper or similar and mark dummy points two or three times before using the marker for actual operation.***

- Auto lens meter TL-5000 main unit
- Power cord 1
- Nose Piece for Measuring glasses 1
  (The Norse Piece is preinstalled on the main unit.)
- Nose piece for measuring contact lenses..... 1
- Hard contact lens holder..... 1
- Fuse..... 4
  (Two of these are preinstalled on the main unit.)
- Printer paper..... 3
  (1 roll is set in the main unit.)
- Dust cover 1
- INSTRUCTION MANUAL (this manual) 1
- Guarantee certificate 1

- DATA Transfer installation CD 1
- DATA Transfer startup guide..... 1
- Glass for refractive index measurement.....
  .....Large.1 , Small.1
- Gel for refractive index measurement 2

1.3 Glossary

Main terms used in this manual are described below.

[ADD] : Addition of multifocal lens (including progressive power lens)

[AUTO HOLD] : Function to automatically read the following measurements
- Optical center of a mono-focal lens
- Optical center of a contact lens
- Far area and near area of a progressive power lens
- Far area and near area of a bifocal lens
- Far area middle point, and near area of a trifocal lens

[AUTO TABLE LOCK] : Function to automatically lock the lens table at the following positions
- Optical center in mono-focal lens measurement mode

[AXIS (A)] : Axis angle that represents the direction of astigmatism (Unit: deg)

[BAS] : Direction (angle) of the base of the prism displayed in polar coordinates (Unit: deg).

[CL] : Symbol representing contact lenses

[CYL (C)] : Cylindrical dioptry (Unit: D)

[D] : Diopter Unit for expressing the dioptry of a lens. This is the inverse of the focal length (Unit: m)

[DCX] : Distance (eccentricity) in the horizontal direction (DCX) from the measurement position to the optical center (Unit: mm)

[DCY] : Distance (eccentricity) in the vertical direction (DCY) from the measurement position to the optical center (Unit: mm)

[D1] : Refractive power of the front of lens (Unit: D)

[D2] : Refractive power of the rear of lens (Unit: D)

[DATA Transfer] : System to output inspection data from Tomey products to digital files

[LPD] : Distance from the center of an optical frame to the optical center of the left lens

[n] : Refractive power of inspected lens

[ne]	:	Refractive index of spherometer (The default setting of the instrument is 1.523.)
[PD]	:	Pupil distance (Unit: mm)
[PSM]	:	Absolute value of prismatic power displayed in polar coordinates (Unit: △)
[PX, PY]	:	Prismatic power in horizontal direction (PX) and vertical direction (PY) displayed in orthogonal coordinates (Unit: △)
[RPD]	:	Distance from the center of an optical frame to the optical center of the right lens
[SPH (S)]	:	Spherical dioptry (Unit: D)
[UV]	:	Ultraviolet rays
[△]	:	Prism diopter. Unit for expressing prismatic power
[ABBE number]	:	Number that represents the dispersion level of the refractive index according to wavelength The Abbe number of a normal lens is approximately 60 and that of a high-refractive index lens is 30 - 45.

1.4 Outline of operation

This instrument is designed to measure the dioptry and prismatic power of optical lenses and contact lenses.

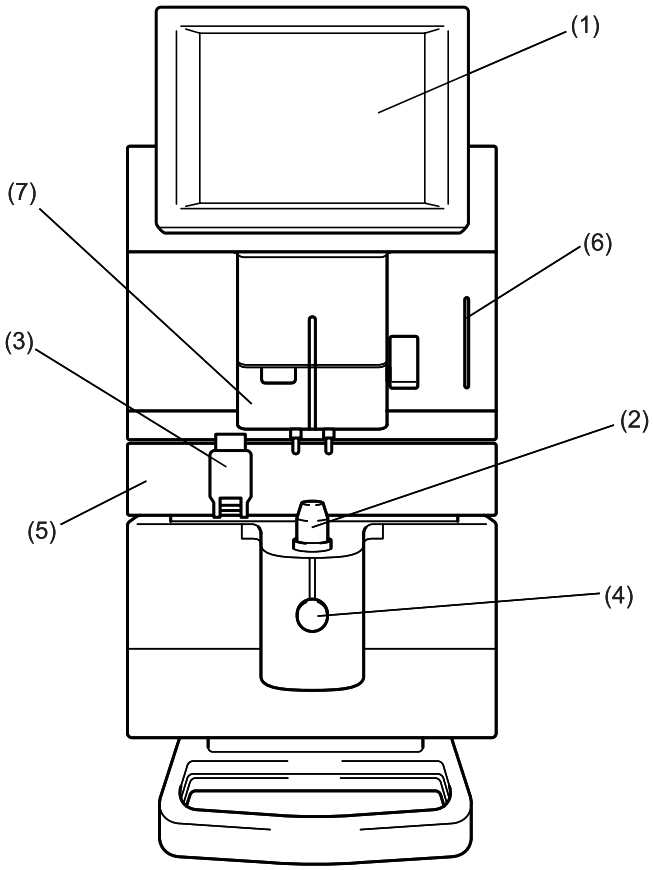
- This instrument consists of the optical system, electrical system, and mechanical system.

- When an optical lens or contact lens is placed on the nose piece, the instrument automatically measures the dioptry and prismatic power and shows the result on the LCD. The measured data is saved in the internal memory and can be printed out using the built-in printer.

2. NAMES AND FUNCTIONS OF PARTS AND COMPONENTS

2.1 Front of the instrument

2.1.1 With point marker cover



(1) Display/Touch panel

Displays information for centering of lenses, measurement conditions, measurement results, etc.; used to operate various buttons.

(2) Nose piece (for measuring optical glasses or contact lenses)

Use to position the lens.

(3) Nose block

Applied to pad of optical frame when measuring PD (pupil distance).

(4) HOLD button

Retains the measurement data and saves it in the internal memory.

(5) Lens table

Used as reference for astigmatism axis of optical glasses.

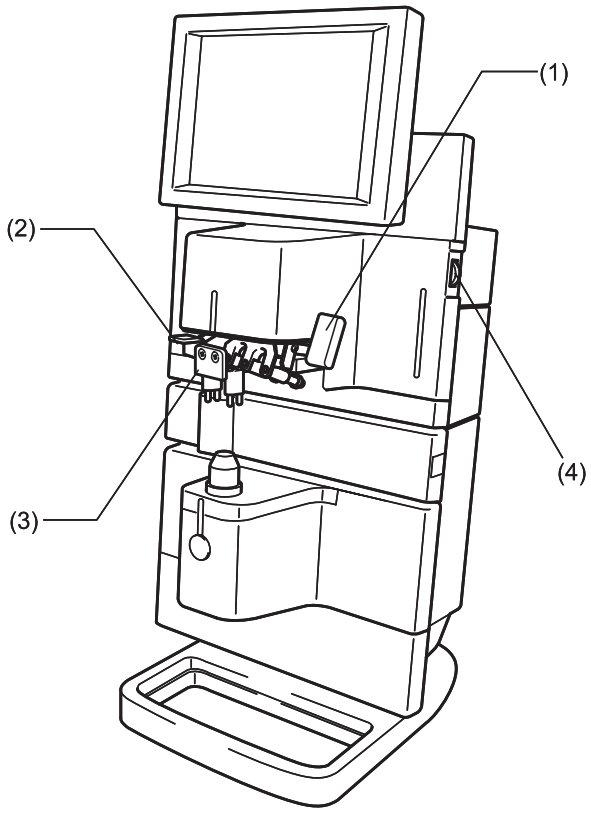
(6) Power lamp

Stays lit green when the instrument is turned on. Blinks while data is being printed.

(7) Point marker cover

Cover for the point marker

2.1.2 Without point marker cover



(1) Point marker

Marks points on the center and axis direction of the lens.

(2) Lens guide lever

Moves the lens guide up and down.

(3) Lens guide

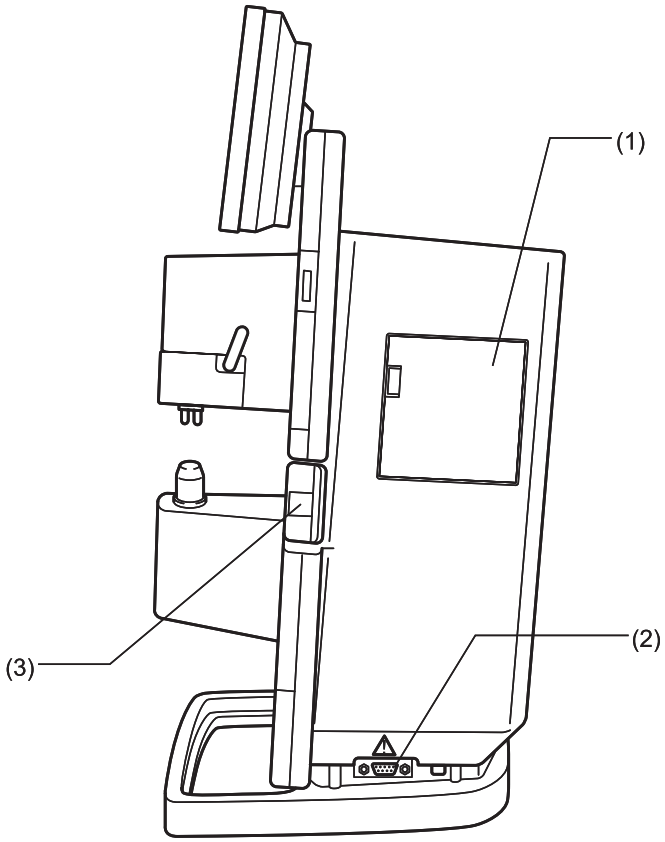
Secures the lens when marking points.

(4) Contrast adjustment volume

Adjusts contrast of the display.

2.2 Sides of the instrument

2.2.1 Right



(1) Printer

Prints the measurement data.

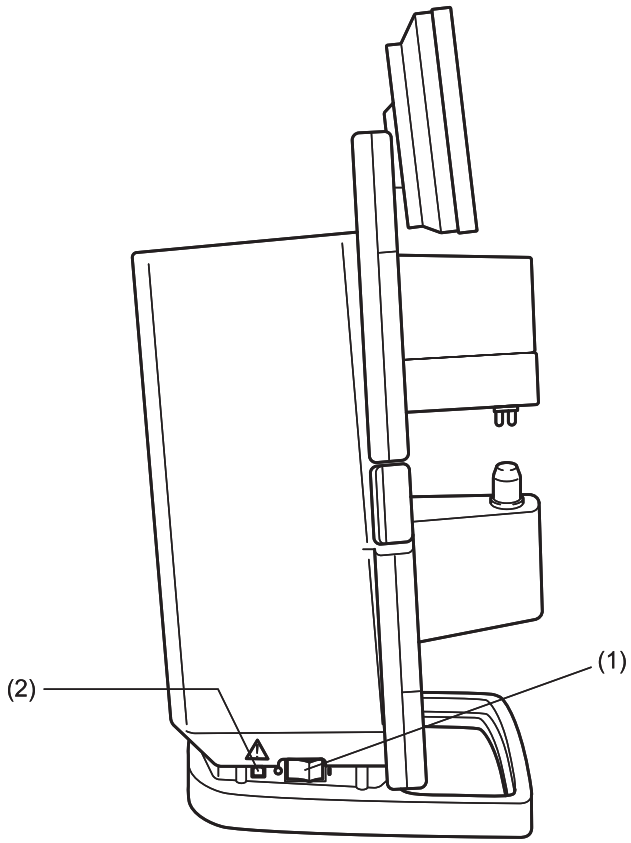
(2) External output terminal (RS232C)

Used when sending/receiving various types of data.

(3) TABLE LOCK button

Locks and unlocks the lens table.

2.2.2 Left



(1) Power switch

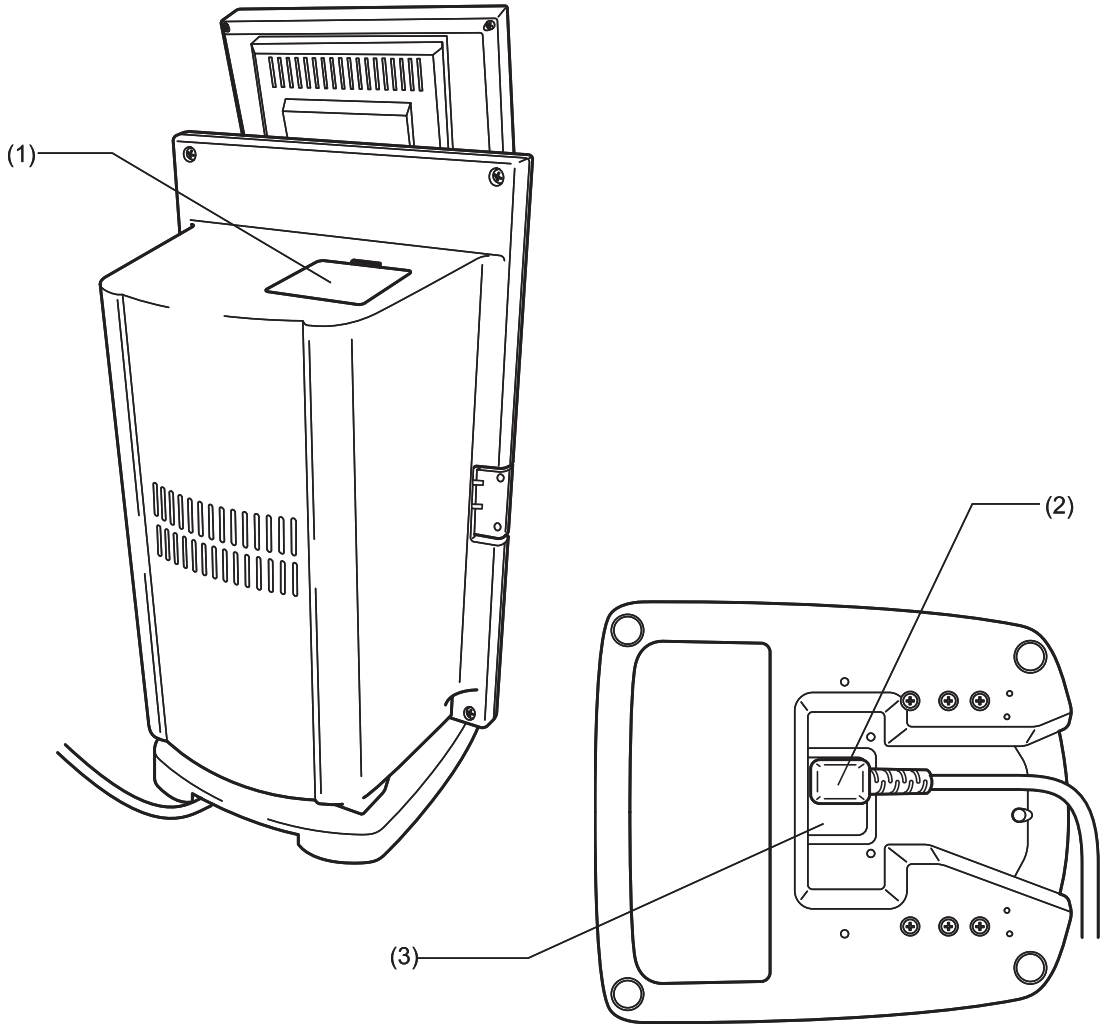
Turns power on and off.

(2) External output terminal (USB)

Used when sending/receiving various types of data.

Use the USB port when using Data Transfer provided with the instrument. (Refer to the Data Transfer operation manual for details.)

2.3 Rear and bottom of the instrument



(1) Accessory case

Stores the nose piece for measuring contact lenses, contact lens holder, etc.

(2) Power socket

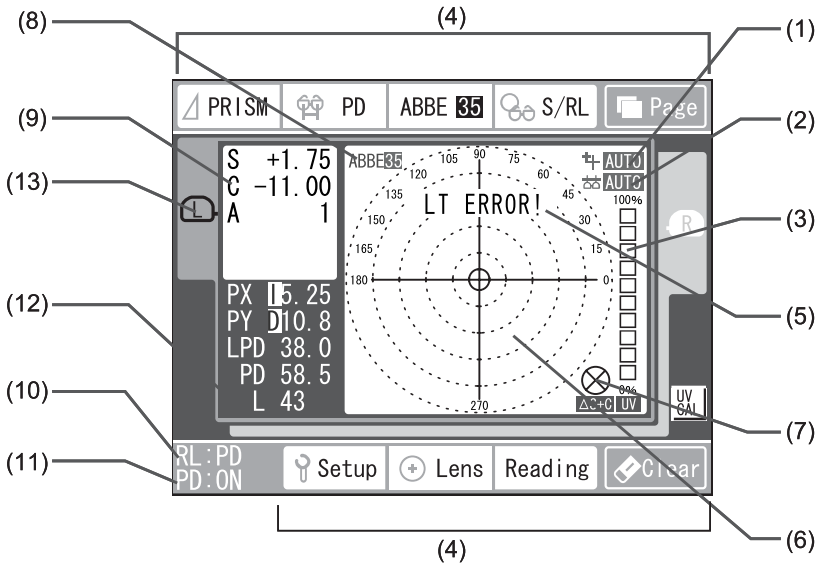
Insert the power connector here.

(3) Fuse holder

Holds 2 fuses

2.4 Measurement screen

2.4.1 RL measurement screen



(1) AUTO HOLD

Displayed when the AUTO HOLD function is activated.

(2) AUTO TABLE LOCK

Displayed when the AUTO TABLE LOCK function is activated. "LOCK" is displayed while the lens table is locked when the AUTO TABLE LOCK setting is either "AUTO" or "MANUAL."

(3) UV bar graph

Indicates the transmissivity of ultraviolet rays.

(4) Operation buttons

Displays the operation buttons.

(5) Error display

Displays an error message if any error occurs.

(6) Target area

Area for centering the lens to be inspected using the target (cross mark)

(7) Power map

Indicates the power distribution around the target in different colors.

(8) ABBE number

Displays the ABBE number when measuring the high refractive power lens.

(9) Data

Displays the measurement data.

(10) Displays the status of the AUTO RL (function that automatically switches the measurement side between left and right).

[RL: A] : The AUTO RL function is activated. (Left or right is selected according to the measurement side.)
[RL: M] : The AUTO RL function is deactivated.
[RL: PD] : Right or left is selected according to the position of the nose block for measuring PD.

(11) PD

Displays the PD measurement status.

[PD: OFF] : The PD is measured. (The nose block is suspended at the left end position.)
[PD: ON] : The PD is measured. (During PD measurement)
[PD: NA] : The PD is not measured.

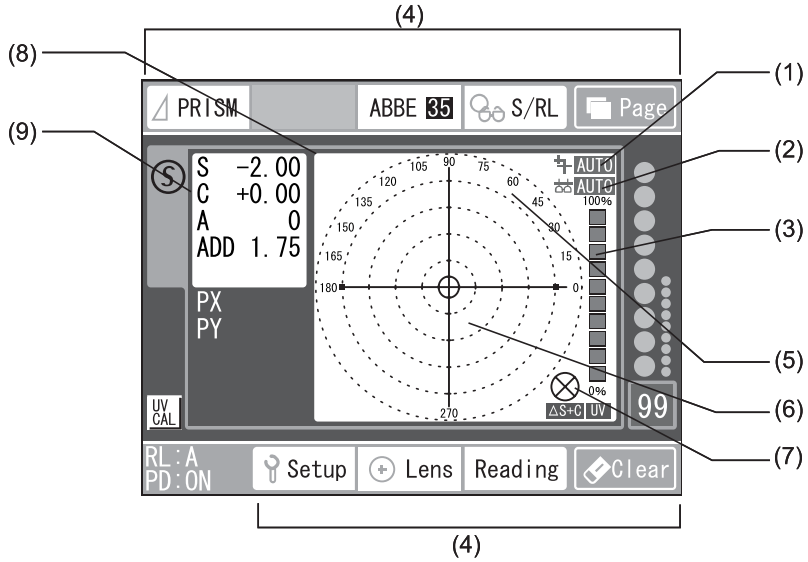
(12) L (length)

Displays the distance from the lower edge of the optical frame to the optical center of the lens.

(13) RL tab

Touching the “R” and “L” tab displays the right lens measurement screen and left lens measurement screen respectively. The screen corresponding to the colored tab can be measured. Whether or not the measurement data has been saved is also displayed. The symbol is highlighted when the data has been saved on the RL measurement screen.

2.4.2 Single lens measurement screen



(1) AUTO HOLD

Displayed when the AUTO HOLD function is activated.

(2) AUTO TABLE LOCK

Displayed when the AUTO TABLE LOCK function is activated. "LOCK" is displayed while the lens table is locked when the AUTO TABLE LOCK setting is either "AUTO" or "MANUAL."

(3) UV bar graph

Indicates the transmissivity of ultraviolet rays.

(4) Operation buttons

Displays the operation buttons.

(5) Error display

Displays an error message if any error occurs.

(6) Target area

Area for centering the lens to be inspected using the target (cross mark)

(7) Power map

Indicates the power distribution around the target in different colors.

(8) ABBE number

Displays the ABBE number when measuring the high refractive power lens.

(9) Data

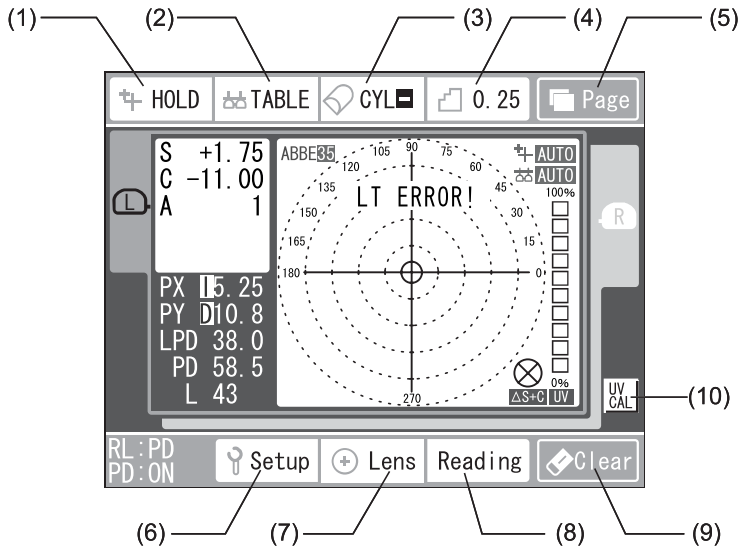
Displays the measurement data.

(10) Number of data sets

Displays the total number of data sets.

2.5 Operation buttons

2.5.1 Operation button menu 1 (default)



(1) AUTO HOLD button

Turns the HOLD function ON and OFF.

(2) AUTO TABLE LOCK button

Turns the AUTO TABLE LOCK function ON and OFF.

(3) CYL button

Switches the symbol for the astigmatism value.

- / ± / +

(4) Increment button

Switches the increment of the value to be displayed.

0.25 / 0.12 / 0.01

(5) Page button

Switches the button menu (1 and 2).

(6) Setup button

Displays the various setting screens.

(7) Lens button

Displays the measurement mode selection screen. Also displays an illustration of the selected lens type.

(8) Reading button

Displays the measurement result display screen (Reading screen).

(9) Clear button

Deletes the measurement data.

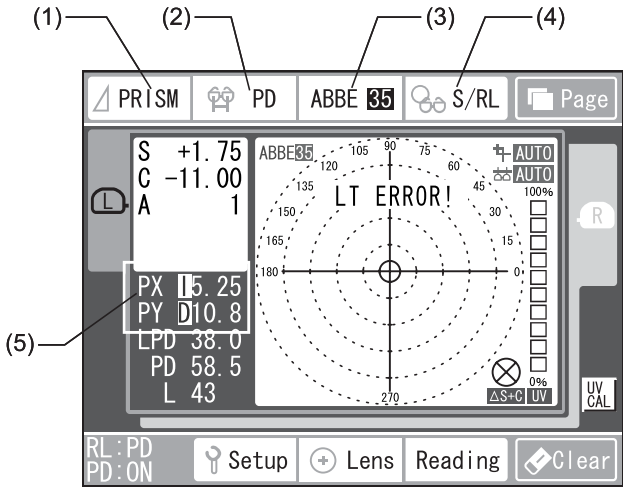
(10) UV CAL button

Calibrates the UV bar graph.

Touch this button to set the value on the UV bar graph to 100% when no lens is set and the UV bar graph does not indicate 100% or when the UV bar graph is shown in red.

This button does not appear while measuring the lens to prevent incorrect operation.

2.5.2 Operation button menu 2 (default)



(1) PRISM button

Displays and switches the prismatic power (5).

No display / PXY / rθ / DXY

(2) PD button

Turns the PD (pupil distance) function ON and OFF.

(3) ABBE button

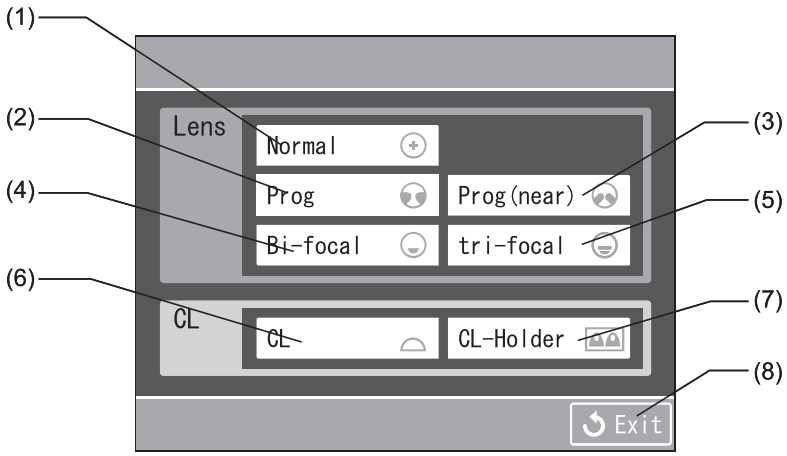
Sets whether or not to correct the measured value of the high refractive index lens.

The measured value is corrected when the ABBE number is displayed in the upper right corner of the target area. Refer to “3.5 Setting measurement conditions” for how to change the ABBE number.

(4) S/RL button

Switches the single lens measurement screen and RL lens measurement screen.

2.6 Measurement mode selection screen



(1) Normal mode

Measures a mono-focal lens.

(2) Prog mode

Measures a progressive power lens (mainly for far area and near area and for middle far area and near area).

(3) Prog (near) mode

Measures a progressive power lens exclusively for near area

(4) Bi-focal mode

Measures a bifocal lens.

(5) Tri-focal mode

Measures a trifocal lens.

(6) CL mode

Measures a contact lens. (When measuring a contact lens placed directly on the nose piece for measuring contact lenses)

(7) CL-Holder mode

Measures a contact lens. (When using the hard CL holder)

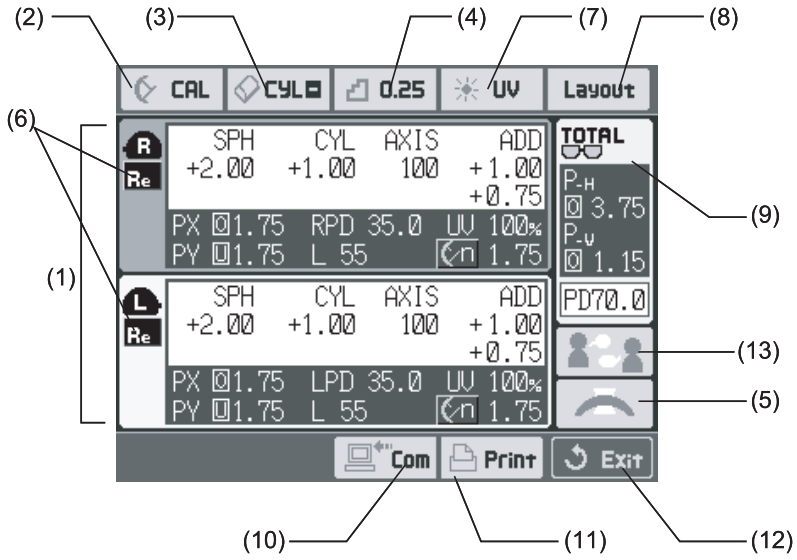
(8) Exit button

Returns to the measurement screen without changing the measurement mode.

2.7 Measurement result display screen

Note ■ ***Touch the EXIT button to delete measurement data.***

2.7.1 Measurement in RL mode



(1) Measurement result display

Displays the measurement results

SPH	:	Spherical dioptry
CYL	:	Cylindrical dioptry
AXIS	:	Astigmatism axis angle
ADD	:	Addition of multifocal lens
PX	:	Prismatic power in horizontal direction OUT/IN
PY	:	Prismatic power in vertical direction UP/DOWN
RPD(LPD)	:	Distance from the center of an optical frame to the optical center of the right/ left lens
L	:	Distance from the lower edge of the optical frame to the optical center
UV	:	UV transmissivity
n	:	Refractive index When both the refractive index calculated by the refractive index calculation screen and that measured using Refractive index estimation are retained, touching the lens mark on the left of the value calls the corresponding index.

(2) CAL button

Displays the refractive index calculation screen to calculate the refractive index using a spherometer. (Refer to “3.4.1 Refractive index calculation function.”)

(3) CYL button

Switches the CYL symbol for the measurement data.

- / ± / +

(4) Increment button

Switches the increment of the measurement data to be displayed.

0.01 / 0.12 / 0.25

(5) Refractive index estimation button

Displays the refractive index measurement screen to measure the refractive index using Refractive index estimation. (Refer to "3.4.2 Refractive index measurement using Refractive index estimation.")

(6) Retake button

Touching the "Re" button (5) under the R tab returns to the right lens measurement screen, while touching the "Re" button (5) under the L tab returns to the left lens measurement screen.

(7) UV button

Displays the UV transmissivity display screen.

(8) Layout button

Displays the Layout screen.

(9) TOTAL

Displays the PD and total prism value.

(10) Data transfer button: Com / Link

Com : Outputs the data to the external device via RS232C.

Link : Sends the personal data, measured data, etc. using TOMEY Link or Data Transfer. (The USB port is used.)

Refer to "3.5 Setting measurement conditions" for various settings.

(11) Print button

Prints the data displayed on the screen.

(12) Exit button

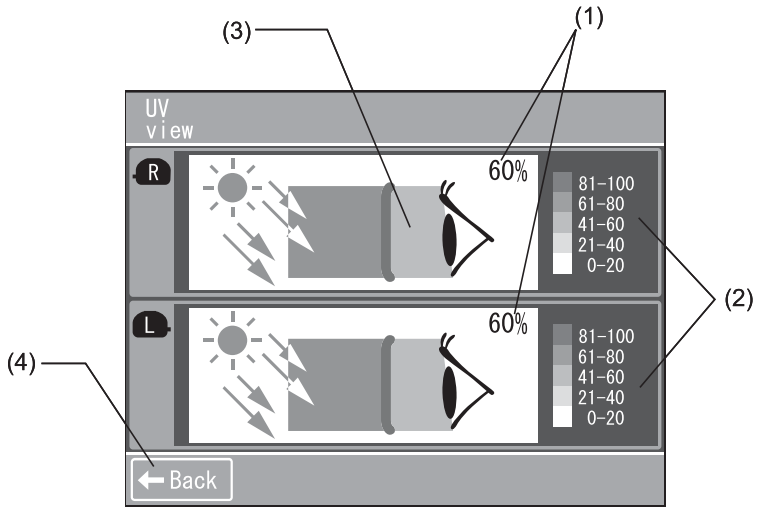
Deletes the measurement data and returns to the measurement screen.

(13) Communications mode button

Changes the mode to Communication mode.

2.7.2 UV transmissivity display screen

Note ■ ***The transmissivity at a wavelength of 385 nm is measured. The value displayed on this screen is not the transmissivity for the entire UV range.***



(1) UV transmissivity

Displays the UV transmissivity of the measured optical lens as a percentage. A transmissivity of 0%, is displayed when the lens is UV-cut coated.

(2) Scale

Displays a color scale that classifies the UV transmissivity in 5 levels.

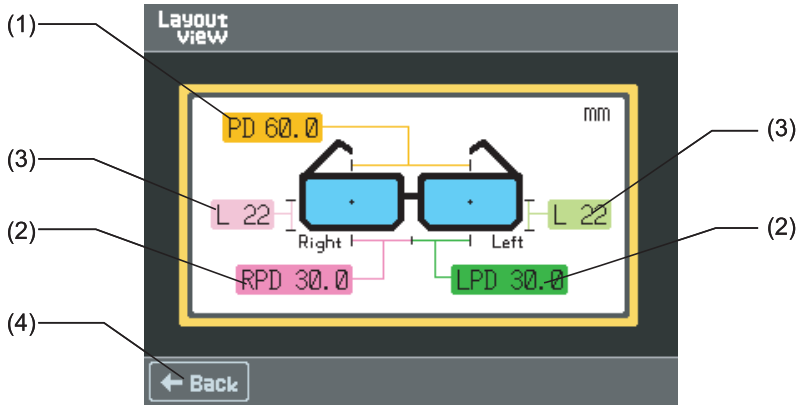
(3) Color display of UV transmissivity

Shows the UV transmissivity using different colors.

(4) Back button

Returns to the measurement result display screen.

2.7.3 Layout screen



(1) PD

Displays the PD (pupil distance).

(2) RPD/LPD

RPD : Displays the distance from the center of the optical frame to the optical center of the right lens.

LPD : Displays the distance from the center of the optical frame to the optical center of the left lens.

(3) L Value

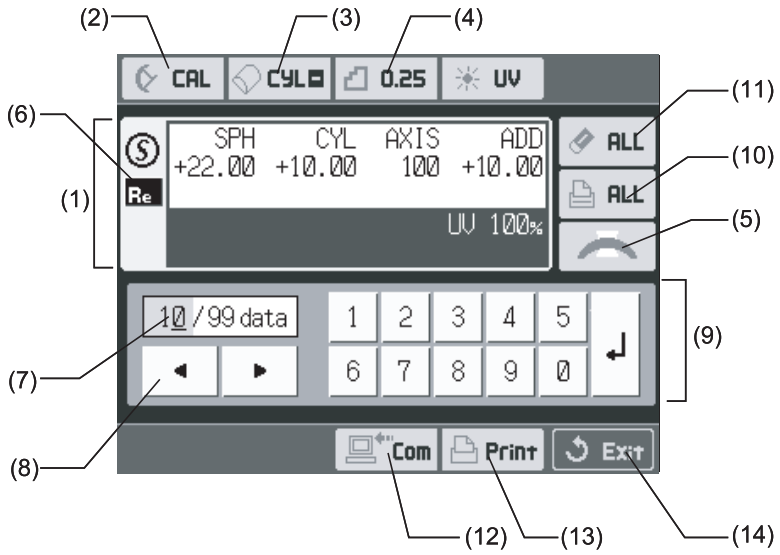
Displays the distance from the lower edge of the optical frame to the optical center when L Value is activated. (Refer to “3.5 Setting measurement conditions.")

(4) Back button

Returns to the measurement result display screen.

2.7.4 Measurement in S mode

Note ■ ***TOMEY LINK functions are not available when measuring a single lens.***



(1) Measurement result display

Displays the measurement results

SPH	:	Spherical dioptry
CYL	:	Cylindrical dioptry
AXIS	:	Astigmatism axis angle
ADD	:	Addition of multifocal lens
PX	:	Prismatic power in horizontal direction OUT/IN
PY	:	Prismatic power in vertical direction UP/DOWN
UV	:	UV transmissivity
n	:	Refractive index

When both the refractive index calculated by the refractive index calculation screen and that measured using Refractive index estimation are retained, touching the lens mark on the left of the value calls the corresponding index.

(2) CAL button

Displays the refractive index calculation screen to calculate the refractive index using a spherometer. (Refer to “3.4.1 Refractive index calculation function.”)

(3) CYL button

Switches the CYL symbol for the measurement data.

- / ± / +

(4) Increment button

Switches the increment of the measurement data to be displayed.
0.01 / 0.12 / 0.25

(5) Refractive index estimation button

Displays the refractive index measurement screen to measure the refractive index using Refractive index estimation. (Refer to "3.4.2 Refractive index measurement using Refractive index estimation.")

(6) Retake button

Measures the displayed data again. The current measurement result will be overwritten with the new data and the measurement result display screen appears.

(7) Data No.

Displays the displayed data number and the total number of measured data sets.

(8) Arrow button

Used to select the data to be displayed.

(9) Keypad

Enter a data number and press the Enter key to display the selected data.

(10) ALL Print button

Prints all of the measured data.

(11) ALL Clear button

Deletes all of the measured data.

(12) Data transmission button: Com

Outputs the data to the external device via RS232C.

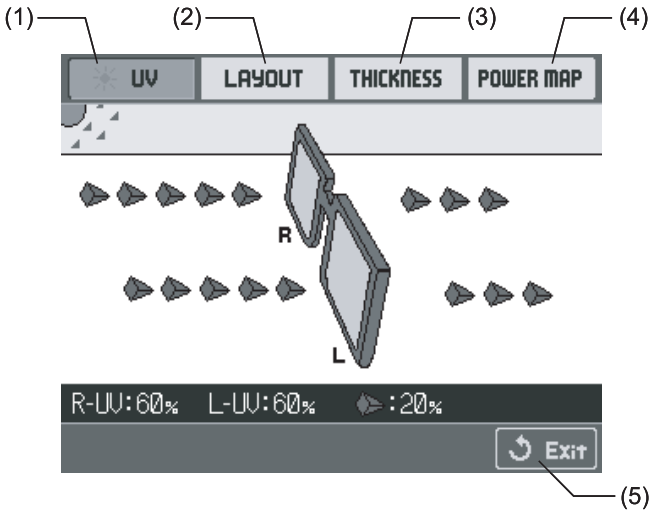
(13) Print button

Prints the data displayed on the screen.

(14) Exit button

Returns to the measurement screen with the measured data retained.

2.8 Communication mode



(1) UV button

Displays the UV transmissivity display screen (Communication mode).

(2) LAYOUT button

Displays the Layout screen (Communication mode).

(3) THICKNESS button

Displays the lens thickness display screen.

(4) POWER MAP button

Displays the POWER MAP screen (communication mode).

(5) Exit button

Exits Communication mode and returns to the measurement result display screen.

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3. OPERATION PROCEDURES

3.1 Installation

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 catch fire.***

- ***Do not hold the display when transporting the instrument. The display may be disconnected 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, images cannot be captured correctly. Also, the instrument may topple over or fall down, resulting in fire or a fatal accident.***

3.1.2 Precautions for connecting the power cord

WARNING

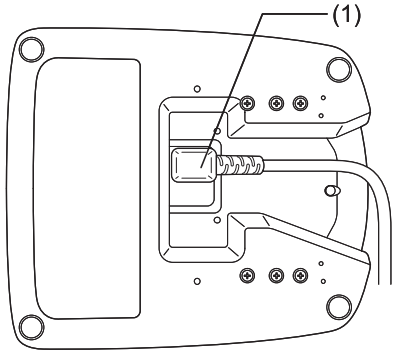
- ***Connect the power plug to a grounded 3-pin outlet. Otherwise, a short circuit due to failure of the instrument may result in electric shock.***
- ***Do not place any heavy object on the power cord or squash the power cord. Fire or electric shock may occur.***
- ***Fully insert the power plug into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

3.2 Preparation before use

3.2.1 Connecting the power cord

Note

- ***The connector must be inserted in the correct direction. Check the direction and firmly insert the connector.***



(Figure 1)

Insert the connector (1) of the power cord into the power socket at the bottom of the main unit in the correct direction.
Connect all three pins of the plug. (Figure 1)

3.2.2 Connection to external device (serial communication cable)

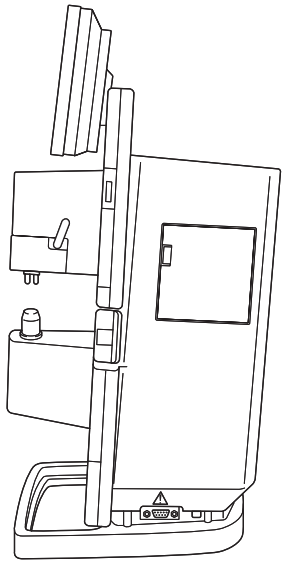
Caution

- ***The external output terminal is not isolated from the internal circuit. Inappropriate wiring may damage the internal circuit. Be sure to contact Tomey Corporation prior to using the external output terminal.***

Note

- ***Use a serial communication cable to connect a device conforming to IEC601-1 or conforming to IEC950 and with a power source isolated by an insulated transformer.***
- ***The connector must be inserted in the correct direction. Check the direction and firmly insert the connector.***
- ***The RS-232C terminal on this instrument is a female terminal. When connecting to a personal computer, attach a male-male adapter to the female-female interlink cable.***

a) Connecting the RS-232C terminal

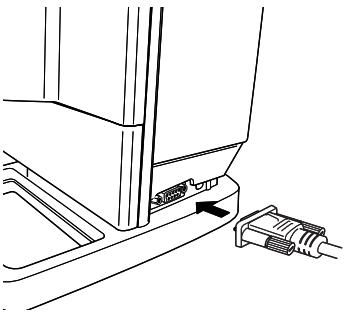


(Figure 1)

An external device can be connected to manage the measurement data.
Connect the male-male adapter (2) to the RS-232C terminal (1). Also connect the female-female interlink cable (3) and secure the connector with screws.
[D-sub9 pin layout]

Pin number	Signal name
1	-
2	R x D
3	T x D
4	D T R
5	S G
6	D S R
7	RTS
8	C T S
9	-

Pin 4 and pin 6 are short-circuited in the instrument.

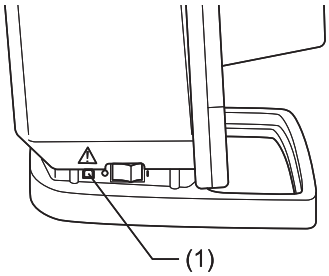


(Figure 2)

b) Connecting the USB cable

Note ■ ***Refer to the corresponding operation manual for the TOMEY Link and DATA Transfer settings.***

Connect a commercial USB cable to the USB port (1) of the instrument and a USB port on the personal computer when using TOMEY Link (optional) and Data Transfer.



(Figure 1)

3.3.3 Turning the power on

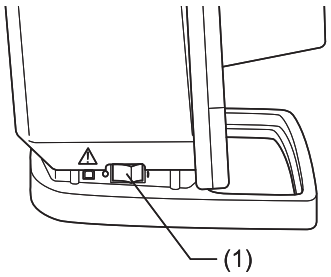
Note

- ***Place the lens on the nose piece after the measurement screen appears. "INITIAL ERROR" occurs when power is turned on with a lens on the nose piece.***
- ***When turning power on while the nose piece for measuring contact lenses is set, a buzzer goes off after the startup screen appears and the error message appears. (Refer to "6. TROUBLESHOOTING.")***
- ***When starting the instrument in contact lens measurement mode, turn power on with the nose piece for measuring contact lenses set.***

1) Connect the power cable to the power terminal and insert the power plug into the power socket.

2) Check the following before turning power on.
   - The nose piece is firmly secured.
   - The protective glass under the nose piece is clean.
   - There is no lens set on the nose piece.

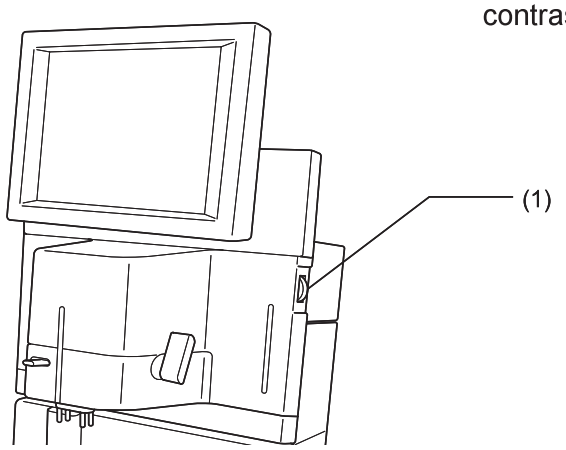
3) When the power switch (1) is set to "|" the startup screen appears for approximately 5 seconds and then the measurement screen appears.



(Figure 1)

3.2.4 Contrast adjustment of display

Turn the contrast adjustment knob (1) to adjust the contrast.



(Figure 1)

3.2.5 Screensaver / All off function

Note ■ ***When the instrument is not used for a while, turn the main unit off and cover it with the dust cover.***

When no button is used for 10 minutes while the instrument is turned on, the screensaver or “all off” function is activated.

1) Call the SETUP > FUNCTION 2 screen.
2) Turn SCREEN SAVER on or off.
   ON: Activates the screensaver function.
   OFF: Deactivates the screensaver function.

The screensaver shows various sizes of Landolt’s ring repeatedly in the specified cycle. The contents set by CONTENT are shown on the final screen. (Refer to "3.5.3 FUNCTION setting screen.”) When the screensaver is set to OFF, the “all off” function is activated. The LCD backlight, internal motor, and measurement light source are turned off to prevent unnecessary wear. This function is appropriate when the instrument is installed in a processing room or inspection room.

3) Touch any part of the LCD to resume measurement. The screen returns to the same condition as when the screensaver or “all off” function was activated.

3.2.6 Point marker

The point marker is a device with three ink markers used to mark the optical center of the lens and the axis direction (in the case of astigmatism lens). Mark points while the lens is secured with the lens guide.

Caution

■ ***Slowly lower the lens guide. If the lens guide is lowered rapidly, the lens may be damaged.***

Note

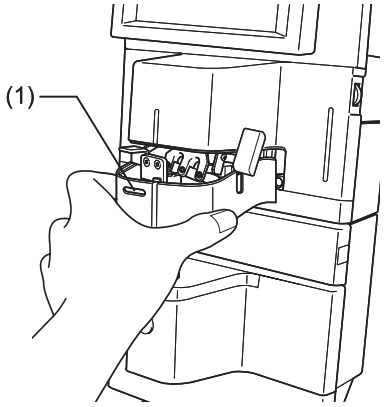
■ ***Remove the lens guide cover before using the point marker. The point marker cannot be used with the cover attached.***

■ ***Use the lens guide only when marking points.***

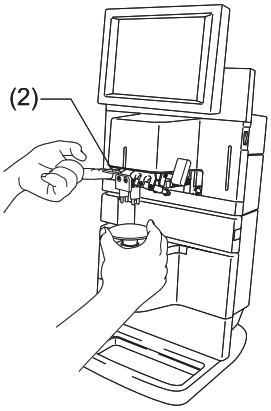
■ ***When measuring a coated lens, do not move the lens while secured by the lens guide; otherwise the coating may be damaged.***

■ ***Do not touch the marker tip of the point marker. Otherwise the marker tip may be deformed and the marker may become unusable.***

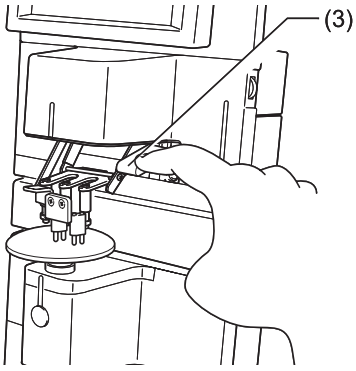
■ ***Replace the ink cartridge when dots become too light. (Refer to "5.5.2 Ink cartridge.")***



(Figure 1)



(Figure 2)



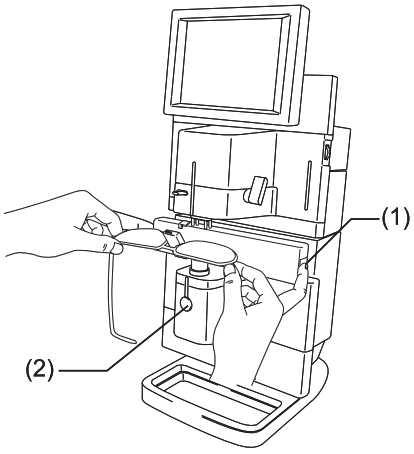
(Figure 3)

1) Hold the sides of the point marker cover (1) in your hands and pull the cover downward to remove it.
2) Lift the lens guide lever (2) slightly to unlock it.
3) Place the center of a lens to be measured on the nose piece for measuring optical glasses and gently lower the lens guide to secure the lens.
4) Lift the lens guide slightly, adjust the lens position, and secure the lens again with the lens guide.
5) Turn the lever (3) of the point marker to turn the marker tip downward and press the lever. The marker tip lowers and marks points on the lens surface.
6) Gently release the lever to return it to its original position.

3.2.7 Lens table

Note ■ ***The lens table is automatically unlocked after 3 minutes.***

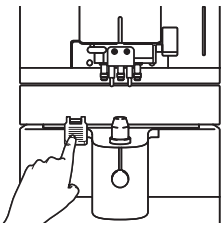
The lens table is used as a reference for the astigmatism axis of glasses.



(Figure 1)

1) When the lens table is locked, press the table lock button (1) on the right of the lens table to unlock it.
2) Pull out the lens table so that it contacts the lower edges on both sides of the optical frame.
3) Press the table lock button (1) to lock the table at the optional position. Press the button again to unlock the table. Activate the AUTO TABLE LOCK function to lock the lens table automatically upon measurement, referring to “2.5.1 Operation button menu 1” or “3.5 Setting measurement conditions.” When the AUTO TABLE LOCK function is activated, AUTO is displayed in the upper right corner of the measurement screen.

3.2.8 How to avoid the nose block

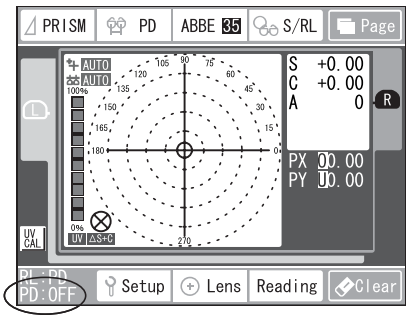


(Figure 1)

The nose block may hinder measurement when not used. Therefore, the nose block can be avoided to enable easier measurement.

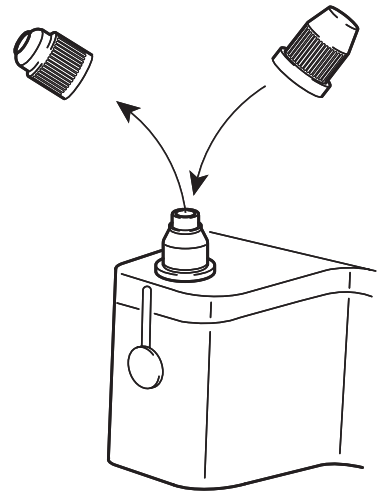
Caution ■ ***Do not move the lens table when the nose block is not completely avoided. Also, do not move or push the nose block while moving the lens table. Otherwise, these devices may be damaged.***

1) Unlock the nose block and slowly lower it to the bottom as shown in Figure 1.
2) Slide the nose block to the left end and check that the status of "PD" on the screen is not “ON.”



(Figure 2)

3.2.9 Replacing the nose piece



(Figure 1)

1) Attach the nose piece for measuring contact lenses in contact lens measurement mode, and the nose piece for measuring optical glasses in optical glass measurement mode. When the nose piece type does not conform to the measurement mode, the error message “NOSEPIECE ERROR!” appears.
2) When the nose piece is changed to that for measuring contact lenses in Normal mode, the measurement mode is automatically switched from “Normal” to “CL” or “CL Holder” if the AUTO CL function is active. Refer to “3.3.1 Selecting the measurement mode” for selection of the measurement mode and to “3.5 Setting measurement conditions” for the AUTO CL function.

3.2.10 Calibrating the touch panel

■ ***Do not use any tool with a sharp tip to press the touch panel. The surface of the panel will be damaged, resulting in failure.***

Check calibration of the touch panel and correct it if required.

1) Turn power on while pressing the upper right point of the touch panel to display the touch panel check screen.
2) Letters "A" to "I" are displayed on the upper right of the screen. Touch "E" in the center repeatedly until "(E) Switch" in the center of the screen changes to "OK."
3) After "(E) Switch” changes to “OK,” letters "J" to "R" are displayed on the lower left of the screen. Touch "N" in the center. Touch “N” repeatedly until “(N) Switch” in the center of the screen changes to “OK.” The screen returns to the measurement screen when both (E) and (N) have changed to OK.
4) If "E" or "N" does not change to "OK" even when pressed repeatedly, touch the "HOLD" button. The touch panel calibration screen appears.
5) Touch the center of the target on the lower left of the screen with a pointed tool (be careful not to damage

the display). When another target appears on the upper right of the screen, touch the center in the same manner.

6) The screen returns to the touch panel check screen. Touch "E" and “N.” When both “E” and “N” have changed to OK, the measurement screen appears. If these do not change to "OK" on the touch panel check screen even after calibration, contact our local distributor.

3.2.11 Setting measurement conditions

Refer to “3.6 Setting” and set the measurement conditions.

3.3 Measurement procedures

Caution

- *Lenses may be damaged if forced against the nose piece or moved rapidly.*

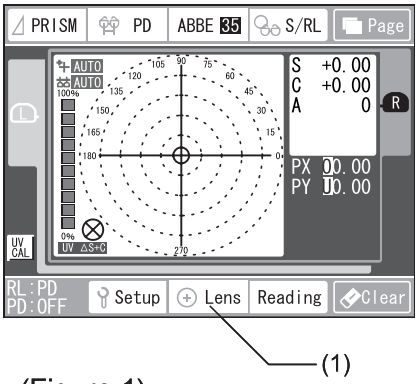
Note

- *Because a cylindrical lens and non-prescription lens do not have an optical center, the target may not be aligned with the center.*
- *Touch the "Clear" button to delete all measurement data saved in the memory.*
- *Generally, measure the right lens and then the left lens. If measurements are always taken from the left lens and then the right lens, refer to "3.5 Setting measurement conditions" to change the setting appropriately.*
- *When measurement cannot be completed correctly, refer to "6. TROUBLESHOOTING."*
- *When PD is not measured, place the nose block on the left end, and lock it or bend it downward.*
- *The target may not come to the center of the target area for some types of lens. Refer to "6. TROUBLESHOOTING" for further information.*
- *The measured value may not be identical to the value indicated on the lens. Refer to "6. TROUBLESHOOTING" for further information.*

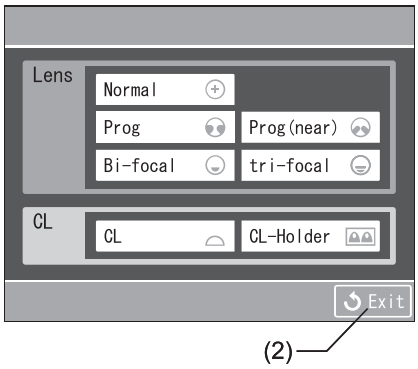
3.3.1 Selecting the measurement mode

Note

■ ***Check that the nose piece corresponding to the measurement mode is set before selecting the mode. If the nose piece type is not correct, the measurement mode may not be selected.***



(Figure 1)



(Figure 2)

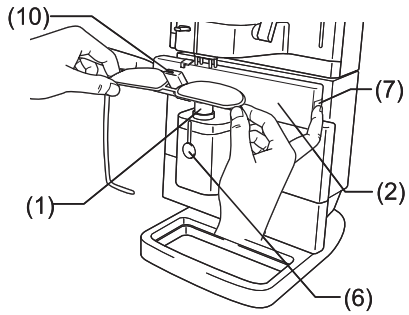
1) Touch the lens button (1) on the measurement screen (Figure 1) to display the measurement mode selection screen (Figure 2).
2) Select the measurement mode according to the lens to be measured
3) Touch the “Back” button (2) to return to the measurement screen without selecting the measurement mode.

Normal mode	:	Mode for measuring a mono-focal lens
Prog mode	:	Mode for measuring a progressive power lens
Prog (near) mode	:	Mode for measuring a progressive power lens exclusively for near area
Bi-focal mode	:	Mode for measuring a bifocal lens
Tri-focal mode	:	Mode for measuring a trifocal lens
CL mode	:	Mode for measuring a contact lens
CL-Holder mode	:	Mode for measuring a contact lens by using the hard contact lens holder

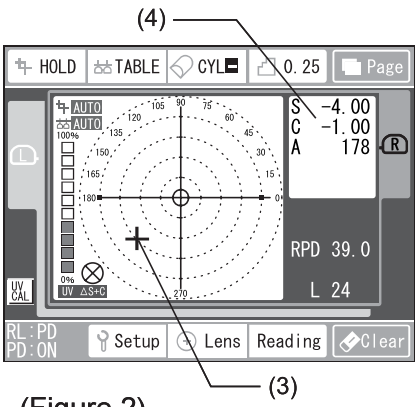
3.3.2 Measuring mono-focal lens (Normal mode)

Note

■ ***When the AUTO PROG function is activated, the measurement mode may be switched to PROG mode if the lens is tilted when placed. If the mode is switched by mistake, select the mono-focal lens measurement screen again to change the mode. When the AUTO PROG function is deactivated, the instrument does not automatically detect the lens type or change the mode to PROG. Refer to "3.5 Setting measurement conditions" for setting the AUTO PROG function.***

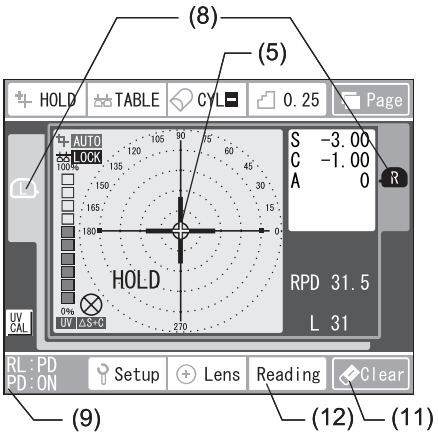


(Figure 1)

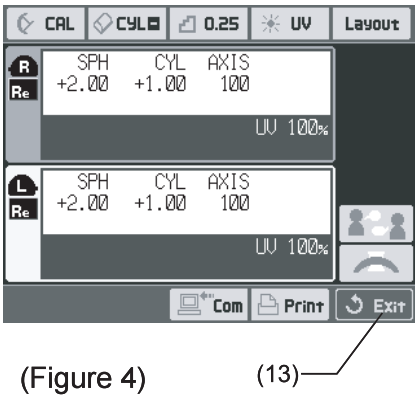


(Figure 2)

1) Measure the lens on the RL measurement screen. (Refer to "2.5 Operation buttons.")
2) Select "Normal" on the measurement mode selection screen. (Refer to "3.3.1 Selecting the measurement mode.")
3) Place the lens on the nose piece for measuring optical glasses (1) so that the front faces up, move the lens table (2), and measure the lens while the lower edges of both sides of the optical frame contact the lens table (2).
4) Slowly move the lens so that the target (3) comes to the center of the target area. The measurement data is shown in real time in the data display section (4).
5) When the optical center of the lens is aligned with the center of the target area, the target (5) becomes larger as shown in Figure 3. When the AUTO HOLD function is ON, the measured value is automatically read. If the AUTO HOLD function is OFF, touch the "HOLD" button (6) to manually read the measured data. Refer to "3.5 Setting measurement conditions" for setting the AUTO HOLD function.
6) When the AUTO TABLE LOCK function is set to ON, the lens table is automatically locked when the optical center of the lens is aligned with the center of the target area. Touch the table lock button (7) to lock the lens table when the AUTO TABLE LOCK function is OFF. While the lens table is locked, touching the table lock button (7) unlocks the table. Refer to "3.5 Setting measurement conditions" for setting the AUTO TABLE LOCK function.



(Figure 3)



(Figure 4)

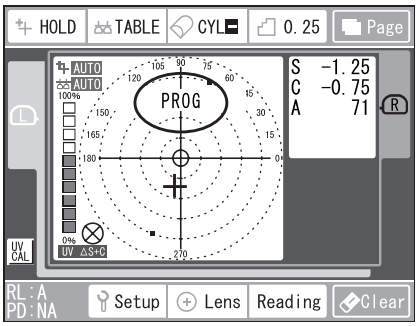
7) When the lens is removed from the nose piece for measuring optical glasses, the target disappears; if the AUTO R/L function is set to ON, the instrument starts to measure the other lens when the lens is set again. When AUTO R/L is OFF, the R/L screen does not change automatically. Touch the RL tab (8) to switch the measurement screen. When PD measurement is set to ON (9), moving the nose block (10) to the right and left switches the screen.
8) Touching the "Clear" button (11) deletes the measurement data and returns to the measurement screen for the first lens.
9) When both lenses have been measured, the measurement result display screen (Reading screen) (Figure 4) automatically appears and the lens table is unlocked. When AUTO VIEW is set to OFF, touch the “Reading” button (12) to display the measurement result display screen (Reading screen) (Figure 4).
10) Touching the "Exit" button (13) deletes the all measurement data and returns to the measurement screen for the first lens.

3.3.3 Automatic detection of a progressive power lens

Note

■ ***Place the approximate center of the lens on the nose piece for measuring optical glasses to detect the progressive area. The instrument may not be able to correctly detect a progressive lens from a peripheral section of the lens even when set.***

■ ***When the addition (ADD value) is 1D or lower, automatic judgment may not be possible.***



(Figure 1)

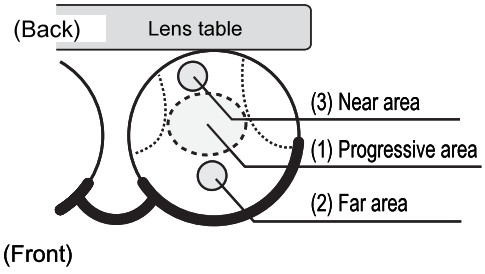
When the AUTO PROG function is ON and a progressive power lens is placed on the nose piece for optical glasses in Normal mode, the instrument automatically detects the lens as a progressive power lens, displays “PROG” in the target area, and switches the measurement mode to PROG. Refer to “3.5 Setting measurement conditions” for setting the AUTO PROG function.

3.3.4 Measuring a progressive power lens (PROG mode)

a) Measurement procedures

Note

■ ***When removing the lens while reading the far area or near area the screen automatically returns to the progressive area detection screen.***



(Figure 1)

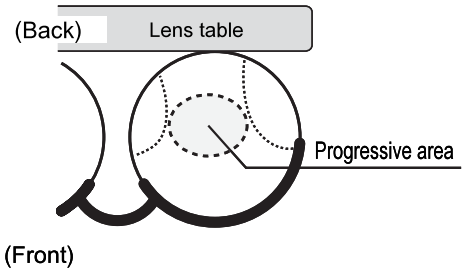
Measurement is conducted according to the steps below.

(1) Detecting the progressive area

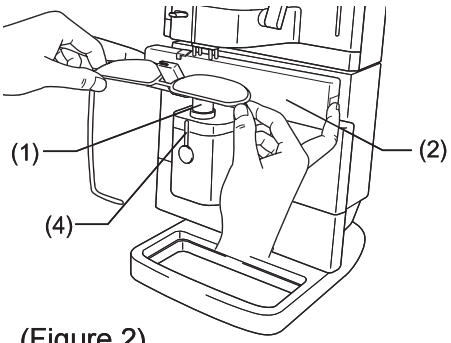
(2) Measuring the far area

(3) Measuring the near area

b) Detecting the progressive area



(Figure 1)



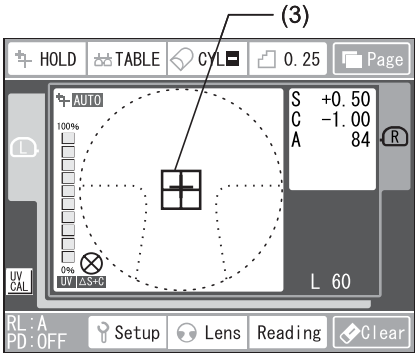
(Figure 2)

Detect the progressive area first.

1) Measure the lens on the RL measurement screen. (Refer to “2.5 Operation buttons.”)
2) Select “Prog” on the measurement mode selection screen. (Refer to “3.3.1 Selecting the measurement mode.”)
3) Place the lens on the nose piece for measuring optical glasses (1) so that the front faces up and the far area is nearest to you, move the lens table (2), and measure the lens while the lower edges of both sides of the optical frame contact the lens table (2).
4) Slowly move the lens to align the target (3) with the center of the target area. Bring the progressive area onto the nose piece for measuring optical glasses (1). When the progressive area is detected, a buzzer goes off and the screen changes to measure the far area.

Note

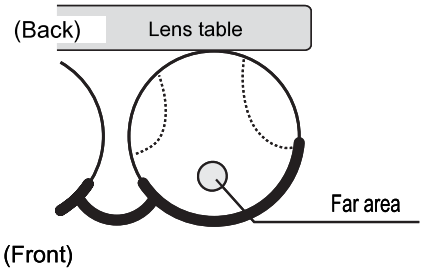
■ ***When the addition is small, the target may not come to the center of the target area. In this case, align the approximate center of the lens with the nose piece for measuring optical glasses and touch the “HOLD” button (4).***



(Figure 3)

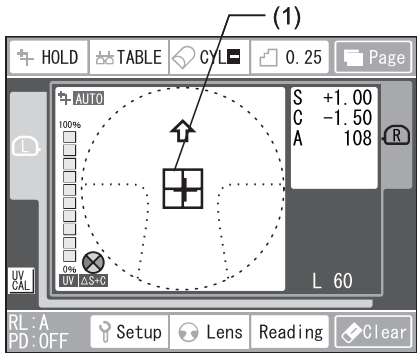
c) Measuring the far area

Measure the far area.

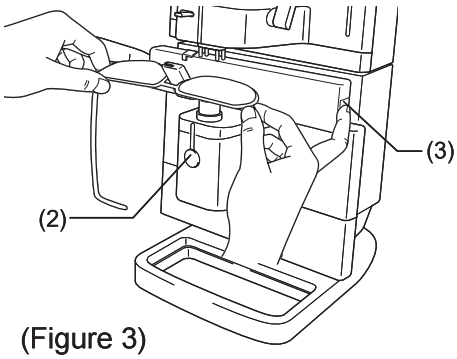


(Figure 1)

1) The far area is nearest to you. Move the lens to the back to bring the target (1) to the center.
2) When the AUTO HOLD function is ON, the far area value is automatically read when the target (1) is aligned with the optical center . When the AUTO HOLD function is OFF, touch the "HOLD" button (2) to read the value. Refer to “3.5 Setting measurement conditions” for setting the AUTO HOLD function.
3) When the far area value has been read, the screen changes to measure the near area.



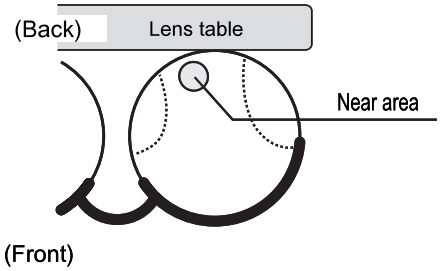
(Figure 2)



(Figure 3)

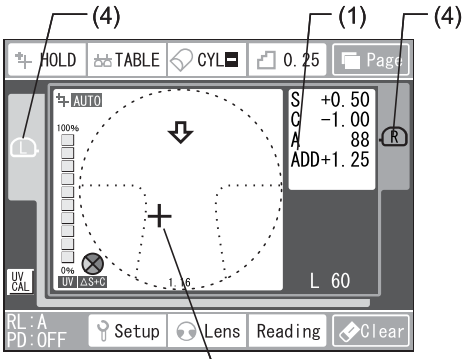
d) Measuring the near area

Measure the near area last.

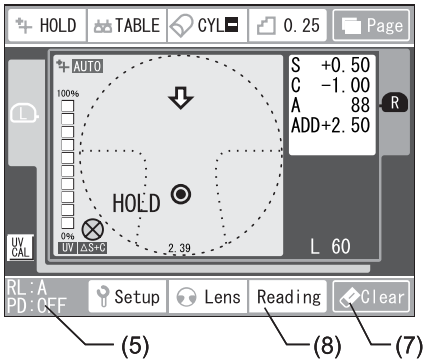


(Figure 1)

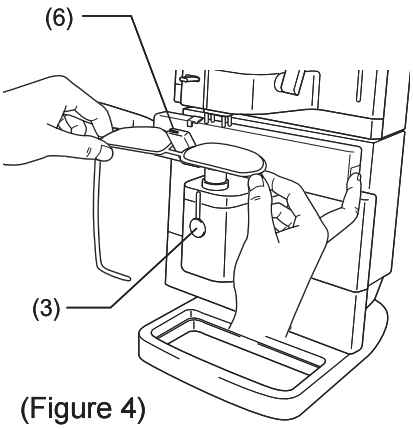
1) When the screen changes to measure the near area, the addition (ADD value) (1) appears.
2) Move the lens toward you so that the target (2) is always in the progressive area. The target moves downward according to the addition.



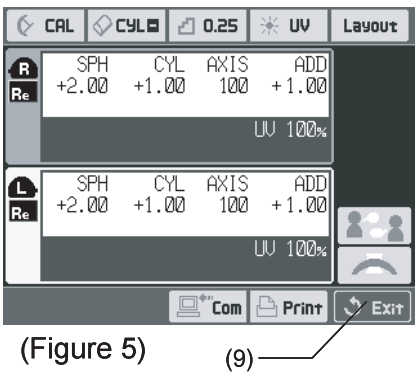
(Figure 2)



(Figure 3)



(Figure 4)



(Figure 5)

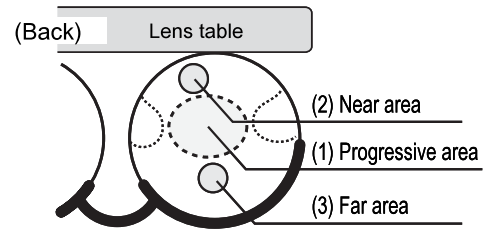
3) The target (2) shape changes from “+” to “○” as it approaches the near area. Move the lens toward you slightly, or to the left or right.
4) The target changes to “◎” when the near area is detected.
5) When the AUTO HOLD function is ON, a buzzer goes off and the addition is automatically read. When the AUTO HOLD function is OFF, touch the "HOLD” button (3) to read the value. Refer to “3.5 Setting measurement conditions” for setting the AUTO HOLD function.
6) When the lens is removed from the nose piece for measuring optical glasses, the target disappears; if the AUTO R/L function is set to ON, the instrument starts to measure the other lens when the lens is set again. When the AUTO R/L is OFF, the R/L screen does not change automatically. Touch the RL tab (4) to change the measurement screen. When PD measurement is set to ON (5), moving the nose block (6) to the left and right switches the screen.
7) Touching the "Clear" button (7) deletes the measurement data and returns to the measurement screen for the first lens.
8) When both lenses have been measured, the measurement result display screen (Reading screen) (Figure 5) automatically appears. When AUTO VIEW is set to OFF, touch the “Reading” button (8) to display the measurement result display screen (Reading screen) (Figure 5).
9) Touching the "Exit" button (9) deletes the all measurement data and returns to the measurement screen for the first lens.

3.3.5 Measuring a progressive power lens exclusively for near area (PROG [near] mode)

a) Measurement procedures

Note

■ ***When removing the lens while reading the near area or far area, the screen automatically returns to the progressive area detection screen.***

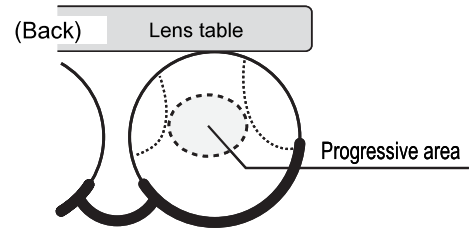


(Figure 1)

Measurement is conducted according to the steps below.

(1) Detecting the progressive area
(2) Measuring the near area
(3) Measuring the far area

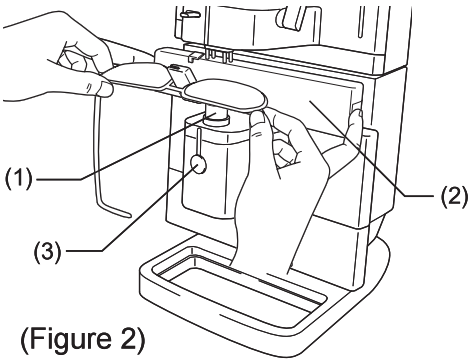
b) Detecting the progressive area



(Figure 1)

Detect the progressive area first.

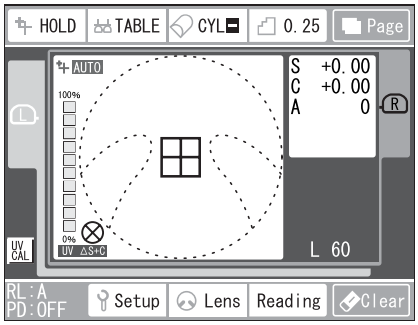
1) Measure the lens on the RL measurement screen. (Refer to “2.5 Operation buttons.”)
2) Select “Prog [near]” on the measurement mode selection screen. (Refer to “3.3.1 Selecting the measurement mode.”)
3) Place the lens on the nose piece for measuring optical glasses (1) so that the front faces up and the far area is nearest to you, move the lens table (2), and measure the lens while the lower edges of both sides of the optical frame contact the lens table (2).
4) Slowly move the lens to align the target with the center of the target area. Bring the progressive area onto the nose piece for measuring optical glasses. When the progressive area is detected, a buzzer goes off and the screen changes to measure the far area.



(Figure 2)

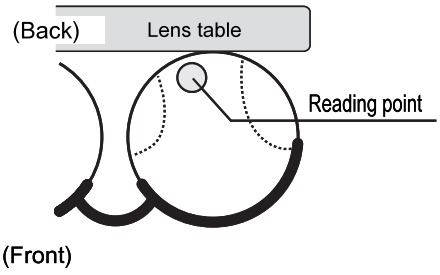
Note

■ ***When the addition is small, the target may not come to the center of the target area. In this case, align the approximate center of the lens with the nose piece for measuring optical glasses and touch the “HOLD” button (3).***



(Figure 3)

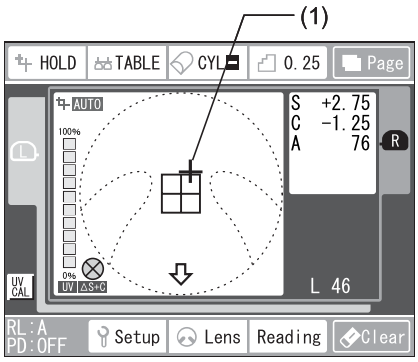
c) Measuring the near area



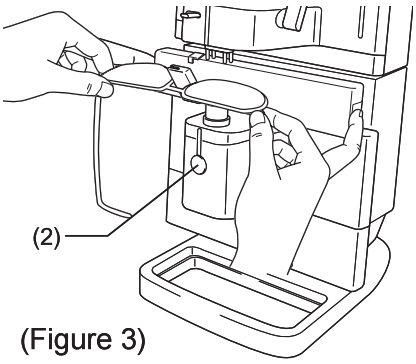
(Figure 1)

Measure the near area next.

1) Move the lens to align the target (1) with the center of the target area. Because the near area is on the far side, move the lens toward you.
2) When the AUTO HOLD function is ON, the near area value is automatically read when the target (1) is aligned with the optical center. When the AUTO HOLD function is OFF, touch the "HOLD" button (2) to read the value. Refer to “3.5 Setting measurement conditions” for setting the AUTO HOLD function.
3) When the near area value has been read, the screen changes to measure the far area.

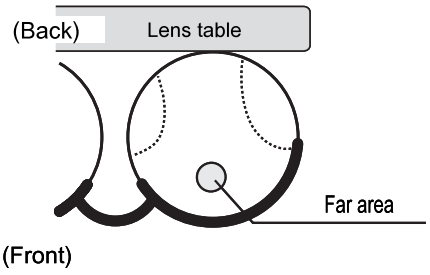


(Figure 2)



(Figure 3)

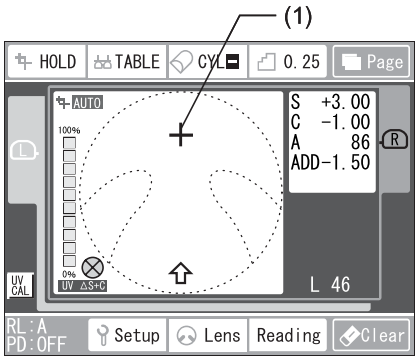
d) Measuring the far area



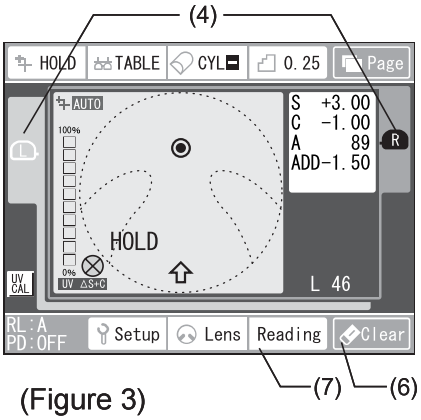
(Figure 1)

Measure the far area last.

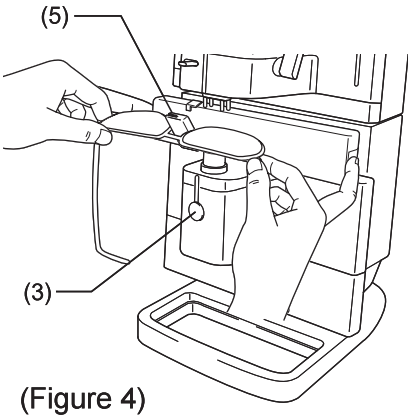
1) When the screen changes to measure the near area, the addition (ADD value) (1) appears.
2) Move the lens to the back so that the target (2) is always in the progressive area. The target (2) moves downward according to the addition.
3) The target (2) shape changes from “+” to “○” as it approaches the far area. Move the lens to the back slightly, or to the left or right.



(Figure 2)



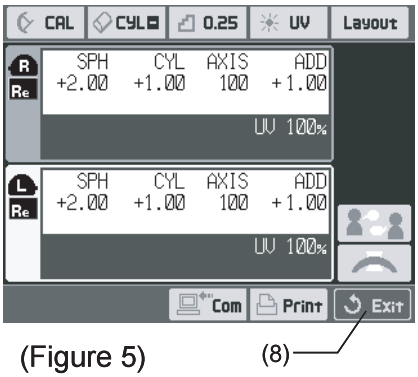
(Figure 3)



(Figure 4)

4) The target changes to "◎" when the far area is detected.
5) When the AUTO HOLD function is ON, a buzzer goes off and the addition is automatically read. When the AUTO HOLD function is OFF, touch the "HOLD" button (3) to read the addition. Refer to "3.5 Setting measurement conditions" for setting the AUTO HOLD function.
6) When the lens is removed from the nose piece for measuring optical glasses, the target disappears; if the AUTO R/L function is set to ON, the instrument starts to measure the other lens when the lens is set again. When the AUTO R/L is OFF, the R/L screen does not change automatically. Touch the RL tab (4) to change the measurement screen. When PD measurement is set to ON, moving the nose block (5) to the left and right switches the screen.
7) Touching the "Clear" button (6) deletes the measurement data and returns to the measurement screen for the first lens.
8) When both lenses have been measured, the measurement result display screen (Reading screen) (Figure 5) automatically appears. When AUTO VIEW is set to OFF, touch the "Reading" button (7) to display the measurement result display screen (Reading screen) (Figure 5).
9) Touching the "Exit" button (8) deletes the all measurement data and returns to the measurement screen for the first lens

.



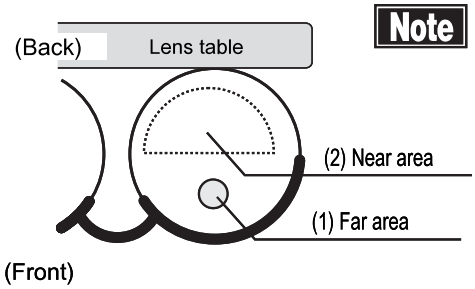
(Figure 5)

Note

■ ***The target shape does not change to "○" or "◎" for some types of lens. In this case, regard the position where the negative addition is largest to be the far area and touch the "HOLD" button while the target is in the progressive area.***

3.3.6 Measuring bifocal lens

a) Measurement procedures



(Figure 1)

Note

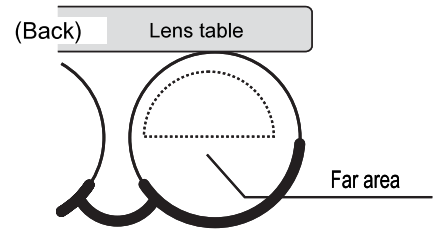
■ ***When removing the lens while reading the far area or near area, the screen automatically returns to the far area measurement screen.***

Measurement is conducted according to the steps below.

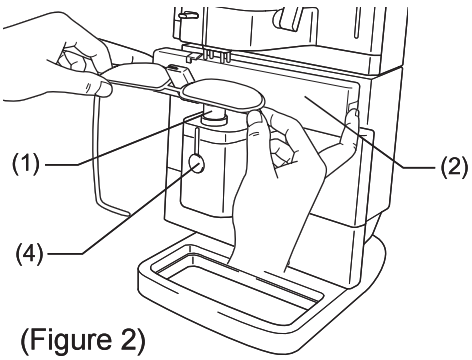
(1) Measuring the far area
(2) Measuring the near area

b) Measuring the far area

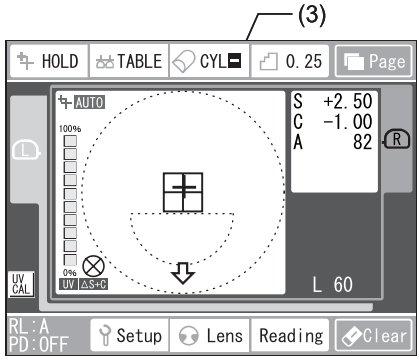
Measure the far area first.



(Figure 1)



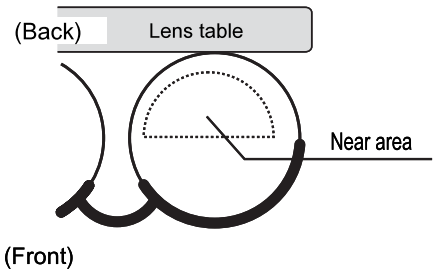
(Figure 2)



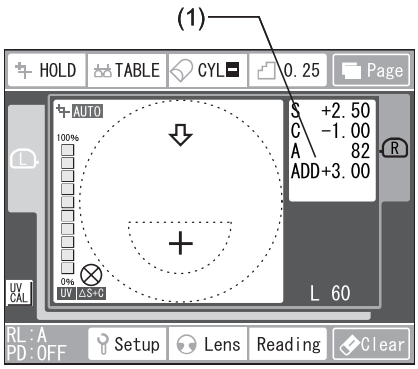
(Figure 3)

1) Measure the lens on the RL measurement screen. (Refer to “2.5 Operation buttons.”)
2) Select “Bi-focal” on the measurement mode selection screen. (Refer to “3.3.1 Selecting the measurement mode.”)
3) Place the lens on the nose piece for measuring optical glasses (1) so that the front faces up and the far area is nearest to you, move the lens table (2), and measure the lens while the rim of the optical frame contacts the lens table (2).
4) The far area is nearest to you. Move the lens to the back to bring the target (3) to the center.
5) When the AUTO HOLD function is ON, the far area value is automatically read when the target (3) is aligned with the optical center. When the AUTO HOLD function is OFF, touch the "HOLD” button (4) to read the value. Refer to “3.5 Setting measurement conditions” for setting the AUTO HOLD function.
6) When the far area value has been read, the screen changes to measure the near area.

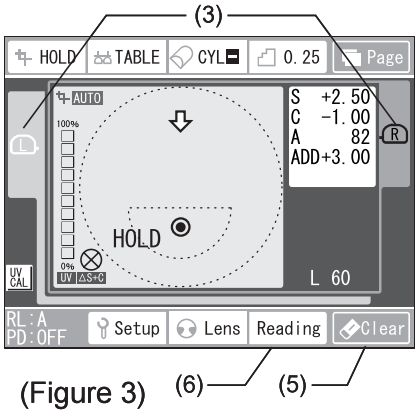
c) Measuring the near area



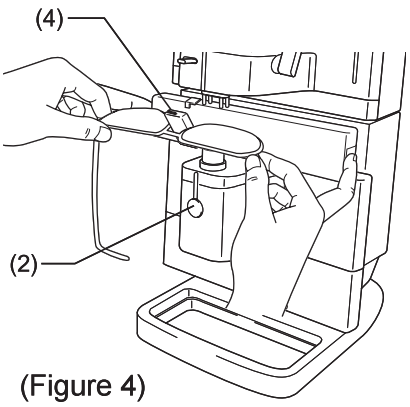
(Figure 1)



(Figure 2)



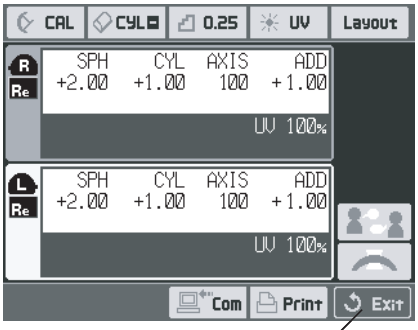
(Figure 3)



(Figure 4)

Measure the near area last.

1) When the screen changes to measure the near area, the addition (ADD value) (1) appears.
2) Move the lens toward you to align for the near vision lens with the nose piece for measuring optical glasses.
3) The target mark changes to “◎” when aligned with the optical center of the near area.
4) When the AUTO HOLD function is ON, a buzzer goes off and the addition is automatically read. When the AUTO HOLD function is OFF, touch the "HOLD” button (2) to read the value. Refer to “3.5 Setting measurement conditions” for setting the AUTO HOLD function.
5) When the lens is removed from the nose piece for measuring optical glasses, the target disappears; if the AUTO R/L function is set to ON, the instrument starts to measure the other lens when the lens is set again. When the AUTO R/L is OFF, the R/L screen does not change automatically. Touch the RL tab (3) to change the measurement screen. When PD measurement is set to ON, moving the nose block (4) to the left and right switches the screen.
6) Touching the "Clear" button (5) deletes the measurement data and returns to the measurement screen for the first lens.
7) When both lenses have been measured, the measurement result display screen (Reading screen) (Figure 5) automatically appears. When AUTO VIEW is set to OFF, touch the “Reading” button (6) to display the measurement result display screen (Reading screen) (Figure 5).
8) Touching the "Exit" button (7) deletes all the measurement data and returns to the measurement screen for the first lens.

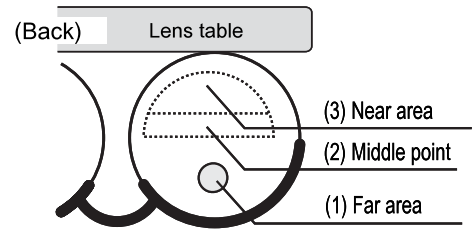

CAL
CYL
0.25
UV
Layout
R
Re
SPH CYL AXIS ADD
+2.00 +1.00 100 +1.00
UV 100%
L
Re
SPH CYL AXIS ADD
+2.00 +1.00 100 +1.00
UV 100%
Com
Print
Exit
(7)

(Figure 5)

3.3.7 Measuring trifocal lens

a) Measurement procedures

Note ■ ***When removing the lens while reading the far area, middle point, or near area, the screen automatically returns to the far area measurement screen.***

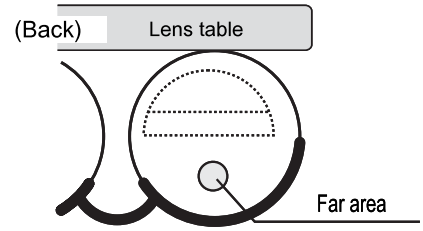


(Figure 1)

Measurement is conducted according to the steps below.

(1) Measuring the far area
(2) Measuring the middle point
(3) Measuring the near area

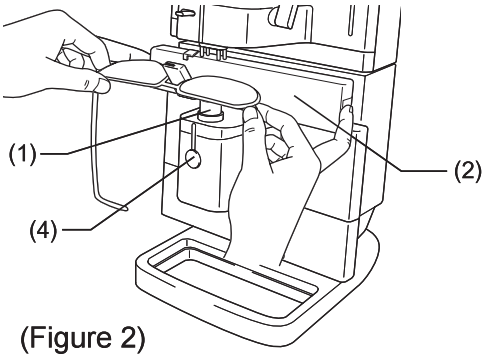
b) Measuring the far area



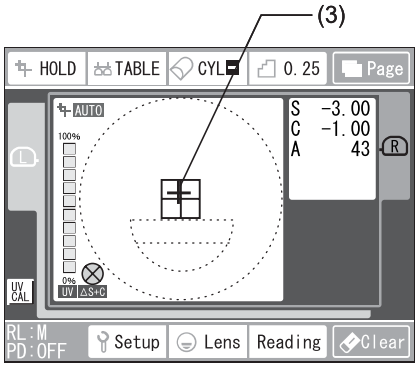
(Figure 1)

Measure the far area first.

1) Measure the lens on the RL measurement screen. (Refer to “2.5 Operation buttons.”)
2) Select “Tri-focal” on the measurement mode selection screen. (Refer to “3.3.1 Selecting the measurement mode.”)
3) Place the lens on the nose piece for measuring optical glasses (1) so that the front faces up and the far area is nearest to you, move the lens table (2), and measure the lens while the lower edges of both sides of the optical frame contact the lens table (2).
4) The far area is nearest to you. Move the lens to the back to bring the target (3) to the center.
5) When the AUTO HOLD function is ON, the far area value is automatically read when the target (3) is aligned with the optical center. When the AUTO HOLD function is OFF, touch the "HOLD” button (4) to read the value. Refer to “3.5 Setting measurement conditions” for setting the AUTO HOLD function.
6) When the far area value has been read, the screen changes to measure the near area.

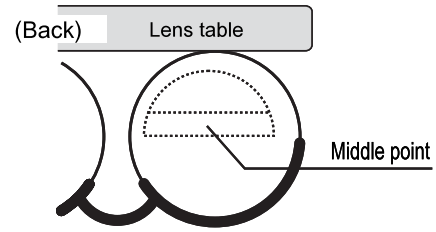


(Figure 2)



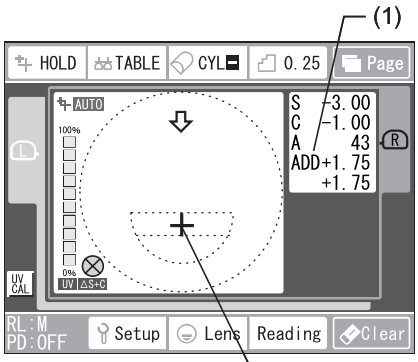
(Figure 3)

c) Measuring the middle point

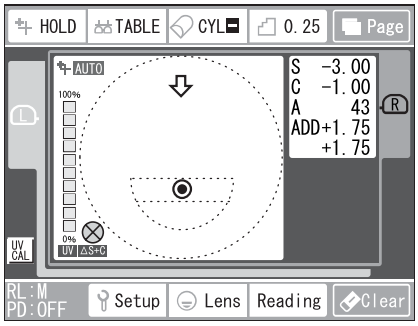


(Front)

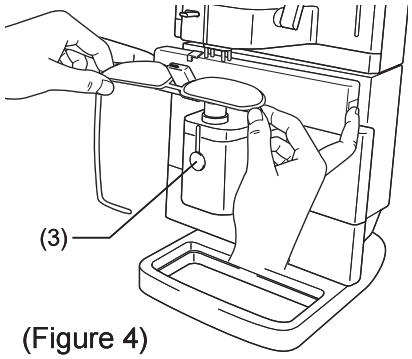
(Figure 1)



(Figure 2)



(Figure 3)



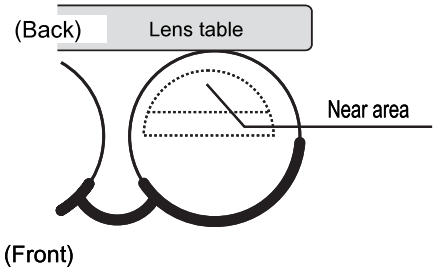
(Figure 4)

Measure the middle point next.

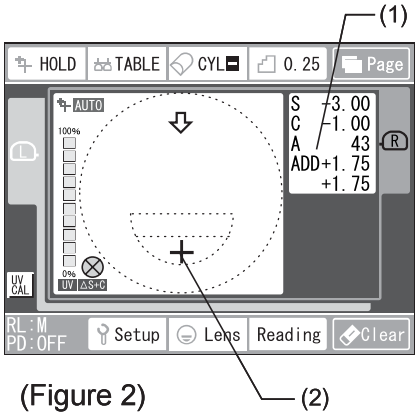
1) When the screen changes to measure the middle point, the addition (ADD value) (1) appears.
2) Move the lens toward you to align the middle-point lens with the nose piece for measuring optical glasses.
3) The target (2) changes to "◎" when aligned with the optical center of the middle point.
4) When the AUTO HOLD function is ON, the far area value is automatically read when the target (2) is aligned with the optical center. When the AUTO HOLD function is OFF, touch the "HOLD" button (3) to read the value. Refer to "3.5 Setting measurement conditions" for setting the AUTO HOLD function.
5) After the middle point value has been read, the screen changes to the near area measurement screen.

d) Measuring the near area

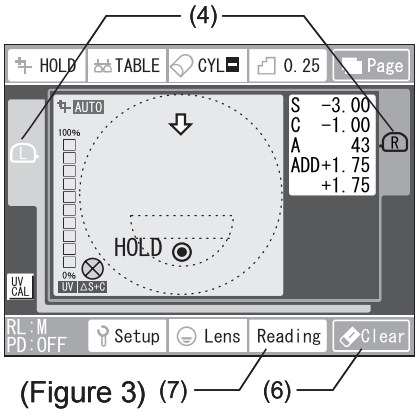
Measure the near area last.



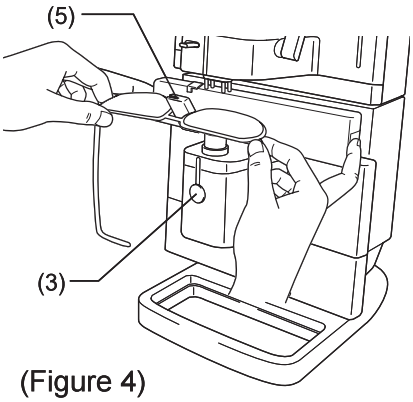
(Figure 1)



(Figure 2)

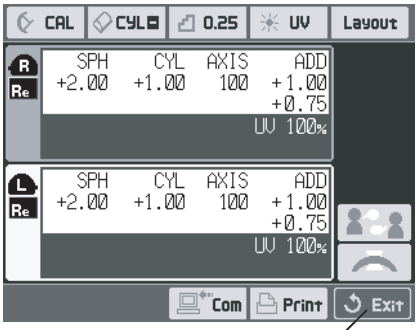


(Figure 3)



(Figure 4)

1) When the screen changes to measure the near area, the addition (ADD value) appears.
2) Move the lens toward you to align for the near vision lens with the nose piece.
3) The target mark changes to “◎” when aligned with the optical center of the near area.
4) When the AUTO HOLD function is ON, the near area value is automatically read when the target (2) is aligned with the optical center. When the AUTO HOLD function is OFF, touch the "HOLD” button (3) to read the value. Refer to “3.5 Setting measurement conditions” for setting the AUTO HOLD function.
5) When the lens is removed from the nose piece for measuring optical glasses, the target disappears; if the AUTO R/L function is set to ON, the instrument starts to measure the other lens when the lens is set again. When the AUTO R/L is OFF, the R/L screen does not change automatically. Touch the RL tab (4) to change the measurement screen. When PD measurement is set to ON, moving the nose block (5) to the left and right switches the screen.
6) Touching the "Clear" button (6) deletes the measurement data and returns to the measurement screen for the first lens.
7) When both lenses have been measured, the measurement result screen (Reading screen) (Figure 5) automatically appears. When AUTO VIEW is set to OFF, touch the “Reading” button (7) to display the measurement result display screen (Reading screen) (Figure 5).
8) Touching the "Exit" button (8) deletes all the measurement data and returns to the measurement screen for the first lens.



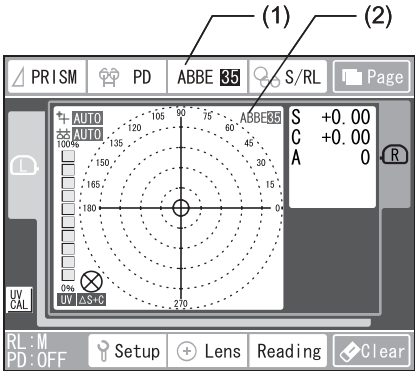
(Figure 5)

3.3.8 Measuring high refractive index lens

It is recommended to use high refractive index lens mode when measuring a high refractive index lens. Refer to "3.3.2 Measuring a mono-focal lens" and other relevant sections for details of measuring procedures.

Note

- ***Because the reference wavelength of the lens is different from the wavelength of the LED that this instrument uses as the measurement light source, errors may occur in the value measured for a high refractive index lens.***
- ***When not using high refractive index lens measurement mode, the ABBE number is always set to 60.***



(Figure 1)

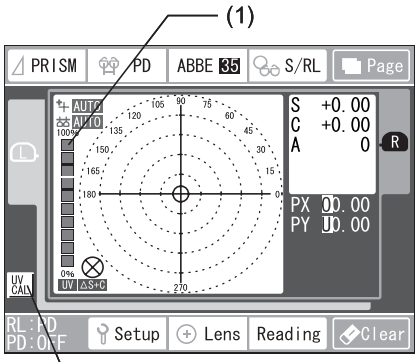
1) Set the ABBE number. Refer to "3.5 Setting measurement conditions" for the setting procedures.
2) Touch the "ABBE" button (1) in operation button menu 2 to change the measurement mode to high refractive index lens mode. The ABBE number (2) appears in the upper right corner of the target area. In this case, the measured value is automatically corrected based on the set ABBE number.

3.3.9 Function for measuring UV transmissivity

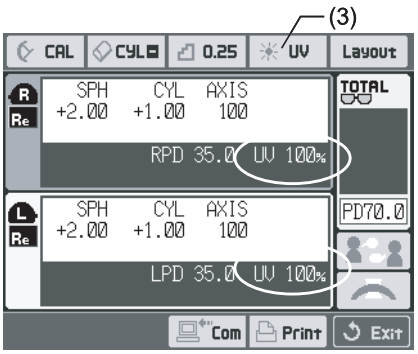
The UV transmissivity of a lens can be dispayed using a bar graph to check whether the lens is UV-cut coated.

Note

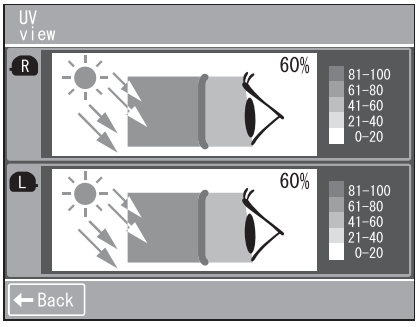
- ***The transmissivity for a wavelength of 385 nm is measured. The value displayed on this screen is not the transmissivity for the entire UV range.***
- ***When measuring the UV transmissivity, align the lens with the optical center. (Align the target with the center. The UV transmissivity cannot be measured correctly at a point away from the optical center. The UV transmissivity may be 0% at a point far from the optical center even though the lens is not UV-cut coated.***



(Figure 1)



(Figure 2)



(Figure 3)

1) Set “UV” to ON. (Refer to “3.5 Setting measurement conditions.")
2) The UV transmissivity bar graph (1) is displayed to the left of the target area when measuring the right lens and to the right when measuring the left lens.
3) When the bar graph (1) does not indicate 100% with no lens on the nose piece for measuring optical glasses, touch the “UV CAL" button (2) to calibrate the bar graph to 100%.
4) The UV transmissivity is measured simultaneously when measuring the dioptry of the lens. A larger value in the bar graph (1) means a higher UV transmissivity. When the bar graph (1) indicates 0%, the lens is UV-cut coated.
5) The measured UV transmissivity is recorded simultaneously with other measurement data and can be checked on the measurement result display screen (Figure 2). The UV transmissivity can also be printed.
6) Touching the “UV” button (3) on the measurement result display screen (Figure 2) displays the UV transmissivity display screen (Figure 3).

3.3.10 Measuring contact lens (CL mode; CL Holder mode)

Note

■ ***Always measure contact lenses in CL mode or CL Holder mode with the nose piece for measuring contact lenses attached. Errors occur in measured values in Normal (optical lens measurement) mode. (Refer to "3.2.9 Replacing the nose piece.")***

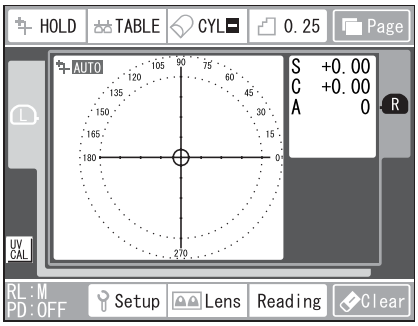
■ ***The cylindrical dioptry ("C" value) may be measured for a contact lens used for a long period because the lens has deformed.***

a) Measuring a hard contact lens (using the hard CL holder)

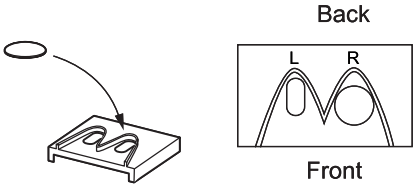
Note

■ ***The following types of contact lenses can be measured using the hard CL holder. When measuring lenses other than those listed below, place the lens directly on the nose piece for measuring contact lenses without using the holder and conduct measurement in CL mode; otherwise large measurement errors may be introduced.***

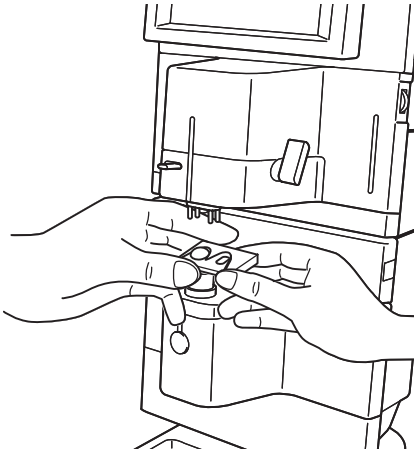
- Power : -15D - +15D
- Base curve : 7.35mm - 8.25mm
- Diameter : 8.0 mm - 9.6 mm



(Figure 1)



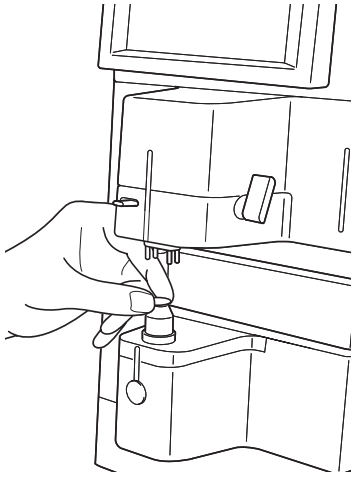
(Figure 2)



(Figure 3)

1) Select "CL Holder" on the measurement mode selection screen. (Refer to "3.3.1 Selecting the measurement mode.")
2) Place a hard contact lens on the hard CL holder with the outer surface of the lens facing up. (Place the right lens on the "R" holder and left lens on the "L" holder.)
3) Place the contact lens on the nose piece for measuring contact lenses so that the character ("R" or "L") of the hard CL holder is on the back, and secure the lens with the lens guide.
4) Move the holder to center the lens. Follow the measurement procedures for a mono-focal lens. (Refer to "3.3.2 Measuring mono-focal lens.")

b) Measuring a hard contact lens (without using the hard CL holder)

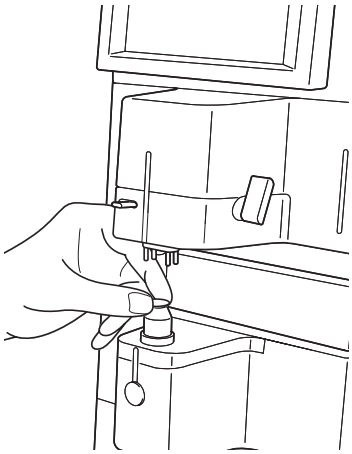


(Figure 1)

1) Select “CL” on the measurement mode selection screen. (Refer to “3.3.1 Selecting the measurement mode.”)
2) Place a contact lens on the nose piece for measuring contact lens with the outer surface of the lens facing up.
3) Move the lens to center it. Follow the measurement procedures for a mono-focal lens. (Refer to “3.3.2 Measuring mono-focal lens.”)

d) Measuring a soft contact lens

Note ■ ***Because it is difficult to maintain the proper shape of the lens due to the nature of the lens, precise measurement is difficult.***



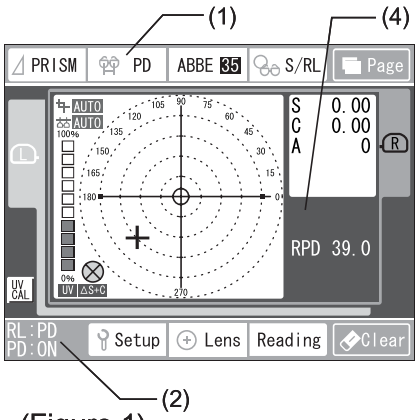
(Figure 1)

1) Select “CL” on the measurement mode selection screen. (Refer to “3.3.1 Selecting the measurement mode.”)
2) Wipe any water from the contact lens.
3) Place a soft contact lens on the nose piece for measuring contact lenses with the outer surface of the lens facing up.
4) Move the lens to center it. Follow the measurement procedures for a mono-focal lens. (Refer to “3.3.2 Measuring mono-focal lens.”)

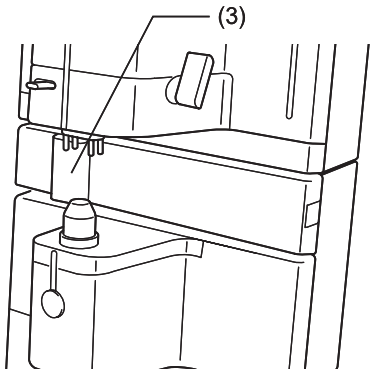
3.3.11 Measuring the pupil distance (PD)

Note

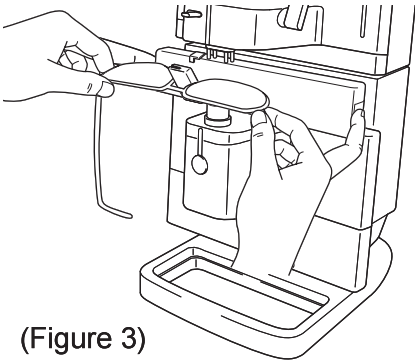
- ■ ***The PD cannot be measured on the single lens measurement screen.***
- ■ ***Firmly apply the PD measurement nose block to the pad of the optical frame to ensure correct measurement.***
- ■ ***Always take measurements while the bottom edges of both sides of the optical frame contact the lens table to ensure correct measurement.***



(Figure 1)



(Figure 2)



(Figure 3)

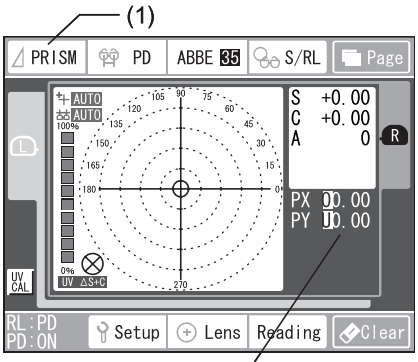
(Figure 4)

1) Measure the lens on the RL measurement screen. (Refer to “2.5 Operation buttons.”)
2) Touch the “PD” button (1) of operation button menu 2 to activate the PD measurement function. Touching the “PD” button (1) activates and deactivates “PD Display (2).”
   [PD: NA] : PD measurement is deactivated.
   [PD: OFF] : PD measurement is activated.
   [PD: ON] : When PD measurement is activated and the nose block is used
3) Unlock the nose block (3), tilt it toward you, and move it slightly to the right. The PD value (4) is displayed on the screen. When the RPD or LPD value is not displayed while measuring the PD, move the nose block to the left end and then again to the right.
4) Apply the pad to the PD measurement nose block, holding the top of the optical frame toward you.
5) Place the lens to be measured on the nose piece for measuring optical glasses, with the front facing up. The instrument automatically switches right or left (R/L) according to the position of the nose block.
6) Unlock the lens table and measure the lens while the bottom edges of both sides of the optical frame contact the lens table (Figure 3). Refer to the measurement procedures for the appropriate lens type.
7) PRD, LPD and the PD value are displayed in the measurement result display (Figure 4).

3.3.12 Measuring the prism

Note

■ ***When there is a prism, the target is not aligned with the center of the target area because of the prismatic power, and the AUTO HOLD function is not available.***



(Figure 1)

Refer to “4. TECHNICAL INFORMATION” for the prism and refraction.

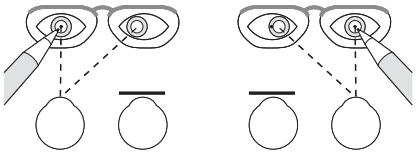
The prism can be indicated in the following three ways. Touch the prism button (1) of operation button menu 2 to select how to display the prism. Touching the prism button (1) alters the prism (2) display. Set TOTAL PRISM display to show the total prismatic power of right and left lenses. (Refer to “3.5 Setting measurement conditions.")

- Orthogonal coordinates: PX, PY (△)
  Prism symbols represent the base direction as follows.
  O (base out) : Outward
  I (base in) : Inward
  U (base up) : Upward
  D (base down) : Downward

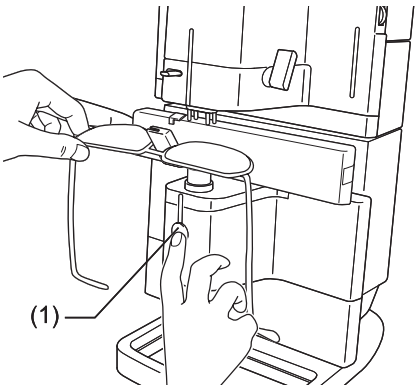
- Polar coordinates: PSM, BAS (△, deg.)
  PSM : Absolute prismatic power (△)
  BAS : Base direction (angle in degrees)

- Eccentricity: DCX, DCY (mm)
  The distance from the current measurement position of the lens to the optical center is indicated in the X (horizontal) and Y (vertical) directions.
  DCX : Eccentricity in the X (horizontal) direction (mm)
  DCY : Eccentricity in the Y (vertical) direction (mm)
  When Total PRISM is set to ON, the total prismatic power of the right and left is displayed.
  P-H : Prismatic power in the horizontal direction
  P-V : Prismatic power in the vertical direction
  * The prismatic power in the vertical direction indicates the value based on the right eye.

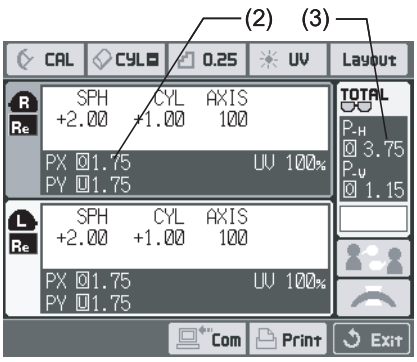
a) Measuring the prism of a mono-focal lens



(Figure 1)



(Figure 2)



(Figure 3)

1) The examiner and the patient face each other, approximately 40 cm apart.
2) The examiner covers their right eye and instructs the patient to look at the examiner's left eye.
3) Mark a small dot (1-mm diameter or smaller) on the right lens to indicate the center of the pupil.
4) The examiner covers their left eye and instructs the patient to look at the examiner's right eye.
5) Similar to the right lens, mark a small dot (1-mm diameter or smaller) on the left lens to indicate the center of the pupil.
6) Set the position of the marked dot and touch the “HOLD” button (1) to measure the prismatic power. The target appears at a point outside the center of the target area according to the measured prismatic power.
7) Repeat these steps to measure the left lens.
8) When both lenses have been measured, the measurement result display screen (Figure 3) automatically appears to show the prismatic power of the left and right lenses (2). When TOTAL PRISM display is set to ON, the total prismatic power of both lenses appears in the TOTAL column (3).

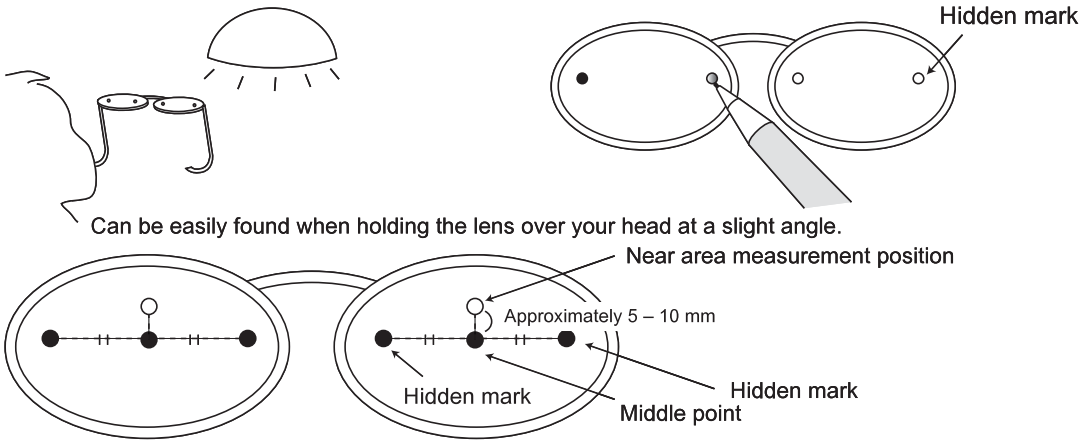
b) Measuring the upper/lower prism of a mono-focal lens

1) Measure the optical center (position where both the upper and lower prism is 0.0△) of the right lens. Measure the lens while the bottom edges of both sides of the optical frame contact the lens table.
2) Press the table lock button to lock the lens table at the position where the right lens was measured.
3) Measure the left lens. While the bottom edges of both sides of the optical frame contact the lens table, place the left lens on the nose piece and align the target in the horizontal direction only.

4) If the target appears at a point above or below the center of the target area, the lens has prisms. When the target is aligned with the center of the target area, there is no upper or lower prism.
5) Touch the “HOLD” button to measure the prismatic power of the left lens. When the TOTAL PRISM function is ON, the total upper/lower prismatic power of the examined glasses is shown.

c) Measuring the prism of a mono-focal lens

1) Mark a dot at the position for measuring the far area. Hold the lens to be examined up toward a light to find the two hidden marks, and mark these two marks and the center between them with a marker.
2) Then mark a dot at a position approximately 5 - 10 mm above the marked center dot as the point for measuring the far area.



3) Set the marked position for measuring the far area on the nose piece for measuring optical glasses and touch the “HOLD” button to take the measurement. The target appears at a point outside the center of the target area according to the measured prismatic power. * The prismatic degree and power of the far area vary depending on the position of the measured point. When measuring the prism in this manner, consider possible errors beforehand.

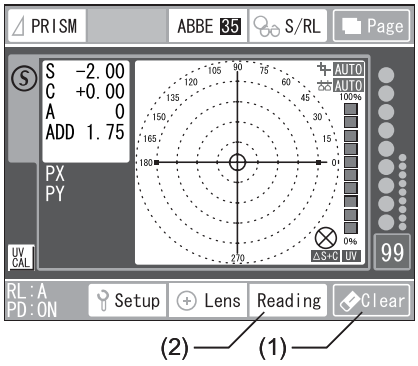
3) Measuring near area

When measuring the near area, locate the position where the target cursor changes to "◎" and measure the addition.

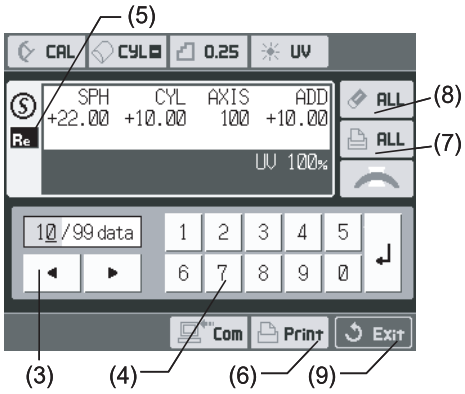
3.3.13 Measuring lens on the single lens measurement screen

Note

■ ***TOMEY Link and Data Transfer functions are not available on the single lens measurement screen.***



(Figure 1)



(Figure 2)

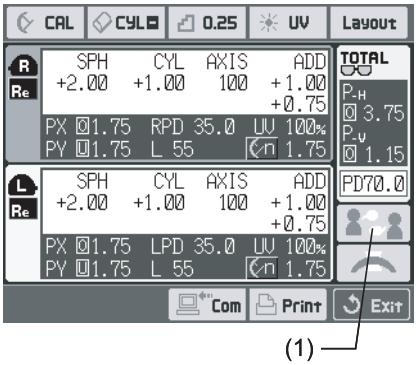
1) The single lens measurement screen (Figure 1) appears. (Refer to “2.5 Operation buttons.”)
2) Select the measurement mode appropriate for the lens to be measured on the measurement mode selection screen. (Refer to “3.3.1 Selecting the measurement mode.”)
3) Measure the lens. The procedures vary depending on the lens type. Refer to the pages describing the corresponding measurement procedures.
4) Replace the lens with another and measure it. Data for up to 99 measurements can be saved.
5) The latest measurement data is deleted every time the “Clear” button (1) is touched.
6) Touch the “Reading” button (2) to display the measurement result display screen (Figure 2).
7) Select optional data using the arrow button (3) or keypad (4) and touch the “Retake” button (5) to measure the selected data again.
8) Touch the “Print” button (6) to print the displayed data and the “All Print” button (7) to print all measurement data. The “ALL Print” button (7) changes to “Cancel” while printing all measurement data. Touch the “Cancel” button to stop printing the data.
9) Touch the “ALL Clear” button (8) to delete all data.
10) Touch the “Exit” button (9) to return to the measurement screen (Figure 1) with the measurement data retained.

3.3.14 Communication mode function

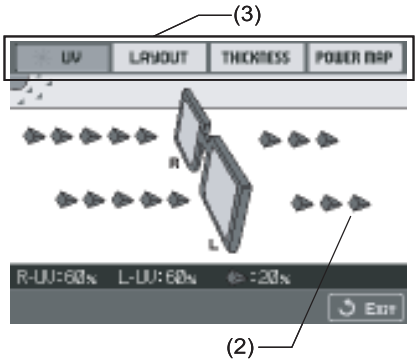
Note

■ ***Communication mode is used to explain the performance of the measured glasses to customers (patients).***

■ ***The functions in Communication mode are not available on the single lens measurement screen.***



(Figure 1)



(Figure 2)

1) After measuring the lens, the measurement result display screen (Figure 1) appears. (Refer to “2.5 Operation buttons.”)
2) Touch the “communication mode” button (1) to enter Communication mode. (Refer to “2.7 Measurement result display screen (Reading screen).")
3) The UV transmissivity display screen appears and the measured UV transmissivity is shown (Figure 2).

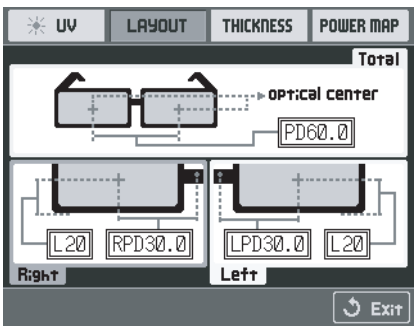
UV screen

The UV transmissivity is indicated using arrows (2) for easy visual understanding. One arrow represents UV transmissivity of 20%. The arrows shown on the left of the glasses in the center of the screen represent UV entering the glasses and the arrows shown on the right of the glasses represent the amount of UV after passing through the glasses (transmissivity). Because the transmissivity of a UV-cut coated optical lens is 0%, no arrows are shown on the right of the glasses.

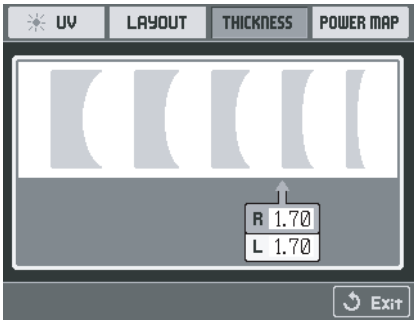
4) Touch any button on the top of the screen (3) to display another screen.

LAYOUT screen (Figure 3)

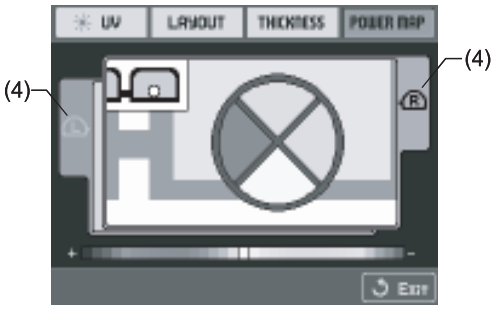
Displays the PD and L value of the measured glasses with illustrations. The position of the optical center of the optical lens is shown.



(Figure 3)



(Figure 4)



(Figure 5)

THICKNESS screen (Figure 4)

Graphically indicates the thickness of the optical lens of which the refractive index was measured. The relationship between the refractive index and thickness (edge thickness) is shown graphically, and the thickness of the measured optical glass can be easily explained.

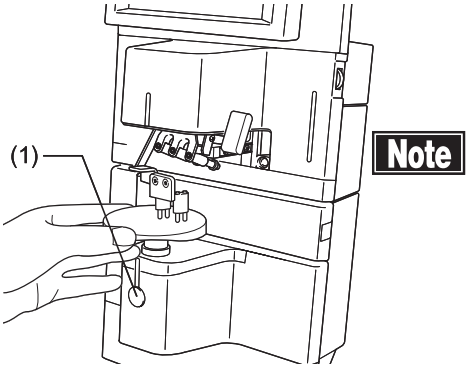
POWER MAP screen (Figure 5)

Displays the power distribution of the measured section of the lens using a color map. Touch the tabs (4) on the screen to switch the right and left lenses.
When moving the optical lens placed on the nose piece, the lens shown on the screen also moves accordingly. Colors on the top, bottom, right, and left of the map show the condition (deformation or damage) of the measured optical lens.

5) Touch the “Exit” button to return to the measurement result display screen (Figure 1).

3.4 Calculating refractive index of lens

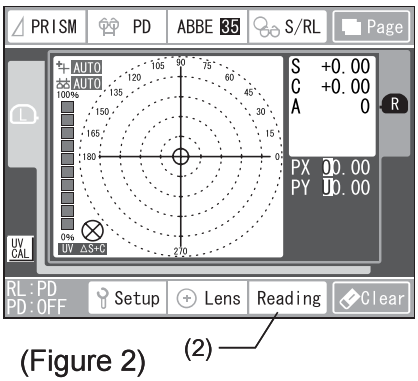
3.4.1 Refractive index calculation function



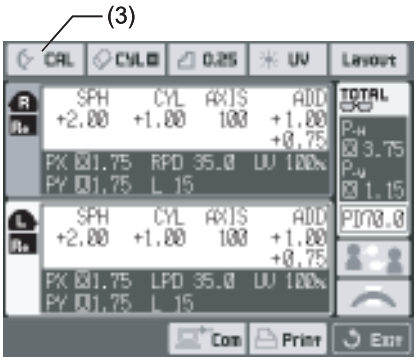
(Figure 1)

Use the spherometer to obtain the dioptry of the lens to be inspected.

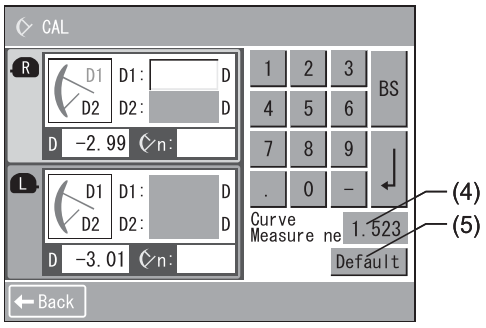
- ■ ***The dioptry of the spherometer here (D1 and D2) is the value obtained when the refractive index of the lens is 1.523. If the refractive index of the lens measured by your spherometer is not 1.523, set the appropriate refractive index for your spherometer. The refractive index of the spherometer may be changed within the range of 1.400 < ne < 1.900. The new values are saved in the memory and are retained even after turning power off.***
- ■ ***When measuring an aspherical lens, errors of 0.03 ~ 0.05 may occur in the calculated refractive index.***
- ■ ***When measuring a progressive power lens or progressive power lens for near area, enter the value read by the spherometer at the measured far area or the near area (for progressive power lens for near area). However, if a progressive area exists in the measured far area or near area, measurement cannot be completed correctly by the spherometer and errors may occur in the refractive index obtained.***



(Figure 2)

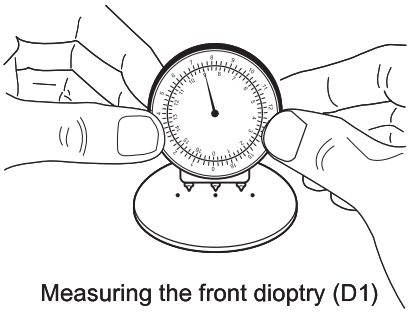


(Figure 3)



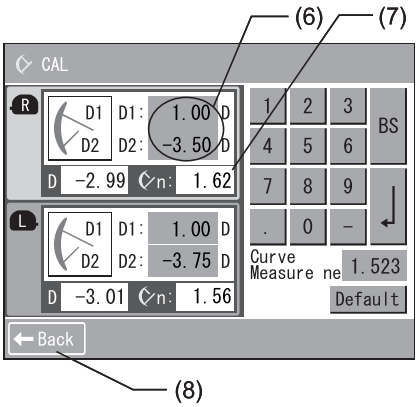
(Figure 4)

1) Set AUTO HOLD to OFF. (Refer to “3.5 Setting measurement conditions.")
2) Secure the lens with the lens guide when the target is aligned with the center.
3) Touch the “HOLD” button (1) to read the measurement data and then mark points on the lens. Refer to "3.4 Operation procedures for point marker, lens guide, and lens table" for details on operating the point marker.
4) Touch the “Reading” button (2) to display the measurement result display screen (Figure 3), and then the “CAL” button (3) to display the refractive index calculation screen (Figure 4).
5) Touch the refractive index field (4) to activate it and enter a value using the keypad when you need to change the refractive index. Touch the “Default” button (5) to reset the value to the default (1.523).

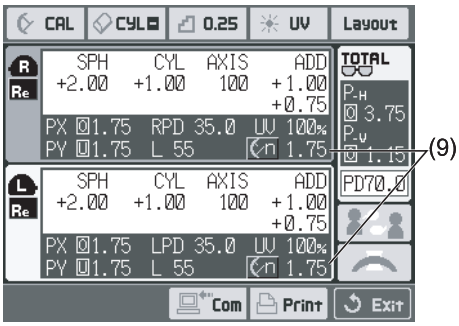


Measuring the front dioptry (D1)

(Figure 5)



(Figure 6)



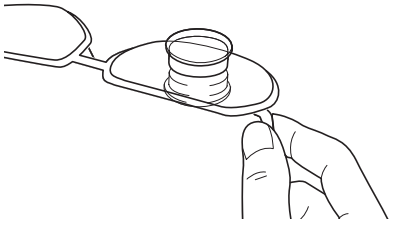
(Figure 7)

6) Remove the lens from the nose piece for measuring optical lenses and measure the dioptry of the lens with points marked using the spherometer.
7) Place the lens on the leveled table as shown on Figure 5 and apply the spherometer in the direction of the marked points. Read the value of the spherometer (D1: front dioptry). Repeat to measure the dioptry of the opposite side (reverse side) (D2: rear dioptry).
8) Touch the D1 or D2 (6) entry field to select an item to be entered and enter a value using the keypad to display the refractive index (7). Enter values from +25D to -25D for D1 and D2. Otherwise an error occurs and "ERROR!" appears in the calculation result. An error also occurs when the sum of D1 and D2 is 0.
9) Touch the “Back” button (8) to return to the measurement result display screen (Figure 7). The refractive index (9) appears.

3.4.2 Measuring refractive index using Refractive index estimation

Note

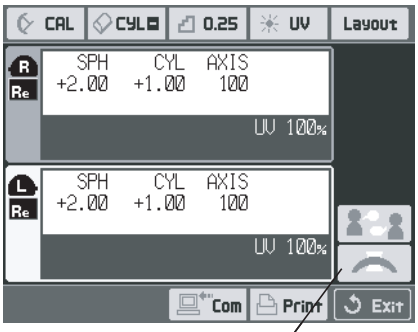
- ***“Refractive index estimation is used to measure refractive index by holding the lens between the glass included in the package and measuring gel.***
- ***There are two types of glass for attachment using gel: one for the front (large) and the other for the back (small). Be sure to use the correct type.***
- ***When releasing air trapped between the gel and lens, do not press the gel too hard, or the glass may be damaged. Pay careful attention.***



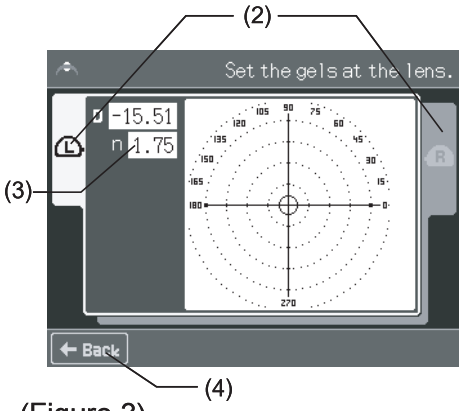
(Figure 1)

■ ***Attach the gel so that the front and rear gels are aligned at the center of the lens. Attach gels to the measuring distance point when measuring a progressive lens..***

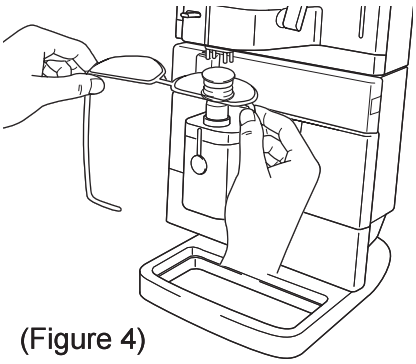
■ ***Use the lens guide to prevent air entering between the gel and lens. Gently lower the lens guide to avoid breaking the glass.***



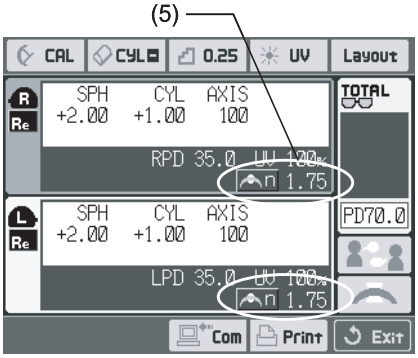
(Figure 2)



(Figure 3)



(Figure 4)

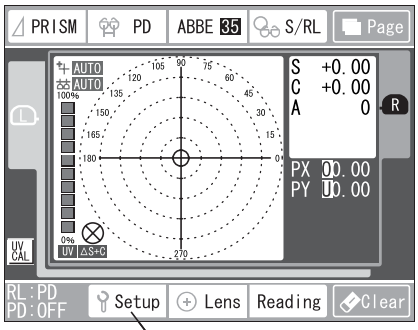


(Figure 5)

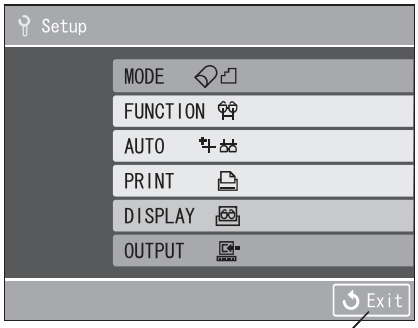
1) After measuring the lens, the measurement result display screen (Figure 2) appears. (Refer to the measurement procedures for the appropriate lens type.)
2) Touch the “Refractive index estimation” button (1) to display the refractive index measurement screen (Figure 3).
3) Touch the “L” or “R” tab (2) to display the measurement screen for the left lens and right lens respectively.
4) Attach gel to the larger glass for the front and attach the gel to the front side of the lens. Attach gel to the smaller glass for the back and attach the gel to the rear side of the lens. When air is trapped between the lens and gel, lightly press the gel to release the air.
5) While the gel and glass is attached to the front and rear of the lens, place the lens on the nose piece so that the gel and glass on the rear side is positioned on the nose piece.
6) Gently lower the lens guide onto the front glass to fix the glass and gel. Check that there is no air in the measuring section.
7) The refractive index of the lens (3) is displayed in real time in the upper right corner of the measurement screen. Check that the refractive index (3) becomes stable around the center of the target area, touch the “HOLD” button, and read the value.
8) After both lenses have been measured, touch the “EXIT” button (4) to return to the measurement result display screen (Figure 5). The measured refractive index (5) appears.

3.5 Setting measurement conditions

3.5.1 Setup screen



(Figure 1)



(Figure 2)

Set operation conditions on this screen. Settings made on this screen is effective unless otherwise changed.

■ ***Settings made using the operation buttons on the measurement screen are not reflected in the settings on the Setup screen. The settings on the Setup screen are applied when power is turned on.***

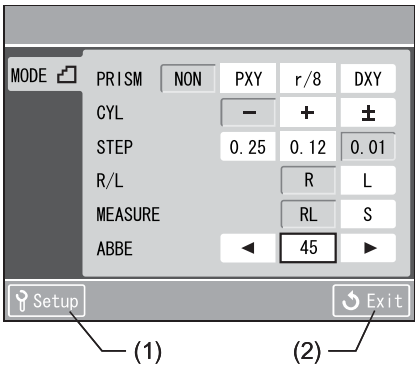
1) Touch the “Setup" button (1) on the measurement screen to display the Setup screen (Figure 2).
2) Select a setting item and change the settings as needed on the corresponding screen.
3) Touch the “Exit” button (2) to return to the measurement screen (Figure 1).

MODE : Items related to measurement (Refer to “3.5.2 MODE setting screen.”)
FUNCTION : Items related to extensions (Refer to “3.5.3 FUNCTION setting screen.”)
AUTO : Items related to AUTO functions (Refer to “3.5.4 AUTO setting screen.”)
PRINT : Items related to printing (Refer to “3.5.5 PRINT setting screen.”)
DISPLAY : Items related to screen display (Refer to “3.5.6 DISPLAY setting screen.”)
OUTPUT : Items related to external communication (Refer to “3.5.7 OUTPUT setting screen.”)

3.5.2 MODE setting screen

Note

■ ***When the sum of the spherical dioptry (“S” value) and cylindrical dioptry ("C" value) is “0” or larger, the cylindrical dioptry (“C” value) for mixed reading is automatically displayed as a positive reading; if the sum is less than “0,” the “C” value is displayed as a negative reading.***



(Figure 1)

■ ***The ABBE number set here is the value when measuring a lens with a high refractive index. When measuring a lens in HI mode, the measured value is corrected with the ABBE number set here. The ABBE number in Normal mode is set to "60."***

When a button is touched, the button appears as if it has been pressed to indicate that it is selected. Touch the "Setup" button (1) to return to the Setup screen and the "Exit" button (2) to return to the measurement screen.

PRISM (setting of prism display)

NON : No prism displayed
PXY : PX and PY (display in orthogonal coordinates)
r/θ : PSM and BAS (display in polar coordinates)
DXY : DCX and DCY (eccentricity)

CYL (setting of CYL display)

- : Negative reading
± : Mixed reading
+ : Positive reading

STEP (sets increment to indicate measured value)

0.25 : In increments of 0.25D (⊿)
0.12 : In increments of 0.12D (⊿)
0.01 : In increments of 0.01D (⊿)

R/L (R/L switching order)

R : Measure lenses in an optical frame from the right lens.
L : Measure lenses in an optical frame from the left lens.

Measure (setting on the measurement screen)

RL : RL measurement screen
S : Single lens measurement screen

ABBE (setting of ABBE number)

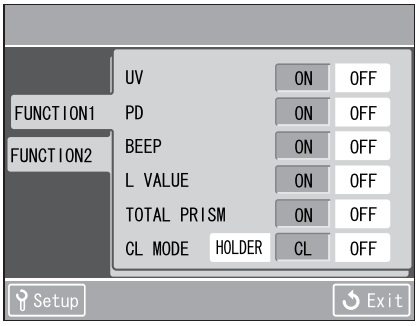
Set the ABBE number in HI mode. Values from 20 to 65 can be set in increments of 5 (10 steps in total). ("35" is the initial setting).

3.5.3 FUNCTION setting screen

Note

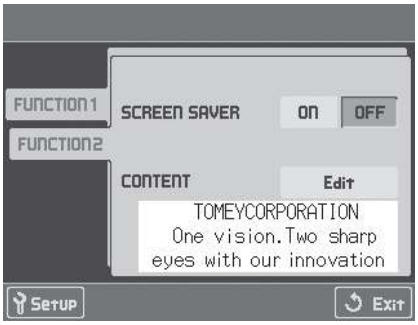
■ ***When the instrument is started with CL MODE set to ON, the accuracy check at startup is only conducted for CL measurement, and no functions for measuring optical glasses are available. Start the instrument with CL MODE set to OFF when measuring optical lenses.***

FUNCTION 1



(Figure 1)

FUNCTION 2



(Figure 2)

When a button is touched, the button appears as if it has been pressed to indicate that it is selected. Touch the “Setup” button to return to the Setup screen and the “Exit” button to return to the measurement screen.
Touching the FUNCTION1 and FUNCTION2 tabs switches the setting screens.

UV (UV transmissivity)

ON : Displays a bar graph of UV transmissivity on the measurement screen when measuring a lens.
OFF : A bar graph of UV transmissivity is not displayed on the measurement screen.

PD (function for measuring distance between pupils)

ON : Activates the PD measurement function.
OFF : Deactivates the PD measurement function.

BEEP (buzzer)

ON : A buzzer goes off.
OFF : A buzzer does not go off.

L VALUE (sets whether to display "L” value)

Sets whether to display the distance from the lower edge of the optical frame to the optical center (“L” value) on the measurement screen.

ON : Displays the “L” value.
OFF : The “L” value is not displayed.

TOTAL PRISM (sets whether to display the total prism)

Sets whether to display the total prismatic power of both eyes when measuring the prism.

ON : Displays the total prismatic power.
OFF : The total prismatic power is not displayed.

CL MODE (selects CL measurement mode)

Starts the instrument in CL mode or CL Holder mode. When starting the instrument in CL mode or CL Holder mode, the nose piece for measuring contact lenses needs to be set. When the nose piece for measuring contact lenses is not set, the error message “NOSEPIECE ERR!” appears.

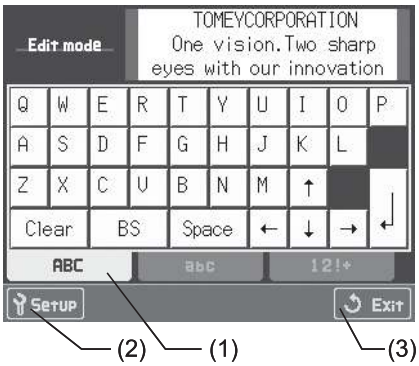
Holder Starts the instrument in CL Holder mode.
CL : Starts the instrument in CL mode.
OFF : Starts the instrument in Normal mode.

SCREEN SAVER

ON : Activates the screensaver function.
OFF : Turns off the LCD backlight, internal motor, and measuring power source.

CONTENT

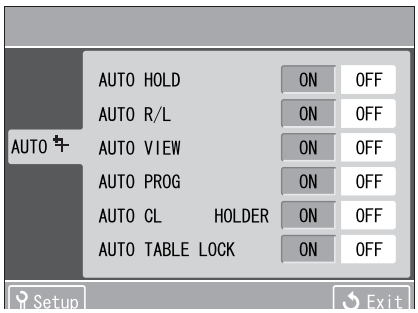
Display the content to be shown on the final page of the screensaver and to be printed in the last line of the printout. Touch “Edit" to display the CONTENT edit screen (Figure 3) and enter up to 72 characters (24 characters x 3 lines) to be printed. The description entered is displayed at the top of the screen. Follow the procedures below to edit CONTENT.



(Figure 3)

1) Touch a character key on the screen to enter it. Touch the “Tab” button (1) at the bottom to switch to upper case, lower case, numbers, or symbols.
2) Use the up/down/right/left arrow keys to move the cursor. Touch the keyboard to insert the character at the position of the cursor.
3) Touch the “Clear” button to delete the entire line. Touch the “BS (backspace)” button to delete the character before the cursor.
4) Touch the “Setup” button (2) to return to the Print setting screen. The entered description is displayed in the CONTENT field. Touch the “Exit" button (3) to return to the measurement screen.

3.5.4 AUTO setting screen



(Figure 1)

When a button is touched, the button appears as if it has been pressed to indicate that it is selected. Touch the "Setup" button to return to the Setup screen and the "Exit" button to return to the measurement screen.

AUTO HOLD (automatic reading of measurement value)

Sets whether to read measurements automatically.

ON : Automatically reads measurement values.
OFF : Measurement values are not automatically read.

AUTO R/L (automatic switching of right and left lenses)

Sets whether to automatically switch the right and left lenses to be measured.

ON : Automatically switches the lens.
OFF : The lens is not automatically switched..

AUTO VIEW (automatic display of measurement results)

Sets whether to automatically jump to the measurement result display screen after measurement is completed on the RL measurement screen.

ON : Automatically jumps to the measurement result display screen.
OFF : The measurement result display screen does not appear automatically. Touch the "Reading" button to display the measurement result display screen.

AUTO PROG (automatic switching to PROG mode)

Sets whether to automatically switch to PROG mode when the instrument detects the lens type as a progressive lens.

ON : Automatically switches to PROG mode.
OFF : Only the result of progressive lens detection is displayed; the instrument does not automatically switch to PROG mode.

AUTO CL (automatic switching to CL mode)

Sets whether to automatically switch to the contact lens measurement mode when the nose piece for measuring contact lenses is set.

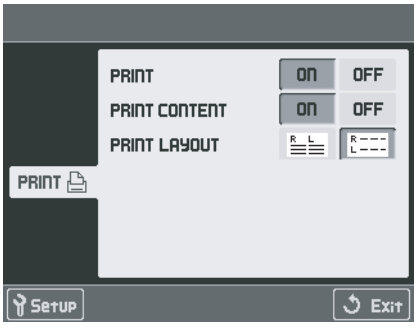
ON : Automatically switches to CL mode.
OFF : Does not automatically switch to CL mode.
HOLDER : Automatically switches to CL Holder mode.

AUTO TABLE LOCK (automatic lock of the lens table)

Sets whether to automatically lock the table when reading the measurement data in Normal mode.

ON : Automatically locks the lens table.
OFF : Lock the table manually by touching the “TABLE LOCK” button.

3.5.5 PRINT setting screen



(Figure 1)

When a button is touched, the button appears as if it has been pressed to indicate that it is selected. Touch the “Setup” button to return to the Setup screen and the “Exit” button to return to the measurement screen.

PRINT

ON : Activates the print function.
OFF : Deactivates the print function.

PRINT CONTENT

Sets whether to print the characters set on the CONTENT edit screen in the last line of the printout.

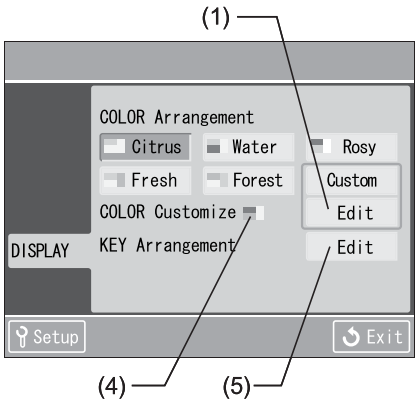
ON : Prints the description set on the CONTENT edit screen.
OFF : The description set on the CONTENT edit screen is not printed.

PRINT LAYOUT (sets the print layout)

The printing layout can be set.

Vertical printing : Prints S, C, and A in one vertical line.
Horizontal printing : Prints S, C, and A in one horizontal line. The data can be printed on shorter print paper in this mode.

3.5.6 DISPLAY setting screen



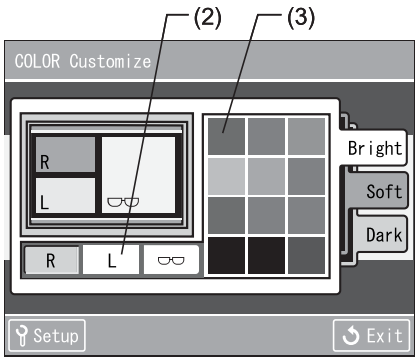
(Figure 1)

When a button is touched, the button appears as if it has been is pressed to indicate that it is selected. Touch the "Setup" button to return to the Setup screen and the "Exit" button to return to the measurement screen.

COLOR Arrangement (sets screen color)

Sets the color of the screen.

Citrus : Yellow-base screen
Water : Light-blue-base screen
Rosy : Pink-base screen
Fresh : French color base screen
Forest : Green-base screen
Custom : Setting on the COLOR Customize screen (Figure 2)

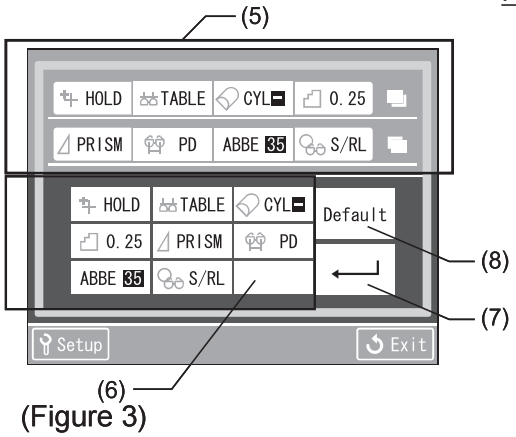


(Figure 2)

COLOR Customize (color edit)

The screen color can be changed as desired. Touch the "Edit" button (1) to go to the COLOR Customize screen (Figure 2). Select the section of color to be changed using the position selection button (2) and select a color from the pallet (3).
There are three types of pallets: Bright, Soft, and Dark. Set optional colors for the background of the RL tab on the RL measurement screen or the background in S mode. When color settings are changed here, the color of (4) on the DISPLAY setting screen (Figure 1) will also be changed.

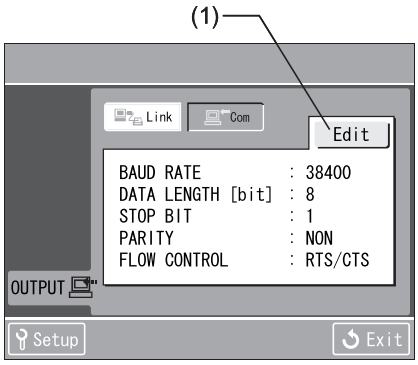
KEY Arrangement



(Figure 3)

The layout of operation button menus 1 and 2 in the upper section of the measurement screen can be changed. Touch the "Edit" button (5) to go to the BUTTON setting screen (Figure 3).
The button layout for the measurement screen is displayed in two lines at the top of the setting screen. (position selection button)
Specify the button to be customized using the position selection button (6) and then select a function from the function list (7) shown in the lower half of the setting screen. Touch the "ENTER" button (8) to cancel the selected status. Touch the "Default" button (9) to reset the layout to the condition upon delivery.

3.5.7 OUTPUT setting screen



(Figure 1)

When a button is touched, the button appears as if it has been pressed to indicate that it is selected. Touch the “Setup” button to return to the Setup screen and the “Exit” button to return to the measurement screen.

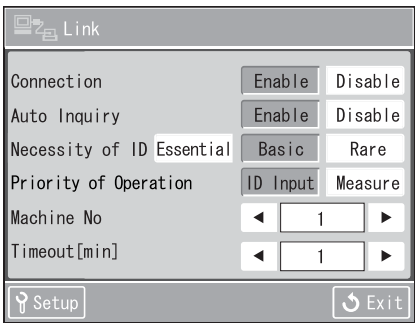
Link (TOMEY Link/Data Transfer)

Sends/receives data using TOMEY Link or Data Transfer.
The current settings are displayed in the white frame. Touch the "MODIFY” button (1) to change the communication settings. (Refer to “3.5.8 Link setting screen.”)

COM

Enables data communication with external devices via RS232C. Select this when using communication software other than TOMEY Link and DATA Transfer. Consult Tomey Corporation for details.
The current settings are displayed in the white frame. Touch the "MODIFY” button (1) to change the communication settings. (Refer to “3.5.9 COM setting screen.”)

3.5.8 Link setting screen



(Figure 1)

When a button is touched, the button appears as if it has been pressed to indicate that it is selected. Touch the “Setup” button (1) to apply changes and return to the OUTPUT screen. Touch the “Exit" button (2) to return to the measurement screen.
Values specified with an asterisk (*) are the default setting.

Connection

Set whether to connect the instrument to Data Transfer.

Enabled : Connected
Disabled : Not connected *

Auto inquiry

Set whether to automatically retrieve the patient's data.

Enabled : Automatically retrieves the patient's data.
Disabled : The patient's data is not automatically retrieved.

Necessity of ID

Set whether to enter the ID.

Essential : The ID must be entered. (If mandatory)
Basic : The ID may be entered. (If optional)
Rare : The ID is not entered. *

Priority of Operation

Set the priority for operations (whether to enter the ID before measurement or after measurement).

ID Input : Priority is given to the ID (the measurement screen appears after the ID is entered).
Measure : Priority is given to measurement (enter the ID after measurement and then send the data).

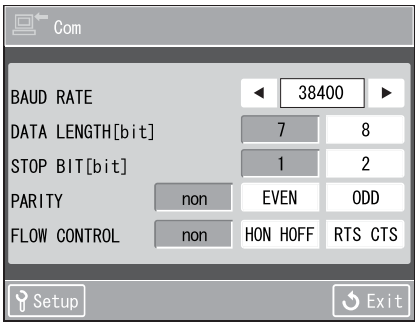
Machine No.

Set the machine number (device number).
If there is more than one TL-5000 on the same LAN, set the machine number (device number) to identify the device. (1 – 99) (Default: 0)

Timeout (min.)

Set the waiting time allowed for a response from the server when retrieving the patient's data. When no response is received from the server within the time set here, an error occurs and the screen returns to its original condition. (Setting: 1 – 10 minutes in increments of 1 minute) (Default: 1)

3.5.9 COM setting screen



(Figure 1)

When a button is touched, the button appears as if it has been pressed to indicate that it is selected. Touch the “Setup” button to apply changes and return to the OUTPUT screen. Touch the “Exit” button to return to the measurement screen.
Values specified with an asterisk (*) are the default setting.

BAUD RATE

Sets the baud rate.
2400, 4800, 9600, 19200, 38400 bps *

DATA LENGTH [bit]

Sets the data length.
7 bit, 8 bit *

STOP BIT [bit]

Sets the stop bit length.
1 bit * 2 bit

PARITY

Sets the parity.
NON *, Even, Odd

FLOW CONTRO

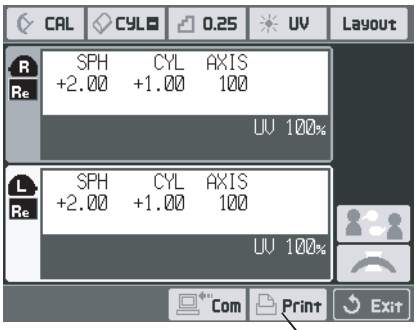
Sets the flow control.
NON, XON XOFF, RTS CTS *

3.6 Printout

3.6.1 Printing

Note

- ***Check that the paper roll is set in the built-in printer. (Refer to "5.5.3 Printer paper.")***
- ***No data is printed if "PRINT" is set to "OFF" on the Setup screen. Set "PRINT" to "ON" to activate the printout function. (Refer to "3.5 Setting measurement conditions.")***
- ***The printer in this instrument is thermosensitive. This means the measurements printed on the paper will fade over time. Make a copy when storing the measurement data for long periods.***

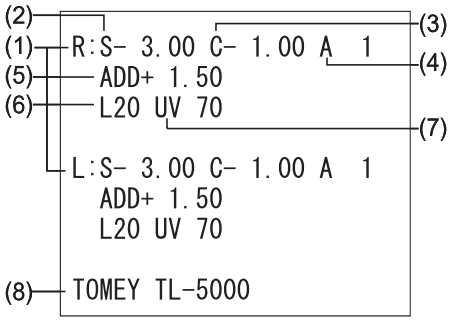


(Figure 1)

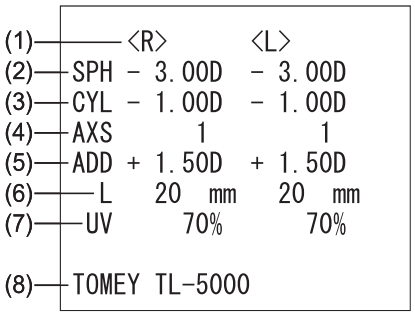
1) After measuring the lens, the measurement result display screen (Figure 1) appears.
2) Touch the "Print" button to print out the data. Blank paper is fed when the "Print" button is touched with no data measured (no measurement data is saved in the internal memory).
3) Even when printing measurement data once, touching the "Print" button prints the same measurement data repeatedly until the "Exit" button is touched.

3.6.2 Printout details

<Printout type 1>



<Printout type 2>



(Figure 1)

Refer to “3.5 Setting measurement conditions” for setting the descriptions on the printout.

(1) R/L
(2) SPH (spherical dioptry)
(3) CYL (cylindrical dioptry)
(4) AXS (axis angle that specifies astigmatism direction)
(5) ADD (addition)
(6) L (Distance from the lower edge of the optical frame to the optical center)
(7) UV (UV transmissivity)
(8) CONTENT

3.7 Data management using TOMEY Link and Data Transfer

Note

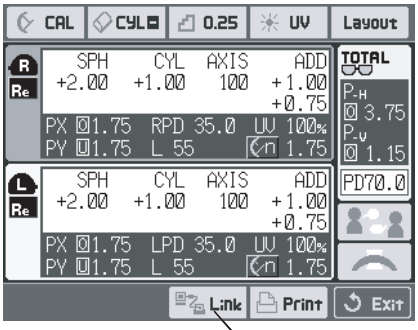
- ***Use the USB port to send and receive data via TOMEY Link and Data Transfer. Prepare a commercial USB cable before using TOMEY Link and/or Data Transfer.***
- ***Data Transfer provided with the instrument does not provide a database function. Purchase the optional "TOMEY Link" software for data management.***
- ***Refer to the instruction manual provided with each application when installing TOMEY Link and/or Data Transfer on your personal computer.***
- ***When "Necessity of ID" of the measurement condition is set to "Essentially," no data is sent or received unless the ID number is entered. (Refer to "3.5 Setting measurement conditions.")***
- ***Data can be managed via TOMEY Link and Data Transfer on the RL measurement screen. The data management function is not available on the single lens measurement screen.***
- ***Check that "Link" is selected on the OUTPUT setting screen. (Refer to "3.5 Setting measurement conditions.")***

3.7.1 Entering the patient ID and receiving the patient's data

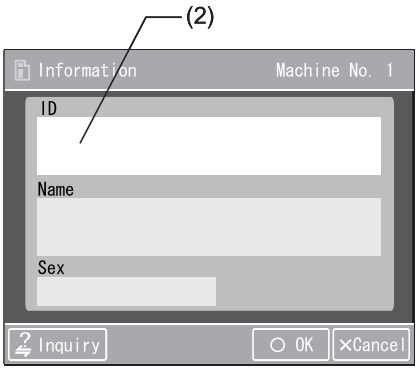
Note

■ ***Data Transfer does not provide a database function and patient data cannot be queried. Therefore, only the ID can be entered. (Only ID can be displayed.)***

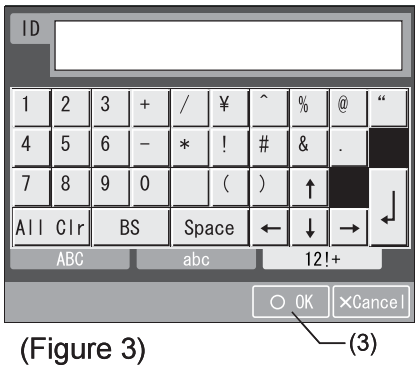
■ ***If "Necessity of ID" is set to "Rare (No)," the ID entry screen does not appear.***



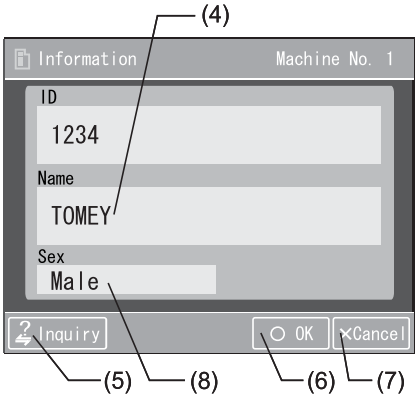
(Figure 1)



(Figure 2)



(Figure 3)



(Figure 4)

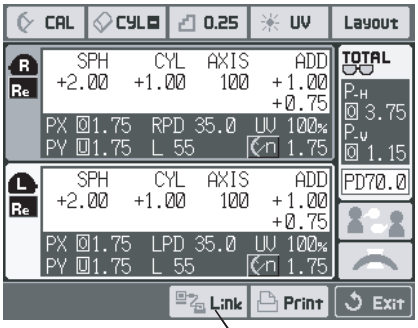
When priority is given to entry of ID for the measurement condition setting, the ID entry screen appears before measurement. When priority is given to measurement, touch the "Link" button (1) on the measurement result display screen to display the ID entry screen after measurement is completed.

1) Touch the ID display field (2) to display the keypad for entering the ID (Figure 2).
2) Enter the ID and touch the "OK" button (3). (Up to 64 characters)
3) When the measurement condition is set to automatically query the patient's data, the data is automatically retrieved from the server and Name (4) and Sex (8) are displayed. If automatic retrieval of the patient's data is deactivated, touch the "Query" button (5) after entering the ID to search for the data on the server. The patient's data is retrieved and Name (4) and Sex (8) are displayed.
4) If the patient's data (Name) and Sex (8) conform to the entered ID, touch the "OK" button (6). Touch the "Cancel" button to correct the ID. The screen shown in Figure 2 appears again with the ID and Name are blank. Enter the ID again.
5) If "Necessity of ID" is set to "Basic" and no ID is entered, touch the "OK" button (9) on the screen shown in Figure 2 with the ID field blank. "No ID" appears in the ID field and the field turns gray. Touch the "OK" button again to confirm "No ID."

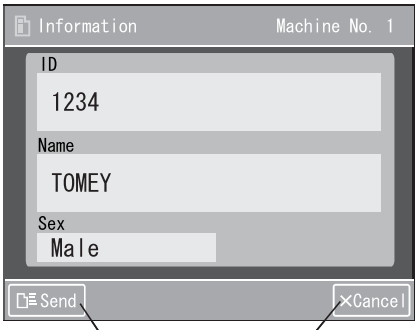
3.7.2 Sending measurement results

Note

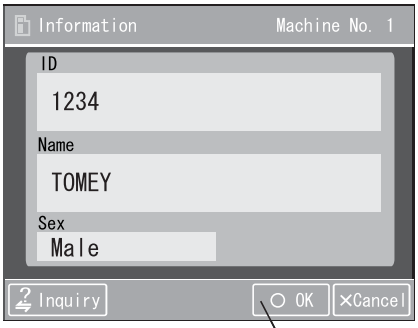
- ***If the data cannot be sent correctly, an error appears. Check the cables and/or settings.***
- ***Because the measurement mode cannot be changed to the mode for measuring the single lens (S mode) during Link connection, the S/RL button is not available.***
- ***If "Necessity of ID" is set to "Rarely," touch the "Link" button on the measurement result display screen to display the send screen and then send the data to the personal computer. "sending..." is displayed while sending the data.***



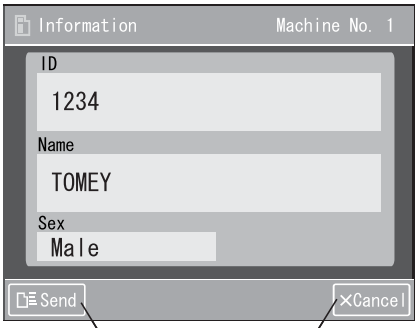
(Figure 1)



(Figure 2)



(Figure 3)



(Figure 4)

[When priority is given to entering the ID]

1) Touch the "Link" button (1) on the measurement result display screen (Reading screen) after measurement. The send screen (Figure 2) appears.
2) Check the ID, Name, and Sex, and touch the "Send" button (2). The message "Sending..." appears and the data is sent to the personal computer. If the data has been sent correctly, the measurement result screen (Reading screen) is displayed.
3) Touch the "Cancel" button (3) to delete the data and return to the ID entry screen.

[When priority is given to measurement]

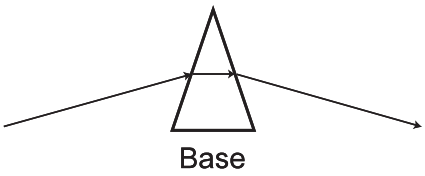
1) Touch the "OK" button (1) to display the send screen (Figure 2).
2) Check the ID, Name, and Sex, and touch the "Send" button (2). The message "Sending..." appears and the data is sent to the personal computer. If the data has been sent correctly, the measurement result screen (Reading screen) is displayed.
3) Touch the "Cancel" button (3) to delete the data and display the measurement screen.

4. TECHNICAL INFORMATION

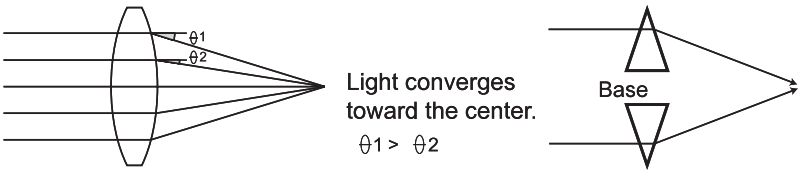
4.1 Prism

4.1.1 Prism and refraction

1) Two non-parallel refracting surfaces generate prismatic power. The incident light is refracted toward the base.

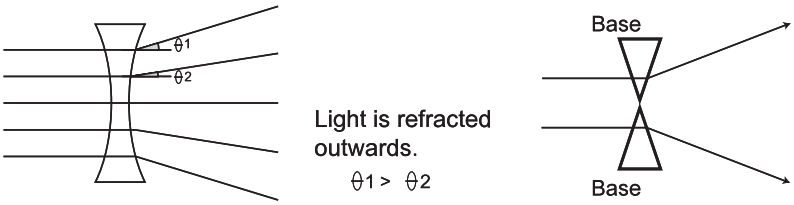


2) A lens can be regarded as a group of prisms. A convex lens is a group of prisms with the base in the center, so light rays are refracted toward the center and concentrated.



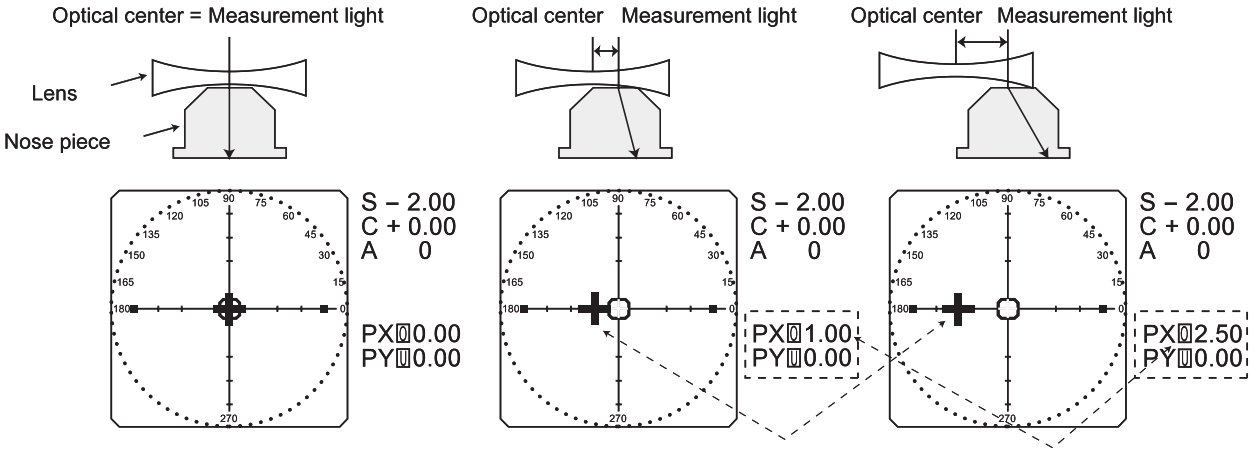
3) The point where light is not refracted by the prism is called the optical center and the prismatic degree at this point is 0△. The prismatic degree becomes larger at points farther from the optical center.

4) Because a concave lens is a group of prisms with the base around the outside, light rays are refracted outwards and radiated.



5) Also for a concave lens, the point where light is not refracted by the prism is called the optical center and the prismatic degree at this point is 0△. The prismatic degree becomes larger at points farther from the optical center.

4.1.2 Example of prism displayed using the auto lens meter



When the measurement light is placed at the optical center, the target cursor appears at the center and the prismatic degree becomes 0 △.

As the measurement light moves away from the optical center, the target cursor also moves away from the center and the prismatic degree becomes high.

4.2 How to improve accuracy of marking

Deactivate the AUTO HOLD function and conduct measurement manually. Set "PRISM" to "DCX/DCY" and mark points.

Roughly align the center and angle, referring to "DCX/DCY" (distance from the optical center) and axis angle.

When lenses are set in an optical frame, push the frame firmly against the lens table and roughly align the optical center.

Use the lens guide to finely adjust the lens position.

Lift the lens guide slightly to avoid damaging the lens while adjusting the position.

Align the optical center and axis angle, and then mark points.

The precision of marking will be improved when "DCX/DCY" is closer to 0.0.

It is more difficult to improve the marking accuracy when the spherical dioptry (“S" value) of the lens is lower, for example 0.25D, 0.50D, etc.

4.3 How to measure PD more precisely

Deactivate the AUTO HOLD function and conduct measurement manually. Set "PRISM" to "DCX/DCY" and measure the PD.

Push the frame firmly against the lens table and the nose block against the pad, and roughly align the optical center. Use the lens guide to finely adjust the lens position. Lift the lens guide slightly to avoid damaging the lens while adjusting the position. After the optical center is aligned, touch the "HOLD" button. The PD can be measured more precisely when "DCX/DCY" is closer to 0.0.

It is more difficult to improve the accuracy of PD when the spherical dioptry (“S" value) of the lens is lower, for example 0.25D, 0.50D, etc

4.4 Reference standard

This instrument has been tested according to the medial equipment standards listed below and it has been proved that the instrument conforms to these standards.

• IEC60601-1:1988 + A1:1991 + A2:1995
• IEC60601-1-2:2001 + A1:2004
.

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 not 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 duty 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 Maintenance

Note

■ ***Check that the guarantee certificate has all the necessary details on it, and store it in a safe place. If the content of the guarantee certificate is incomplete, free guarantee may not be provided.***

For details about guarantee, refer to the guarantee certificate attached.

5.3 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.

5.4 Inspection

The instrument cannot be started correctly if the protective glass is damaged or contaminated. Check that the protective glass is free of damage or contamination. (Refer to “5.4.2 Cleaning protective glass.”)

Check that the UV bar graph on the measurement screen indicates 100% without a lens placed on the nose piece after the instrument is started. If the graph does not indicate 100%, refer to “2.5.1 Operation button menu 1” and calibrate the graph.

5.5 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.***

■ ***Turn power off and disconnect the power plug from the outlet before starting maintenance.***

■ ***Do not use organic solvents such as thinner, benzene, or acetone to clean the instrument. Solvents such as these may corrode the surface of the instrument.***

■ ***Place the dust cover over the main unit when not being used.***

■ ***Do not touch the optical parts of the measurement window, etc. and keep these parts free from dust. Fingerprints and dust affect measurement accuracy.***

5.5.1 Maintenance of main unit

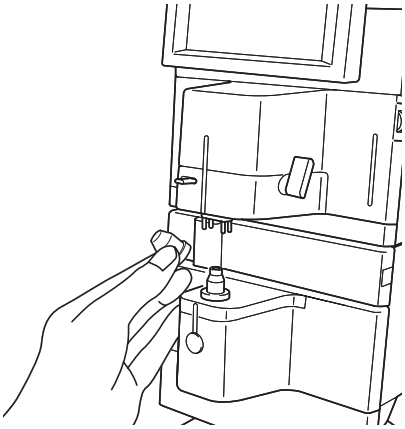
- Wipe the main unit's case, LCD, and operation panel with a dry cloth if dirty. When very dirty, clean the surface using a cloth dampened with diluted neutral detergent.

5.5.2 Cleaning protective glass

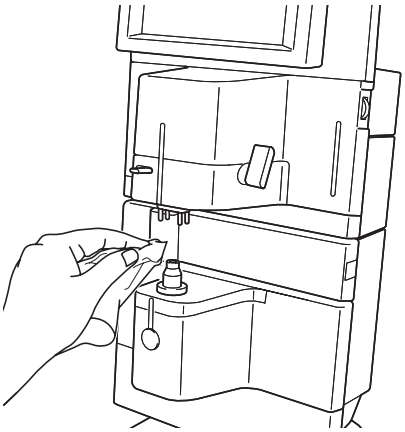
Note

- ***Do not damage the protective glass. Otherwise, the reliability of the measurement data lowers significantly.***
- ***Periodically clean the protective glass under the nose piece with soft cloth or equivalent.***

Remove the nose piece and blow dust from the protective glass using a commercial blower or similar. If dust or dirt is stuck to it, lightly wipe the glass with lens cleaning paper, etc.



(Figure 1)



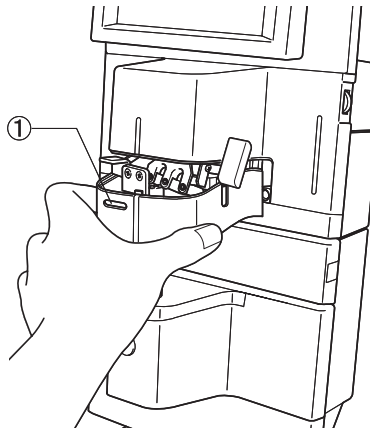
(Figure 2)

5.5.3 Cleaning the collimeter lens

Note

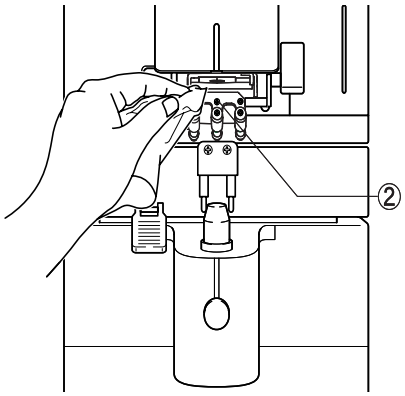
■ ***Do not touch the collimeter lens directly. Otherwise, the lens is contaminated or damaged, and the reliability of the measurement data lowers significantly.***

■ ***Check the collimeter lens periodically. If it is contaminated, clean it with soft cloth or the like.***



(Figure 1)

1) Hold the sides of the point marker cover (1) in your hand and pull the cover downward to remove it.
2) Lift the lens guide lever (2) slightly to unlock and lower it.
3) Use a commercial blower to blow the collimeter lens (2) and to remove dust from it.
   If dust or dirt is stuck to it, lightly wipe the glass with lens cleaning paper, etc.



(Figure 2)

5.6 Replacing consumables

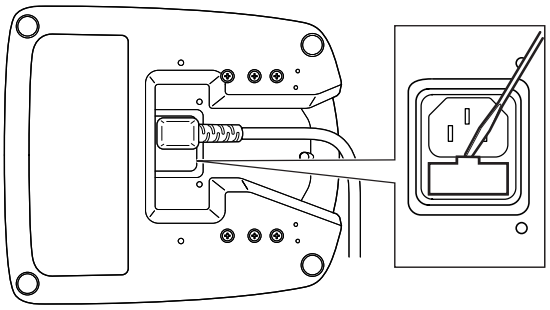
5.6.1 Fuses

Caution

Note

- ***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 this instrument.***
- ***When the instrument does not work correctly after fuses have been replaced, there may be other reasons for the problem. Turn off the instrument immediately and contact our local distributor.***

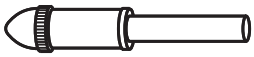
1) Turn power off and disconnect the power plug from the outlet.
2) Disconnect the power cord from the power terminal.
3) Insert the tip of a flat screwdriver into the groove on the top of the fuse holder under the power terminal, release the lock, and remove the holder case.
4) Remove the blown fuse from the fuse holder case and install a new fuse.
5) Reverse the procedure for removing the holder case and return the holder case to the fuse holder.



(Figure 1)

5.6.2 Ink cartridge

Replace the ink cartridge when dots become light.
Replacement ink cartridges are optional parts. Cartridges are available from our local distributor.



Ink cartridge

Spring

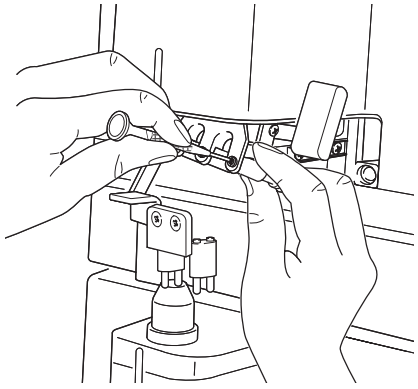
Securing

(Figure 1)

Note

- ***Always use genuine Tomey ink cartridges.***
- ***Do not touch the marker tip of the ink cartridge. Otherwise the marker tip may be deformed and the cartridge may become unusable.***
- ***Do not tighten the securing screw of the ink cartridge too tightly. The ink cartridge may be broken.***
- ***Be very careful not to drop the spring or screw while replacing the ink cartridge. It is recommended to take appropriate precautions so that the spring or screw can be easily found if dropped.***
- ***Only use the provided securing screw and spring. If you lose the screw and/or spring while replacing the ink cartridge, contact Tomey Corporation or our local distributor.***

1) Lift the lens guide.
2) Lower the point marker without turning the marker lever.
3) Hold the ink cartridge with one hand and remove the securing screw using a Phillips screwdriver.
4) Remove the ink cartridge and spring from the point marker.
5) Attach the spring to a new ink cartridge, install it to the point marker, and secure it with the screw.



(Figure 2)

5.6.3 Printer paper

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

Caution

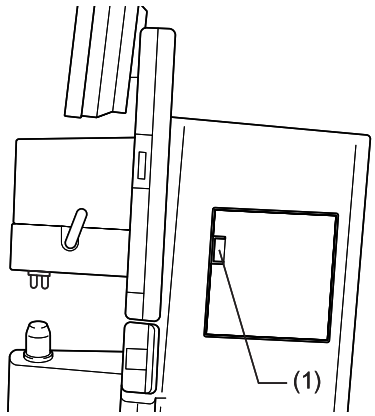
■ ***Never touch the cutter in the printer. Otherwise, you may be injured.***

Note

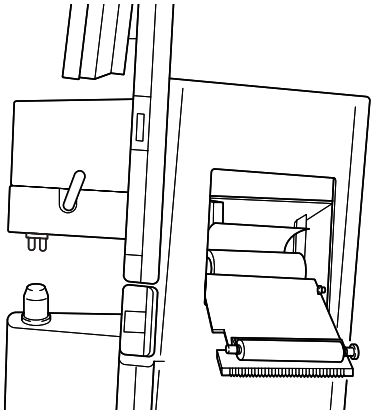
■ ***Always use the specified paper for the printer. Using other types of paper may cause printer failure.***

■ ***Do not start printing without paper set in the printer. The printer head may be damaged.***

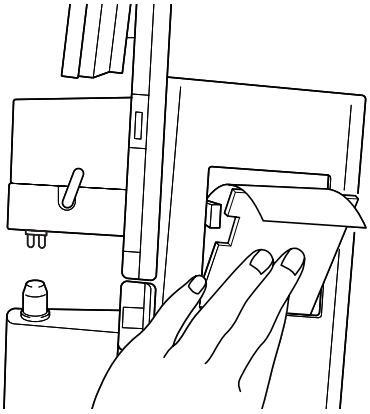
■ ***Do not pull paper forcibly. Trying to pull the paper out may cause printer failure.***



(Figure 1)



(Figure 2)



(Figure 3)

1) Press the button (1) to open the printer cover.
2) Take out the old roll of printer paper.
3) Install a new roll of printer paper. If the roll is installed in the wrong direction, nothing will be printed.
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.

5.6.4 Nose piece

Note

■ ***Do not use a damaged nose piece. The lens being measured may be damaged.***

The tip of the nose piece for measuring optical glasses may be damaged due to rubbing by lenses, so it is recommended to keep a spare nose piece for measuring glasses.

5.7 Storing

■ ***Install the instrument in a place 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 place where chemicals are stored or gases may occur. Spilt chemicals or vapor may enter the instrument and result in fire.***

■ ***Disconnect the power cord from the outlet to ensure safety when the instrument is not operated for 1 month or longer.***

■ ***Install the instrument in a place not influenced by direct sunlight, high temperature and humidity, and air containing dust, salt, and/or sulfur.***

■ ***Store the instrument in a leveled stable place free of vibration or mechanical impact. Otherwise, measurement cannot be conducted correctly. The instrument may also topple over or fall down, resulting in fire or a fatal accident.***

Note

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

5.8 Disposal

Note

- ***Keep the box and packing materials for use when moving or transporting the instrument.***
- ***Keep the packing materials and box together.***
- ***When disposing of the main unit and/or packing materials, sort them by material type and abide by local government rules and regulations.***

6. TROUBLESHOOTING

Check the following first when you find any problem with the instrument.
If the problem is not solved even after checking the applicable item listed below, contact our local distributor to request inspection and/or repair.

■ ***Do not remove the cover of the main unit from the instrument. Otherwise, you may be directly exposed to high voltage sections.***

■ ***Do not take any actions other than those specified below.***

6.1 General operation

- Nothing appears on the display when the power switch is turned on.

  Cause 1 Faulty connection of the power cord

  Solution Firmly connect the power cord to the power terminal.

  Cause 2 Blown fuse

  Solution Replace the fuse (250 VA, 2.0 A). Refer to "4.2.1 Fuses."

  Cause 3 Faulty adjustment of the LCD contrast

  Solution Adjust the contrast of the LCD using the contrast adjustment knob. Refer to "3.2.4 Contrast adjustment of display."

- The instrument stops with the initial error message displayed on the initial screen.

  Cause 1 A lens or other object is on the nose piece when starting the instrument.

  Solution Remove the lens or object from the nose piece and touch the “Retry” button on the screen.

  Cause 2 The nose piece is tilted when set.

  Solution Set the nose piece correctly and touch the “Retry” button on the screen.

Cause 3 The protective glass under the nose piece is dirty.

Solution Remove the nose piece, clean the protective glass, reset the nose piece, and touch the “Retry” button on the screen. (Refer to “5.4.2 Cleaning protective glass.”)

Cause 4 Condensation has formed on the internal optical parts.

Solution When the instrument is transported from a cold place to a warm place, condensation may form and "INITIAL ERROR!" may appear. In this case, do not use the instrument until the unit is adequately warmed and any condensation has dried. When transporting the instrument from a cold place to a warm place, place the instrument in a comparatively warm location during transport.

Cause 5 The instrument was turned on with the contact lens measurement nose piece set in optical glasses measurement mode.

Solution Replace the nose piece with the one for measuring optical glasses and touch the “Retry” button on the screen. When it is necessary to turn on the instrument with the contact lens measurement nose piece set, change the measurement setting to start the instrument in contact lens measurement mode. (Refer to “3.5 Setting measurement conditions.")

Tip ❶ The TL-5000 is designed to check measurement accuracy to ensure correct measurement when turned on (automatically checks that "0.0D (with nothing placed on the nose piece)" conforms to "0.0D" set upon delivery). When the measurement light is obstructed during this accuracy check, the instrument reports this as an error (condition not 0.0D) and displays the initial error message (INITIAL ERROR!).

Tip ❷ The measurement range of the TL-5000 is 5 mm in diameter when measuring glasses and 2.5 mm in diameter when measuring contact lenses, and the opening size of each nose piece varies depending on the item to be

measured. Because the TL-5000 inspects the accuracy of these two types of measurement ranges simultaneously when started, the measurement light is obstructed if the nose piece for measuring contact lenses is placed, resulting in initial error (NOSE Piece ERROR!).

- Values of "S," "C," and "A" are not "0" although there is no lens on the nose piece. / Measurement is conducted but the data is faulty.

  Cause 1 The nose piece is tilted when set.

  Solution Set the nose piece correctly and turn power on again.

  Cause 2 The protective glass under the nose piece is dirty.

  Solution Remove the nose piece, clean the protective glass, reset the nose piece, and turn power on again. (Refer to “5.4.2 Cleaning protective glass.”)

- Nothing is printed when the "PRINT" button is touched.

  Cause 1 ”PRINT” is set to “OFF.”

  Solution Set "PRINT" to "ON." Refer to “3.5.5 Print setting screen.”

  Cause 2 The printer paper is not set in the correct direction (reversed).

  Solution Set the printer paper correctly. Refer to "5.5.3 Printer paper."

- The printed data is too light or dark.

  Cause 1 The printer paper is old.

  Solution Replace the printer paper with a new roll. Refer to "5.5.3 Printer paper."

  Cause 2 The specified printer paper is not used.

  Solution Replace the printer paper with the specified type. (Refer to "5.5.3 Printer paper.")

- The PD value is not displayed when the PD measurement nose block is moved.

  Cause 1 The PD measurement nose block is not reset.

  Solution Move the PD measurement nose block to the left end (stopper position).

  Cause 2 The PD measurement function is not available (PD indicator on the lower left of the screen is "PD: ").

  Solution Activate the PD measurement function to display “PD:ON” or “PD:OFF” on the lower left of the screen. (Refer to “3.5.5 FUNCTION setting screen.”)

- The AUTO R/L (function to automatically switch left and right) does not work when the next lens is set.

  Cause 1 The AUTO R/L function is set to "OFF."

  Solution Set "AUTO R/L" to "ON." Refer to “3.5.4 AUTO setting screen.”

  Cause 2 The instrument does not detect that the lens has been replaced.

  Solution Remove the lens from the nose piece for measuring optical glasses when measurement is complete and set another lens after the target disappears.

  Cause 3 The PD measurement function is set to “ON.”

  Solution Deactivate the PD measurement function, or lock the nose block at the left end and set the mode to "PD: OFF." In particular, when operating the instrument with the nose block moved downward to avoid contact, move the nose block to the left end to set the mode to "PD:OFF." (Refer to “3.5.3 FUNCTION setting screen” or “3.2.8 How to avoid the nose block.”)

  Tip 1 The AUTO R/L (function to automatically switch right and left) is designed to detect that right and left has been switched when the next lens is placed after measurement of the first lens, and to change "R" and "L" on the measurement screen.

Tip 2 When the PD measurement function is activated, the instrument detects left or right of the lens according to the position of the nose block, not after replacement of the lens. The AUTO R/L function is active when PD measurement function is "PD: OFF" or "PD: ."

- A different button to the one touched becomes active.

Cause 1 The touch panel is not correctly calibrated.

Solution Check calibration of the touch panel and correct it if required. (Refer to “3.2.10 Calibrating the touch panel.”)

6.2 General operation for measuring lenses

- The target is not aligned with the center of the target area. / The AUTO HOLD function does not work.

Cause 1 A mono-focal lens with a spherical dioptry ("S" value) of 0.0D and which only has a cylindrical dioptry value ("C" value) was measured.

When a mono-focal lens only has a cylindrical dioptry ("C" value) and its spherical dioptry ("S" value) is 0.0D, the optical center is not a single point but exists as a line. Therefore, the target may not be aligned with the center of the target area and the AUTO HOLD function does not work. In this case, touch the “HOLD” button to read the value measured in the physical center of the lens.

Cause 2 A progressive power lens with a spherical dioptry ("S" value) of 0.0D was measured.

Solution No optical center exists on a progressive power lens with a spherical dioptry ("S" value) of 0.0D. Therefore, the target cannot be aligned with the center of the target area and the AUTO HOLD function does not work. In this case, move the lens slightly back, forth, to the right and left at a point approximately 10 - 15 mm above the center of the optical frame, and touch the "HOLD" button at the position where there is least fluctuation of the SPH value to take the measurement.

- The cylindrical dioptry ("C" value) is displayed for the measurement data of a hard contact lens without astigmatism.

  Cause 1 A hard contact lens that has been used for a long period was measured.

  Solution Recently, soft materials are used for many types of HCLs. Therefore, lenses may become deformed when used for a long period. When a deformed hard contact lens is measured, the distortion caused by deformation may be indicated as the cylindrical dioptry ("C" value).

- The frame interferes with the main unit and the lens is measured while tilted.

  Cause 1 There are a variety of frame designs and the temple tip may contact the main unit of the instrument when measuring a lens in a large frame.

  Solution Set glasses upside down. In this case, pay extra attention to correctly identify right and left.

6.3 Measuring progressive power lens

- The target is not aligned with the center of the target area when detecting the progressive area. The screen does not change to the far area measurement screen.

  Cause 1 The progressive power is small for a progressive lens with an addition (ADD) of 1D or lower, or for other progressive lenses mainly for near area or for middle far area and near area, so the target may not be aligned with the center of the target area when detecting the progressive area.

  Solution The progressive area is located at the center of the lens (or the center of the lens frame in the case of lenses set in an optical frame). Set the lens at these approximate positions and touch the "HOLD" button to display the far area measurement screen.

- The target is not aligned with the center of the target area when measuring the far area.

  Cause 1 The target may not be aligned with the center of the target area for a progressive lens with a large near area or a progressive lens for near area and middle far area.

  Solution Set the lens at a point approximately 10 – 15 mm above the center of the lens, move the lens slightly back, forth, to the right and left, and touch the "HOLD" button at the position where there is least fluctuation of the SPH value to take the measurement.

- The near area cannot be detected. / The target shape does not changed to "○" or "◎"

  Cause 1 This instrument cannot automatically detect the near area when the addition (ADD) is less than 1D. (This is because the progressive degree of a lens with an addition (ADD) of less than 1D is small, and the near area is often detected incorrectly.)

  Solution Place the target in the progressive area. Touch the “HOLD” button to take the measurement when the addition (ADD) is largest.

  Cause 2 When lenses have a long progressive area or are to be set in a short optical frame, the near area is too close to the frame or out of the frame, and may not be detected.

  Solution Place the target in the progressive area. Touch the “HOLD” button to measure the near area when the addition (ADD) is the largest. Note that the measured addition is smaller than the actual value.

- Measurement values vary.

  Cause 1 The lens it not set correctly.

  Solution Push the lens firmly against the nose piece for measuring optical glasses. The lens must not be tilted or separated from the nose piece for measuring optical glasses. To improve the measurement accuracy, set "AUTO HOLD" to "OFF"

and touch the “HOLD” button to take the measurement after checking that the lens firmly contacts the nose piece for measuring optical glasses.

- The degree specified by the lens maker is different to the value measured by the lens meter.

Cause 1 The lens it not set correctly.

Solution Push the lens firmly against the nose piece for measuring optical glasses. The lens must not be tilted or separated from the nose piece for measuring optical glasses. To improve the measurement accuracy, set "AUTO HOLD" to "OFF" and touch the “HOLD” button to take the measurement after checking that the lens firmly contacts the nose piece for measuring optical glasses.

Cause 2 An optical design for ensuring "natural viewing" was recently introduced for some progressive power lenses. When measuring these lenses with the lens meter, the cylindrical dioptry ("C" value) may be larger or the addition (ADD) may be smaller.

Solution Check the lens brand and determine whether the error is due to the characteristics of the lens. However, because the largest error is approximately +/-0.25D, it is more realistic to treat the error as measurement tolerance.

Cause 3 The measurement point specified by the lens maker is different to the measurement point detected by the lens meter.

Solution Set "AUTO HOLD" to "OFF." Set the lens at the measurement point specified by the lens maker and touch the “HOLD” button to measure the far area and near area. The measurement point specified by the lens maker can be checked by attaching the test sticker supplied by the lens maker or referring to the fitting manual. However, because the largest error is approximately +/-0.25D, it is more realistic to treat the error as measurement tolerance.

Tip 1 Definition of measurement point for far area/near area of the progressive power lens on this instrument

[Far area]
(1) The prism in both left and right directions is approximately 0.0△.
(2) The progressive power is approximately 0.
(3) The power reaches the maximum on the negative side.

[Near area]
(1) The prism in both left and right directions is approximately 0.0△.
(2) The progressive power is approximately 0.
(3) The addition reaches the maximum.

- When measuring the far area, the target is aligned with the center when the lens is largely offset to the nose or ear side.

Cause 1 A progressive power lens with a prism was measured.

Solution Refer to “3.3.12 Measuring prism."

Cause 2 A lens prescribed for oblique astigmatism of approximately 45° or 135° was measured.

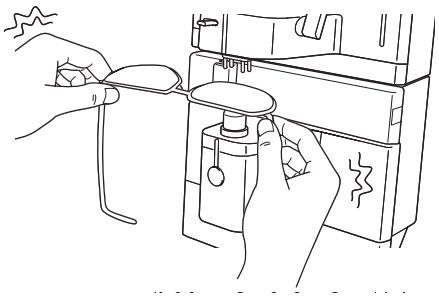
Solution Set the lens at a position approximately 10 - 15 mm above the center of the optical frame and touch the “HOLD” button to take the measurement.

Tip 1 Definition of target mark for far area of progressive power lens

- The target mark indicates the point where the prism in the right and left directions becomes 0.0△.
- The target is centered at a position where the prism in the right and left directions becomes 0.0△ and the dioptry reaches the maximum on the negative side.

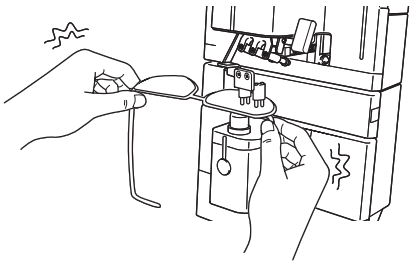
6.4 Measures to prevent flaws on lenses

1) The lens may be damaged during examination when handled as follows.



Cause 1 The lens is forced against the nose piece or was moved rapidly.

Solution Move the lens slowly.

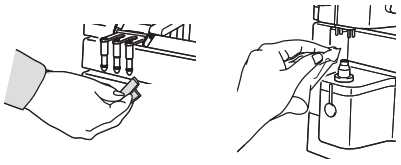


Cause 2 The lens was moved too far using the lens guide.

Solution Do not move the lens too far using the lens guide.

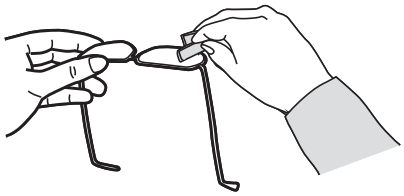
Cause 3 The nose piece or lens guide has dust on it.

Solution Clean the nose piece and lens guide frequently to keep them clean.



Cause 4 The lens has dust on it.

Solution Wipe any dust off the lens before starting measurement.



Cause 5 The nose piece tip is damaged.

Solution Replace the damaged nose piece with a new one.

6.5 Error messages

6.5.1 Startup screen

- INITIAL ERROR!

  Cause 1 Initial error

  Solution Refer to “6.1 General operation.”

6.5.2 Measurement screen

- LT ERROR!

  Cause 1 Insufficient light

  Solution Clean the lens or the protective glass under the nose piece.

  Solution Check that no part of the optical frame is on the nose piece.

  Solution High-density lenses or lenses with excessive flaws cannot be measured.

- NOSEPIECE ERR!!

  Cause 1 The measurement mode does not match the nose piece type.

  Solution Change the nose piece to the appropriate one for the measurement mode. Change the nose piece to the type appropriate for the measurement mode (contact lens measurement mode or optical glasses measurement mode).

- OVER FLOW!

  Cause 1 Over/under flow

  Solution The lens is outside the measurement range and cannot be measured.

- DATA OVER FLOW (only for the single lens measurement screen)

  Cause 1 A measurement was taken after the number of retained data sets has exceeded the maximum level (99).

  Solution Print or transfer the saved data, and delete it.

- MT ERROR!

  Cause 1 Failure of DC motor

  Solution Contact our local distributor.

- Check LENS

  Cause 1 The measured point on the lens may be deformed or damaged.

  Solution Check the lens.

  Cause 2 There is dirt or dust under the nose piece.

  Solution Remove the nose piece and clean it. (Refer to “5.4.2 Cleaning protective glass.”)

- Push UV CAL

  Cause 1 Excessive UV transmissivity

  Solution Touch the “UV CAL” button to calibrate the UV to 100%. (Refer to “2.5 Operation buttons.”)

6.5.3 Measurement result screen

- Print OFF!

  Cause 1 ”PRINT” is set to “OFF.”

  Solution Set "PRINT" to "ON." (Refer to “3.5 Setting measurement conditions.")

- PRT ERROR!

  Cause 1 Paper is jammed in the printer.

  Solution Remove jammed paper. (Refer to "5.5.3 Printer paper.")

- RS ERROR!

  Cause 1 Communication with the external device is not available. (Communication cable is not connected.)

  Solution Connect the communication cable to the external output terminal. (Refer to “3.2.2 Connection of the external device.”

6.5.4 Refractive index measurement screen

- D*ERROR!

  Cause 1 The value of “D1 + D2” is “0.”

  Solution Enter values so that “D1 + D2" is not “0.”

  Cause 2 D1 or D2 is outside the range of +25D - -25D.

  Solution Enter values within the range +25D - -25D.

- ne ERROR!

  Cause 1 The refractive index "ne" of the spherometer is outside the effective range.

  Solution Enter a value of 1.400<ne<1.900 within the effective range of the refractive index of the spherometer.

6.5.5 Power map screen

- Change Nose Piece

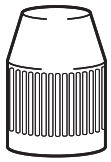
  Cause 1 The nose piece for CL is set when using the POWER MAP screen.

  Solution Change the nose piece to the normal nose piece. (Refer to “3.2.9 Replacing the nose piece.”)

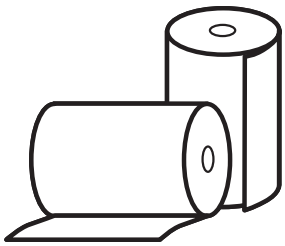
7. SPARE PARTS AND ACCESSORIES

The following spare parts and accessories are available from our local distributor of this instrument. Contact our local distributor to order them.

7.1 Spare parts

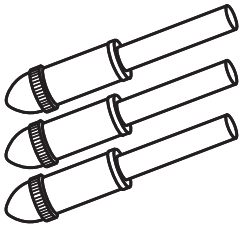


- Nose piece for measuring glasses
  Specify the part type as "TL-5000 nose piece for measuring glasses."
  It is recommended to keep a spare nose piece.

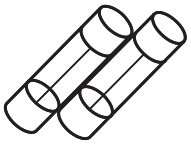


- Printer paper
  Specify the part type as "TL-5000 printer paper."

- Point marker ink cartridge
  Specify the part type as "TL-5000 ink cartridge."



- Fuse
  Specify the part type as “TL-5000 fuse.”



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8. SPECIFICATIONS

8.1 Specifications

8.1.1 Measurement

- Range

Sphere Power (SPH)	±25 D
Cylinder Power (CYL)	±10 D
Axial angle (AXIS)	0 ~ 180°
Additional Power (ADD)	-2 ~ 10 D
Prism Power	0 ~ 10 △

- Increment

Diopter	0.01/0.12/0.25 D
Prism	0.01/0.12/0.25 △

- Mode

Cylinder	- / ± / +
Prism	Rectangular Coordinates / Polar Coodinates / Displacement

- Measurement Time: 0.035seconds (sampling time)
- Wevelength: 660 nm
- Diameter of the beam: Φ2.5 mm, Φ5.0 mm
- Diameter of the lens: Φ20 ~ 120 mm (Φ5mm ~ for Contact Lens)
- Pupilary Distance: 50 ~ 86 mm (step : 0.5 mm)
- Measurement Object: Spectacle lens / Contact lens / Optical lens
- Abbe Numbers: 20 ~ 65 (10 Step)
- Transmittancy of UV: The peak of the wavelength is 385nm.

8.1.2 Data Control

● Display	5.7 inches Color Touch Panel Operation LCD (320×240 dot)
● Alignment	Cross Cursor
● Printer	Thermal Printer / LTP type / 384 dots / line
● External Communication Port	RS-232C, USB(USB1.1)

8.1.3 Dimensions and Electric Requirement

● Dimensions	205(W) × 208(D) × 445(H) mm
● Weight	Approx. 6 kg (13.3 lbs.)
● Power supply	AC 100 ~ 240 V (adjusts automatically)
● Frequency	50/60 Hz
● Consumption Power	40 ~ 50VA

8.2 Noises

This instrument generates machine noise when:

- Measurement (rotation sound of the motor)
- Locked the Lens Table
- Unlocked the Lens Table

8.3 Operating environment

● Installation	Indoor
● Operating Temperature	+5°C ~ +40°C (80% maximum relative humidity for up to 31°C decreasing linearly to 50% RH at 40°C)
● Power fluctuation	Less than ±10% of nominal voltage
● Installation Category	II
● Pollution Degree	2(as per IEC 664)
● Storage Temperature	-20°C ~ +60°C
● Storage Humidity	10 ~ 95%RH

8.4 Conforming standards

● Electrical Safety	EN61010-1:2nd ed.(2001)
● Electromagnetic Compatibility	EN61326:1997 + A1:1998 + A2:2001 + A3:2003

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9. INDEX

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