

**NIDEK**

**AUTO LENSMETER**

**Model LM-970**

**Operator's Manual**



**NIDEK CO., LTD.**

\* Specification and design are subject to change without notice for improvement.

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BEFORE USE, READ THIS MANUAL.

This Operator's Manual contains information necessary for the operation of the NIDEK AUTO LENSMETER Model LM-970. This manual provides general information for the product, cautions, specifications, accessories, operating procedures, and maintenance. In this manual, IEC 60601-1 and UL standards are applied. For correct use, it is necessary that this manual, in particular the operating procedures, be thoroughly understood before using this instrument. Also, always have the manual near the instrument so that you can read it whenever it is necessary. There are no user-serviceable parts inside the instrument except fuses and the ink cartridge. If you find any problem or question about the instrument during the operation, please contact your authorized distributor.



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# §1 INTRODUCTION

## 1.1 Outline of Product

This lensmeter is used for measuring single vision lenses, bifocal (trifocal) lenses, progressive power lenses (PPL), and contact lenses (CL).

It has a measuring unit and a display unit in front. The measuring unit is comprised of a Nosepiece, a Lens Table, a Lens Holder, and a Lens Marker. Below the Nosepiece, there is also a Read Button for recording measured data.

The display unit utilizes a full-graphic LCD, displaying the measured values of right-eye and left-eye lenses at a time, and graphically showing the alignment condition in the shape of a Target. This graphic Target is especially useful when measuring PPL, since the Target moves on the illustration of PPL on the display to show the relation between the measuring point and the progressive channel of the lens. The ADD power value is also graphically indicated.

Icons are conveniently located on the display, next to the corresponding operational buttons.

Since there is no difference in operating procedures of two types of the Lens Markers, Ink Pad Type and Ink Cartridge Type, this manual concentrates on the Ink Cartridge Type.

Furthermore, measured data can be printed out on the AR printer when this lensmeter is connected to the AR-600 series or ARK-700 series. \*1

## 1.2 Classifications

### **[Classification under the provision of 93/42/EEC (MDD)] Class I**

The LM-970 is classified into a Class I instrument.

### **[Protection method against electric shock] Class I**

The LM-970 is classified into a Class I instrument.

The Class I instrument in which protection against electric shock does not rely on basic insulation only, but which includes an additional safety precaution in such a way that means are provided for the connection of accessible conductive parts to the protective (earth) conductor in the fixed wiring of the installation in such a way that accessible conductive parts cannot become live in the event of a failure of the basic insulation.

### **[Degree of protection against electric shock] Type B**

The LM-970 is classified into a Type B instrument.

The Type B instrument with an internal electrical power source providing an adequate degree of protection against electric shock particularly regarding ;

- allowable leakage currents
- reliability of the protective earth connection (if present).

---

\*1 The optional interface cable (OPIF-6) is necessary.

**[Degree of protection against ingress of liquids] IP20**

The LM-970 is an ordinary instrument (enclosed instrument without protection against ingress of liquids). Be careful not to splash water on the instrument.

**[Method(s) of sterilization or disinfection recommended by manufacturer]**

The LM-970 does not have any part to be sterilized or be disinfected.

**[Mode of operation]**

Continuous operation

## 1.3 Symbol Information



This symbol on the body indicates that caution should be taken.  
It is necessary to refer to the operator's manual before using the instrument.



This symbol indicates degree of protection against electric shock is for the Type B instrument.



This symbol on the power switch indicates that the power is ON.



This symbol on the power switch indicates that the power is OFF.



This symbol indicates the contrast adjustment.



This symbol indicates the fuse rating.



This symbol indicates that the instrument must be supplied only with alternating current.

## §2 SAFETY

In this manual, Signal Words are used to designate a degree or level of safety alerting, whose definitions are as follows.

-  **DANGER:** Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
-  **WARNING:** Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
-  **CAUTION:** Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or property damage accident.

### 2.1 Cautions in Use

#### CAUTION

- Do not modify or touch the inside of the instrument.  
This may cause an instrument malfunction or you may get an electric shock.
- Be sure to use the specified electricity.  
If the supplied voltage is too high or too low, the instrument may not work sufficiently, or it may break down or cause a fire.
- Never yank the power cord to disconnect from the wall outlet but hold the plug.  
This can damage the metal core of the cord and may result in a fire, short circuit or electric shock.
- If the metal core of the power cord is exposed, power turns ON and OFF by shaking the cord, or cord plug gets so heated that one can not hold it, it means that the cord is damaged. Change the cord to a normal one immediately.  
It may cause an electric shock or a fire.
- Do not crush or squeeze the power cord with heavy objects.  
If the cord becomes damaged, it may cause a fire or an electric shock.
- Wipe between the prongs of the power plug every once in a while with a dry cloth.  
If dust settles between the prongs, it makes moisture absorb. This may cause a short circuit or a fire may.

## CAUTION

- Do not use the instrument for other than the intended purpose.  
NIDEK will not be responsible for accidents or malfunction caused by such carelessness.
- If you encounter any abnormal conditions such as smoke or strange smells, turn OFF the instrument and pull out the power cord immediately. After confirming that the smoke is no more produced, contact your authorized distributor.  
If the instrument is used under abnormal conditions, it may cause an electric shock or a fire.
- Indoor use only.

## 2.2 In Storage

### NOTE

- Do not store the instrument in a place where it may get wet or where poisonous gas or liquid is stored.
- Do not store the instrument in a dusty place, high temperature and humid place or a place which is exposed to direct sunlight.

## 2.3 In Transference

### CAUTION

- Never grab the frame of the display to lift it up. To carry the instrument, hold it from the backside with both your hands on its base.  
Otherwise, possible injury or the instrument damage may occur.
- Do not carry the instrument while the power cord or interface cable is connected.  
This may cause possible injury or instrument damage.

## 2.4 In Installation

### CAUTION

- Install the instrument in a horizontal and stable place.  
If the instrument is tipped over because of any accidental shock, it may hurt somebody around.
- Do not install the instrument in a place where it may get wet. If water gets into the internal structure, there is a possibility of electric shock or instrument malfunction.
- This instrument has been tested and found to comply with the limits for medical devices to the IEC 60601-1-2: 1993, EN60601-1-2: 1994, Medical Device Directive 93/42/EEC. These limits are designed to provide reasonable protection against harmful interference in a typical medical installation. This instrument generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to other devices in the vicinity. However, there is no guarantee that interference will not occur in a particular installation. If this instrument does cause harmful interference to other devices, which can be determined by turning the instrument off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
  - Reorient or relocate the receiving device
  - Increase the separation between the instrument.
  - Connect the instrument into an outlet on a circuit different from that to which the other device (s) are connected.
  - Consult the manufacturer or field service technician for help.

### NOTE

- Avoid using the instrument in a place exposed to direct sunlight or near incandescent light. A light-reflecting surface such as a glass showcase or a shiny table is also not appropriate for precise work.  
Under such circumstances, the instrument may work irregularly or indicate error messages.
- Avoid using the instrument where wind from air conditioner blows directly.
- Do not use the instrument in a hot, humid or dusty environment. Be sure to install the instrument on a place which can keep the specified environmental conditions.  
Such environments produce adverse effect on the internal parts of the instrument.

## 2.5 In Wirings

### CAUTION

- Be sure to use a wall outlet equipped with a grounding terminal.  
Otherwise, it may cause an electric shock or a fire when it breaks or power leaks.
- Be sure to securely plug in the power cord.  
Insecure connections may cause a fire.
- Be sure to connect the power cord, footswitch cable or interface cable after turning OFF the power switch.  
Otherwise, it may cause a malfunction.
- Be sure to run the power cord, footswitch cable or interface cable through the opening at the back of the base so that they will not be squeezed with the body.  
If the cable becomes damaged, it may cause a fire or a malfunction.

## 2.6 After Use

### CAUTION

- If the instrument will not be used for a long time, disconnect the power plug from the wall outlet.  
If dust settles on the plug, it makes moisture absorb. This may cause a short-circuit or a fire.

### NOTE

- When the instrument is not in use, turn OFF the power and put the dust cover on.  
If dust settles on the optical parts, it may affect the measurement accuracy.

## 2.7 Maintenance and Checks

### CAUTION

- Be sure to replace fuses after turning OFF the power switch and disconnecting the power cord from the power inlet.  
You may get an electric shock.
- Be sure to use the specified fuses for replacement.  
This may cause a fire.
- When replacing fuses, do not change the number shown in the voltage indication window.  
If the voltage setting does not match the specified line voltage, it may cause a fire or a malfunction.
- When replacing the ink cartridge, tighten the screw securely holding the cartridge firmly.  
Use a screwdriver whose bit fits the recess of the screw.  
Be careful not to hurt your fingers with the screwdriver.
- In case that the instrument breaks down, disconnect the power cord from the wall outlet and contact your authorized distributor without touching the inside of the instrument.

### NOTE

- Never use an organic solvent such as paint thinner to wipe the exterior.  
It may ruin the surface.
- Take special care not to scratch the protective glass under the nosepiece.  
Flaws on the glass substantially lower the reliability of measurements.
- Clean the protective glass under the nosepiece every once in a while with a blower.  
If dust settles on the protective glass, it may affect the measurement accuracy.



## 2.8 Disposal

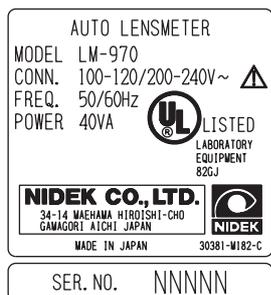
### NOTE

- Follow local governing ordinances and recycling plans regarding disposal or recycling of device components.
- When disposing packing, sort them by the materials and follow local governing ordinances and recycling plans.

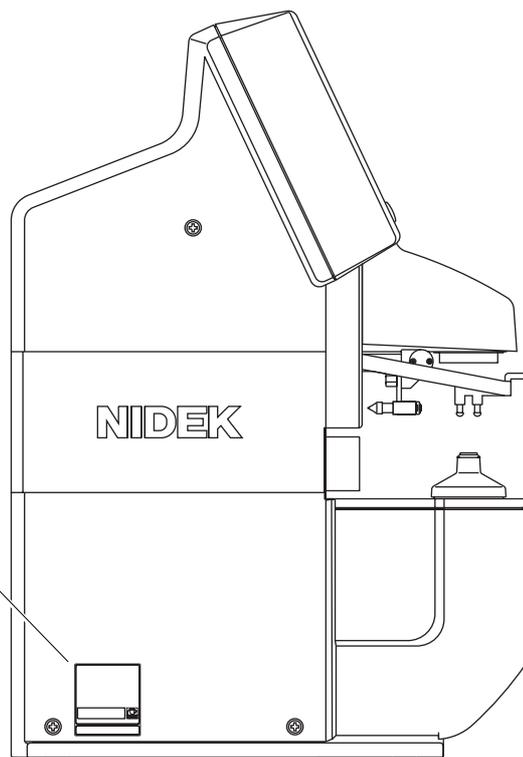
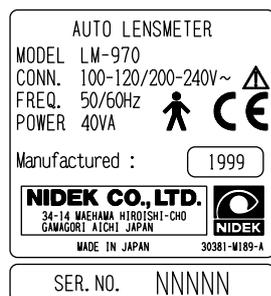
## 2.9 Labels

In order to draw the operator's attention, the appropriate warning labels are attached to the specified locations on the main body.

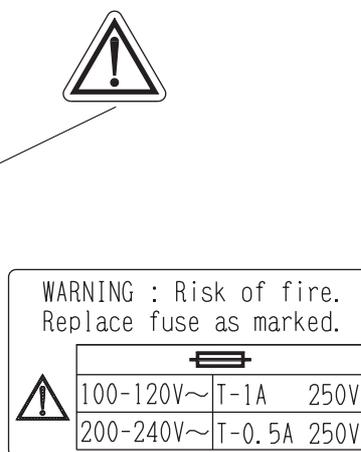
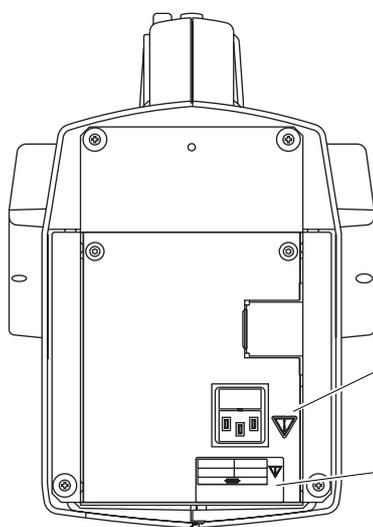
### [Left side view]



OR

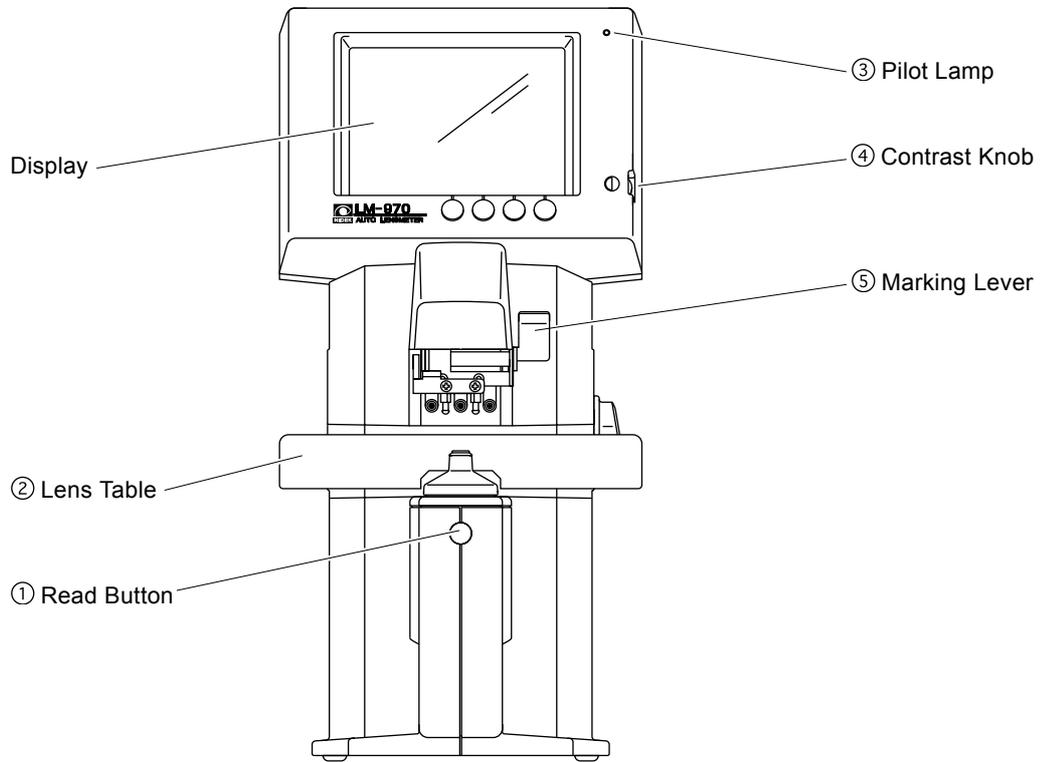


### [Underside view]

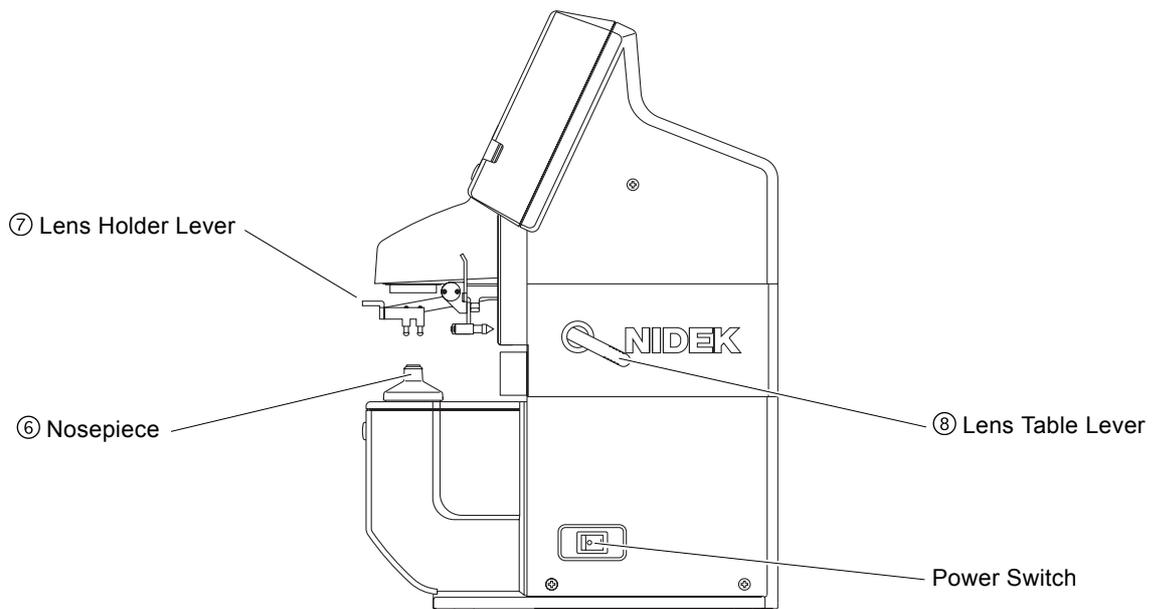


# §3 CONFIGURATION

[Front view]



[Right side view]



**① Read Button**

Used to read data.

This button fixes the measured data on the display so that they will be saved in memory.

**② Lens Table**

Touched to the bottom of the lens frame (both lenses).

**③ Pilot Lamp**

Power ON state : Lit

Auto-OFF state\*1 : Blink

**④ Contrast Knob**

Used to adjust the contrast of the display.

**⑤ Marking Lever**

Used to mark a lens for its basic line. To do so, push the lever down.

**⑥ Nosepiece**

Used to place a lens on; the base point for measurements.

When measuring a contact lens (CL), this must be replaced with the special one for the CL measurement.

**⑦ Lens Holder Lever**

Used to move the lens holder.

To fix a lens:

Lift it once and lower it gently.

To remove a lens:

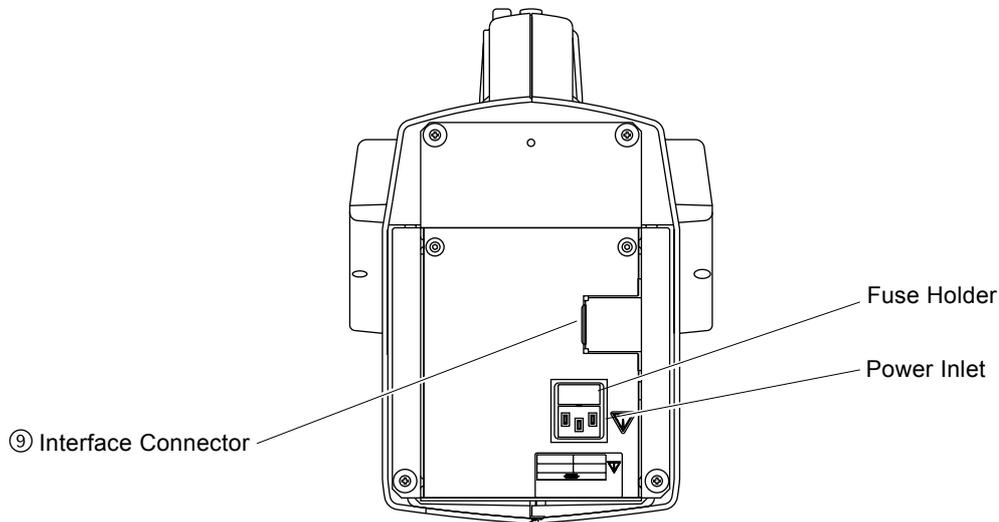
Lift it until it clicks.

**⑧ Lens Table Lever**

Used to move the lens table back and forth.

---

\*1 The display will automatically turn OFF when certain time passes without any button operation; the auto-OFF time limit can be specified on the SUB MENU display. To recall the ON state, press any button. The auto-OFF function will not be executed when a lens is on the nosepiece.

**[Underside view]****⑨ Interface Connector\*2**

Used to connect the interface cable which is needed for transmitting measured data to an external instrument.

It is also used to connect the optional footswitch.

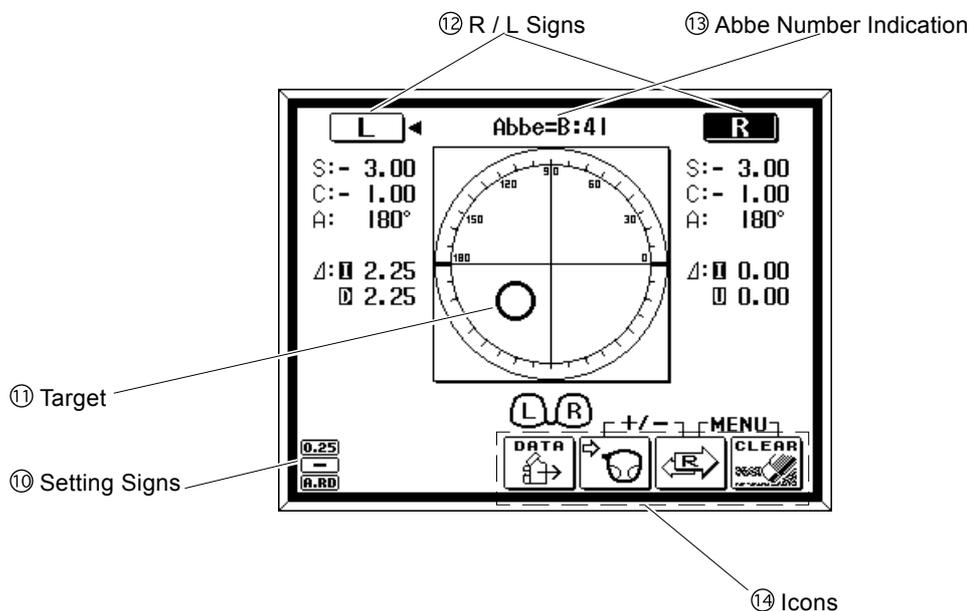
---

\*2 Accessory instrument connected to the analog and digital interfaces must be certified according to the representative appropriate national standards (for example, UL 1950 for Data Processing Equipment UL 2601-1 for Medical Equipment, and CSA C22.2 No. 601-1, EN 60601-1 and IEC 60601-1.)

Furthermore all configurations shall comply with the system standard IEC 60601-1-1. Everybody who connects additional equipment configured a medical system, and is therefore responsible that the system complies with the requirements of the system standard IEC 60601-1-1. If in doubt, consult the technical service department or your local representative.

## [Measurement display]

Lens measurements are performed on this display.



### ⑩ Setting Signs

0.01, 0.12, 0.25 : Steps  
 MIX, +, - : CYL reading way  
 A.RD : Auto-read state\*<sup>1</sup>

### ⑪ Target

Shows the measuring point while a lens is on the nosepiece.

The shape of the target changes with alignment.

- : Out of center
- + : In the center (Within  $0.5f\phi$ )
- + : Aligned to the center (Marking point)

### ⑫ R/L Signs

Show when the right-eye lens or left-eye lens is specified, and values below each show the measured data of the lens. **S** shows that the lens side is not specified.

\*<sup>2</sup>

Reversed sign:

Shows that the measured data is fixed.

Blinking ◀ or ▶ :

Indicates the measuring lens or the lens side on the nosepiece.

### ⑬ Abbe Number Indication

Shows an abbe number setting except when it is set to 58\*<sup>3</sup>.

## ⑭ Icons

Show the functions of buttons at the bottom of the display.

By pressing two buttons whose icons are under  $\Gamma + / - \Gamma$  or  $\Gamma \text{MENU} \Gamma$  simultaneously (Press one button simultaneously with the other button), it serves an another function.

### : Data Button

Used to transmit the measured data shown on the display to the external instrument which is connected to the interface connector.

### : Mode Change Button\*4

Used to change the mode of the measurement display in order.

Each icon represents the mode which is shown by pressing the button.

### : Right/Left Button

Used to specify the right-eye lens or left-eye lens.

By pressing this button simultaneously with the mode change button, the cylinder reading direction switches to + or -. By pressing them again, it returns to the pre-set reading direction.

### : Clear Button

Used to clear the data in memory.

The fixed data will be released and the R/L signs will return to .

By pressing this button simultaneously with the R/L button, the display changes to the MAIN MENU display.

---

\*1 “Auto read” is a function to automatically fix the measured data after the target is centered (or aligned to the center cross), which is made by pressing the read button.  
See “5.3 Parameter Settings”.

\*2 When the power is turned ON, the  display will appear.  
To specify the measuring lens, press  or  so that the R/L-specified display will appear.  
To return it to the non-specified  display, press .

\*3 The abbe number “58” is the light dispersion coefficient of “crown glass K1”, which is the material generally used for spectacles.

\*4 When the “CONTACT2 parameter is set to “ON”, ,  or  will appear.  
When the “CONTACT” parameter is set to “OFF”:

The icon will become , which alternates the regular measurement display and PPL measurement display for each press of the button. Contact lenses cannot be measured.

When the “CONTACT” parameter is set to “ONLY”:

No icon will appear here.

\* This is a setting to restrict the measurement to contact lenses only.

**[Menu display]**

Parameter settings are performed on this display.

Besides MAIN MENU display, RS-232C MENU display includes the parameters which provide the settings for interfacing communication and SUB MENU display includes the parameters whose settings are not used very often.



MAIN MENU display

**⑮ Icons**

Show the functions of buttons at the bottom of the display.



: EXIT Button

Used to return to the measurement display.



: Up Button



: Down Button

Used to select an item.

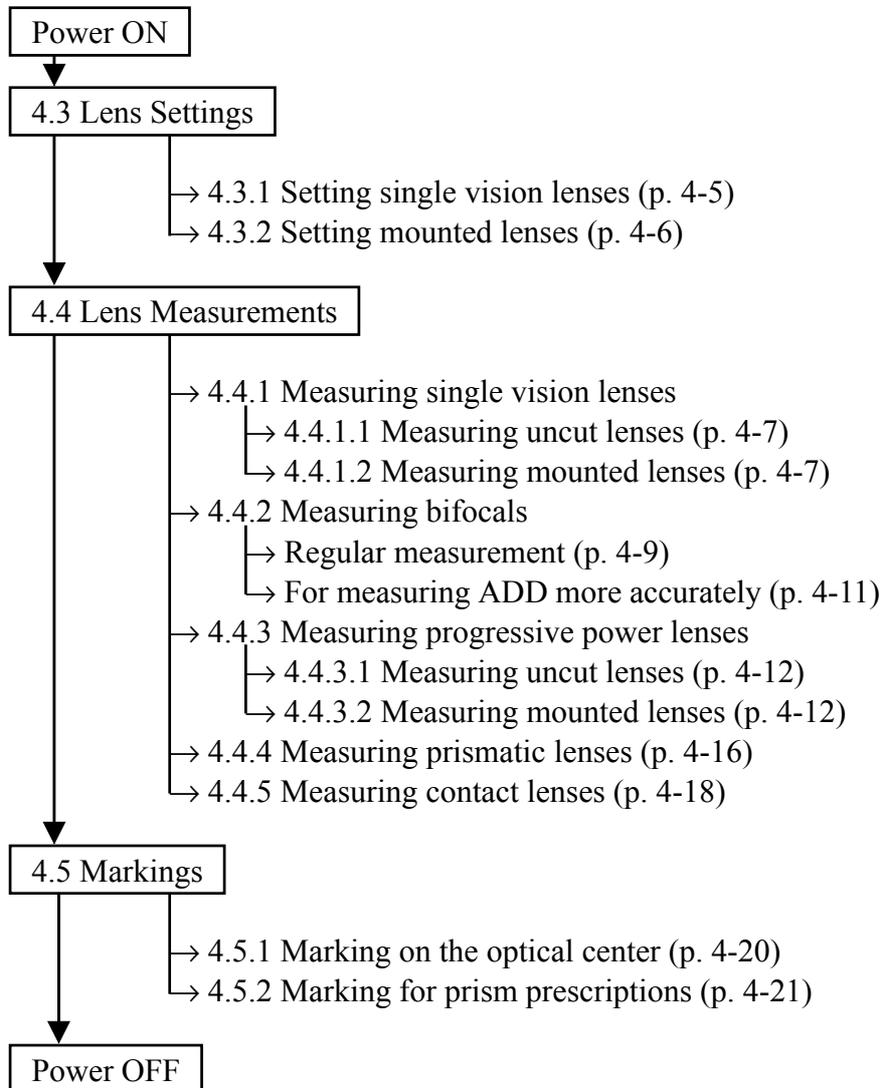


: Right Button

Used to change settings.

# §4 OPERATING PROCEDURES

## 4.1 Operation Flow



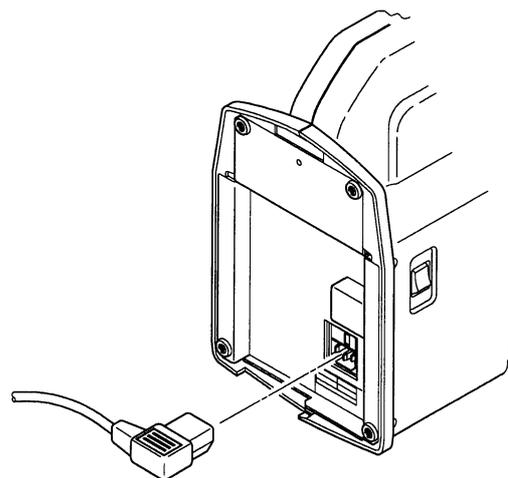
## 4.2 Preparation

### 4.2.1 Setups

1. Connect the power cord to the power inlet on the underside of the instrument.
2. Plug the power cord into the wall outlet.

#### ⚠ CAUTION

- Be sure to use the power outlet equipped with a grounding terminal.  
This may cause an electric shock, breakage or power leakage.



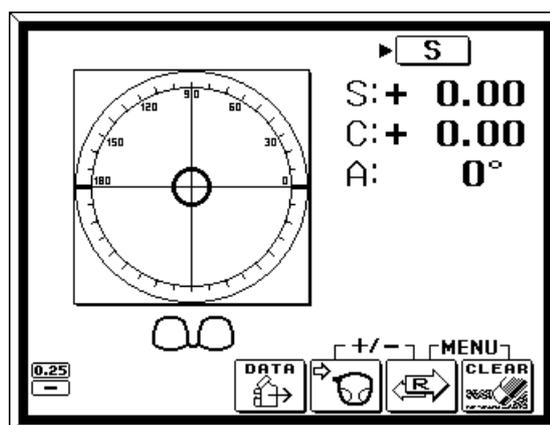
3. Turn ON the power.

- Initialization display appears.

- After initialization, the display changes to Measurement display. \*1



Initialization display



Measurement display

#### NOTE

- Do not turn ON the power with a lens on the nosepiece.  
If a lens is on the nosepiece before the measurement display appears, "Init Err" will appear. Remove the lens and turn ON the power again.

- \*1 The measurement display after initialization varies according to the setting at the “CONTACT” parameter.

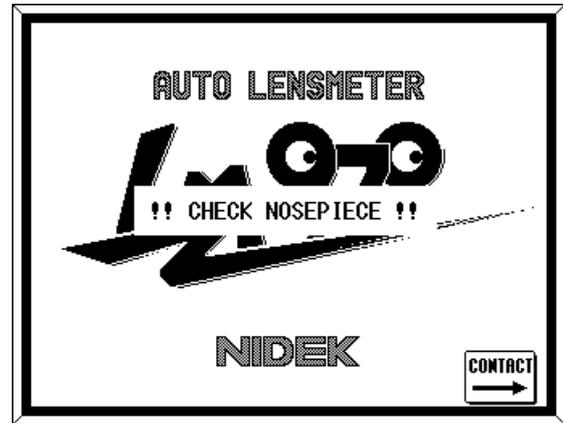
When the parameter is set to “ON” or “OFF”:

The regular measurement display will appear.

\* If the power is turned ON with the nosepiece for contact lenses attached, “!!CHECK NOSEPIECE!!” will appear on the initialization display.

- To measure spectacle lenses:  
Change the nosepiece to the regular one, then turn OFF and ON the power.

- To measure contact lenses only:  
Press  so that the display will change to the CL measurement display.  
The regular or progressive power lenses cannot be measured unless the power is turned OFF and ON again.



When the parameter is set to “ONLY”:

The CL measurement display will appear.

- \* Make sure the nosepiece is for contact lenses.

## 4.2.2 Connection of optional accessories

### 4.2.2.1 Footswitch

The optional footswitch can be used instead of the read button to read measured data.

#### [Connection]

**1. Turn OFF the power.**

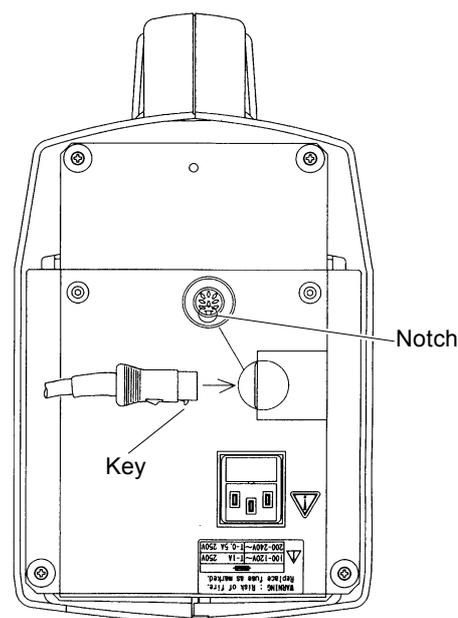
**2. Connect the cable.**

Connect the cable of the footswitch to the interface connector on the underside.

Connect it so that the key of the plug will fit the notch of the receptacle.

**3. Fix the cable.**

Run the cable through the opening at the back of the base so that the cable will not be squeezed with the body.



### 4.2.2.2 Interface cable

The interface cable is used to connect the LM-970 with the NIDEK AOS or COS series to transmit measured data.

The connecting procedure is the same as “4.2.2.1 Footswitch”.

### 4.2.2.3 IC card system

To transmit data to the NIDEK AOS or COS series via IC card, it is necessary to connect the optional IC card system.

The interface cable is used to connect the system to the interface connector on the underside of the instrument.

The connecting procedure is the same as “4.2.2.1 Footswitch”.

## 4.3 Lens Settings

### 4.3.1 Setting single vision lenses

**1. Specify the lens side if necessary.**

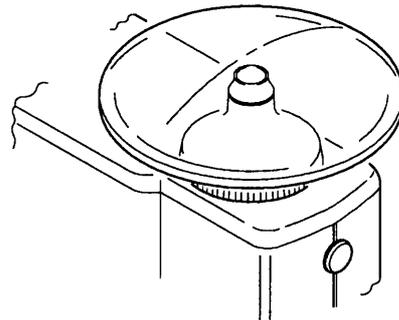
Press  or  to specify the right-eye lens or left-eye lens.

The blinking ◀ or ▶ mark indicates the measuring lens side.



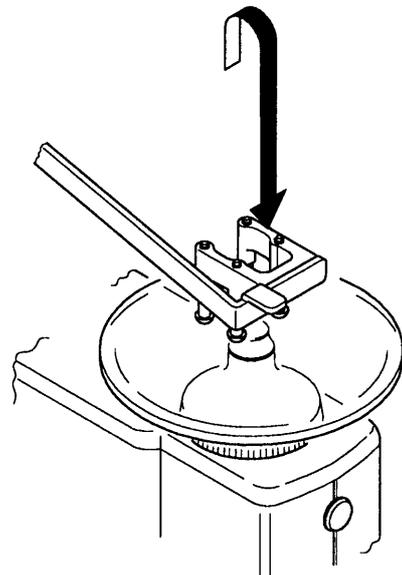
**2. Set the lens.**

Place the measuring lens on the nosepiece with the convex side up.



**3. Fix the lens.**

Raise the lens holder lever to its uppermost position, then lower it slowly to fix the lens.

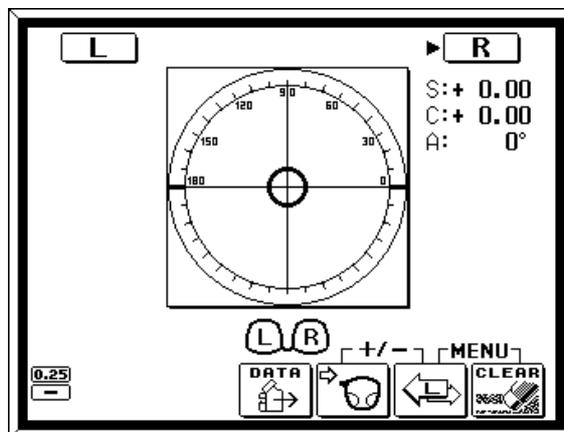


## 4.3.2 Setting mounted lenses

### 1. Specify the lens side.

Press  or  to specify the right-eye lens or left-eye lens.

The blinking ◀ or ▶ mark indicates the measuring lens side.

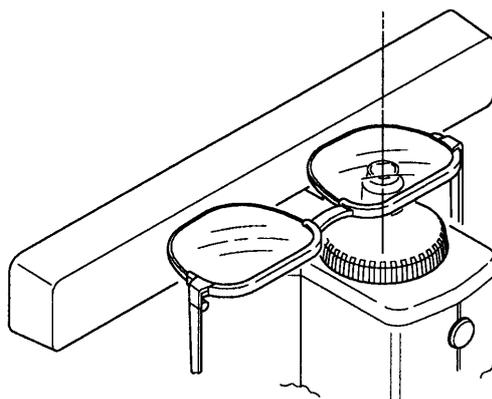


### 2. Set the spectacles.

Place the lens center on the nosepiece with the convex side up.

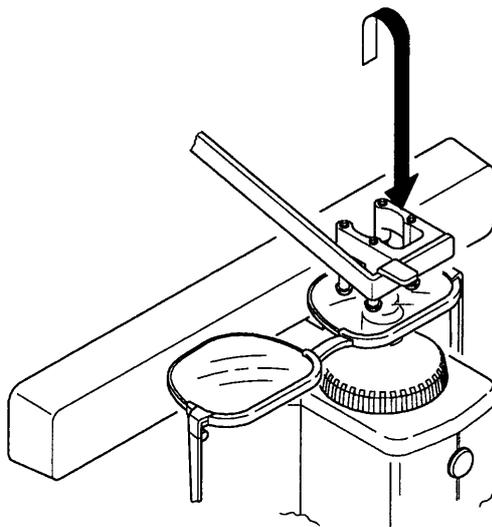
### 3. Set the lens table.

Pull the lens table lever toward yourself until it touches the bottom of the frame (both lenses).



### 4. Fix the lens.

Raise the lens holder lever to its uppermost position, then lower it slowly to fix the lens.



## 4.4 Lens Measurements

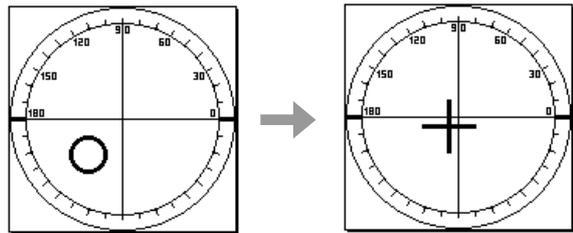
### 4.4.1 Measuring single vision lenses

#### 4.4.1.1 Measuring uncut lenses

**1. Bring the target to the center.**

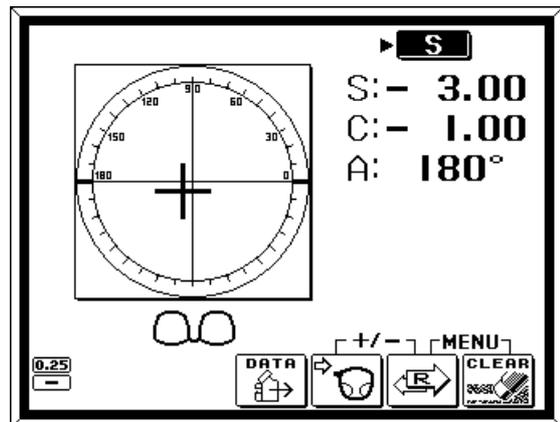
Move the lens to bring the target (○) close to the center of the alignment circle.

When the target comes within a range of  $0.5 \Delta$  from the center, the shape of the target will change to the cross line (+).



**2. Press the read button, which can be found below the nosepiece.**

The measured data will be fixed. \*1 \*2

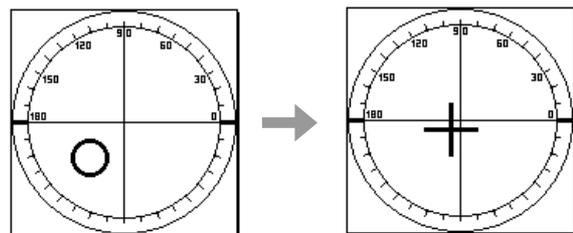


#### 4.4.1.2 Measuring mounted lenses

**1. Bring the target to the center.**

Move the lens to bring the target (○) close to the center of the alignment circle.

When the target comes within a range of  $0.5 \Delta$  from the center, the shape of the target will change to the cross line (+).

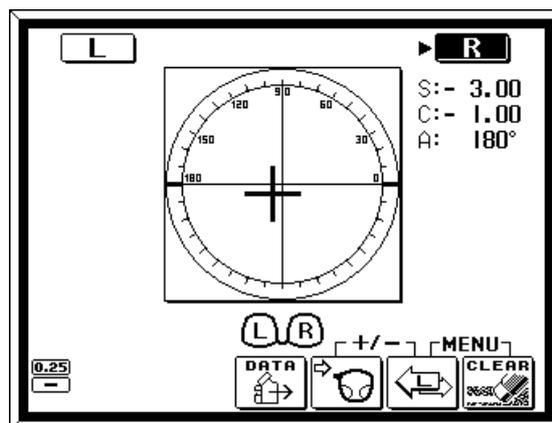


## 2. Press the read button.

The measured data will be fixed. \*1 \*2

## 3. Measure the other lens.

Follow the same steps as the first lens.



### ○ Prism indication

When the prism indication is needed, set the “PRISM” parameter to “ $\Delta\theta$ ” or “BU/D BI/O”. See “5.3 Parameter Settings”.

$\Delta\theta$   $\Rightarrow$  Polar coordinates

BU/D BI/O  $\Rightarrow$  Rectangular coordinates **O**: Base Out, **I**: Base In  
**U**: Base Up, **D**: Base Down

### ○ Changing the reading

Pressing the mode change button (, , or ) simultaneously with the R/L button ( or ) switches the cylinder reading direction to + or -. By pressing them again, it returns to the preset reading direction.

\*1 When the measured data is fixed on the display, the data will be saved in memory and the **R** / **L** or **S** sign will be reversed. Since the target does not fix, measurement can be repeated by centering the target and pressing the read button again. The cylinder +/- reading can be switched although the data is fixed.

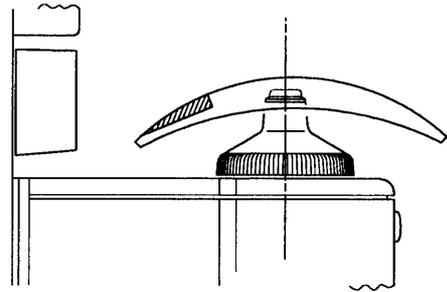
\*2 When the “A. READ S” or “A. READ R/L” parameter is set to “+” or “+”, the data will be automatically fixed after the target is centered (or aligned to the center cross), which is made by pressing the read button. To repeat the measurement, perform alignment and press the read button again. See “5.3 Parameter Settings”.

## 4.4.2 Measuring bifocals

For measuring bifocals or trifocals, follow the procedure below.

### [Regular measurement]

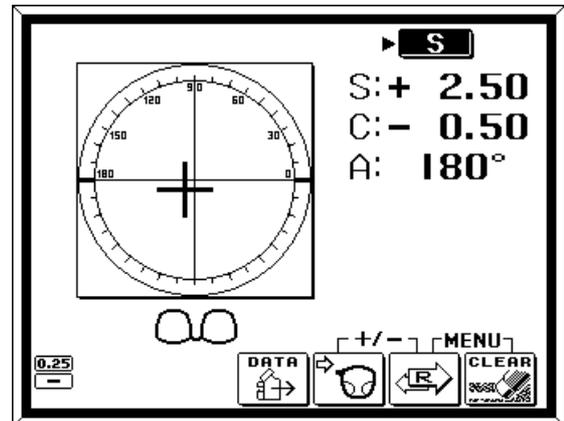
#### 1. Bring the distance part onto the nosepiece.



#### 2. Measure the distance power.

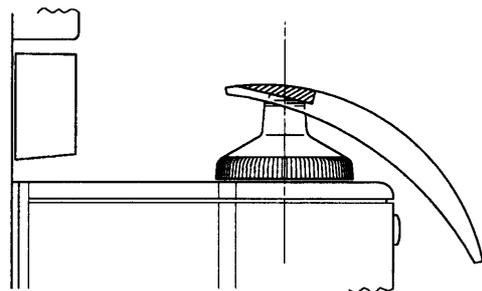
After the shape of the target changes from the circle (○) to the cross line (+), press the read button.

The measured data for distance will be fixed.



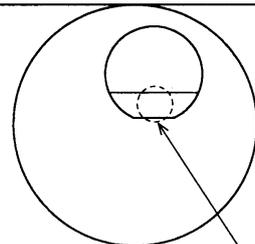
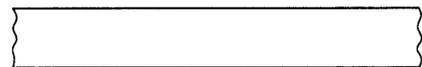
#### 3. Measure the addition power (Add).

Pull the lens toward yourself to bring the near portion onto the nosepiece.



### NOTE

- It is not necessary to perform alignment.
- For trifocals, bring the intermediate portion onto the nosepiece.

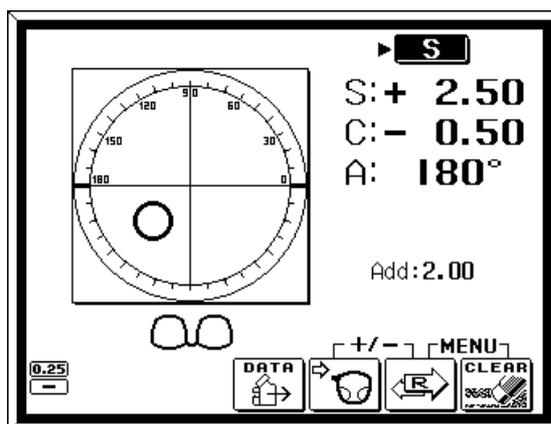


Intermediate position

**4. Press the read button.**

For bifocals, the measurement is completed at this point.

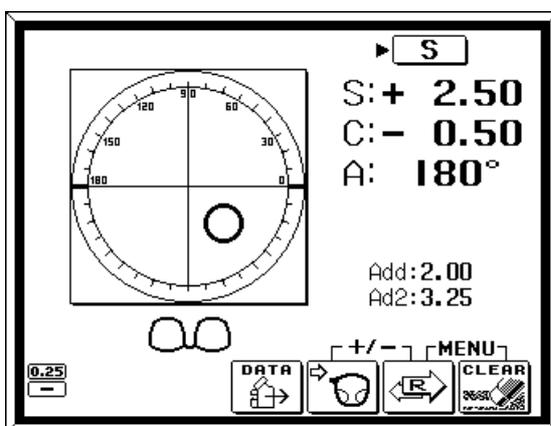
For trifocals, proceed to the steps 5. and 6.

**5. Bring near portion onto the nose piece.**

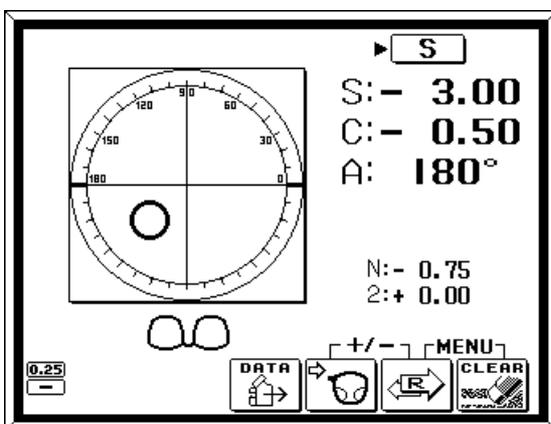
The secondary addition value (Ad2) will appear on the display.

**NOTE**

- It is not necessary to perform alignment.

**6. Press the read button.****○ Sphere indication for near portion**

By setting the "NEAR" parameter on the SUB MENU display to "NEAR SPH", the power of near portion will be indicated by spherical value instead of addition value.



**[For measuring ADD more accurately]**

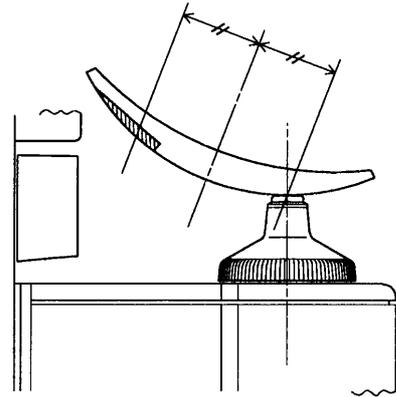
This is a procedure for measuring the addition power without including error in the measured value made by the distance between the segment and the nosepiece. It is especially effective when the base lens is thick.

**1. Set the lens with the concave side up.****2. Set the distance part.**

Bring the nosepiece to the point that is opposite from the segment position about the midpoint of the lens center.

**3. Press the read button.****NOTE**

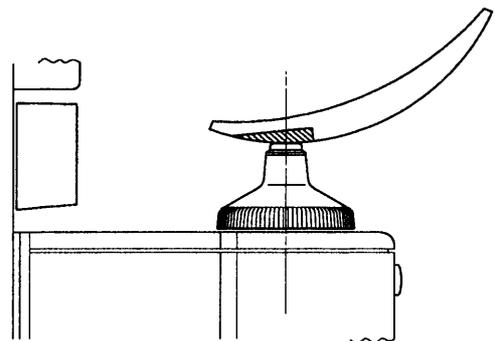
- It is not necessary to perform alignment.
- This measured value is only a reference for getting the ADD power and is not the actual distance data.

**4. Set the near portion.**

Pull the lens toward yourself to bring the near portion onto the nosepiece. The addition value (Add) will appear.

**NOTE**

- It is not necessary to perform alignment.

**5. Press the read button.**

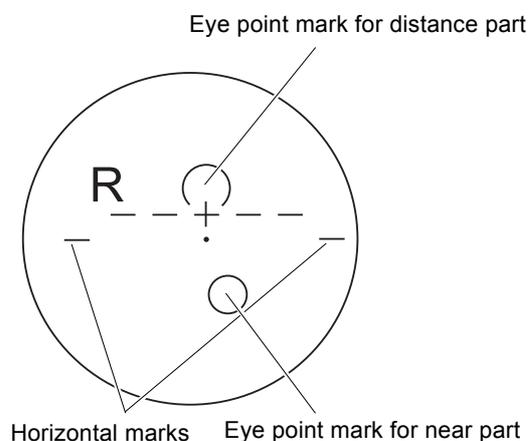
## 4.4.3 Measuring progressive power lenses

### 4.4.3.1 Measuring uncut lenses

Measure the progressive power lens (PPL) in the same manner as “4.4.2 Measuring bifocals”, using manufacturer’s specific eye point marks.

#### NOTE

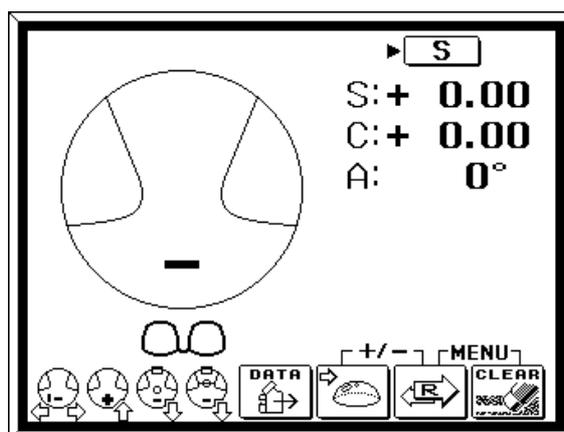
- The lens should be placed with its horizontal marks parallel to the lens table.



### 4.4.3.2 Measuring mounted lenses

#### 1. Press .

The PPL measurement mode will appear.  
The measuring process will be shown at the bottom left of the display. The process will be indicated by blinking of arrows.

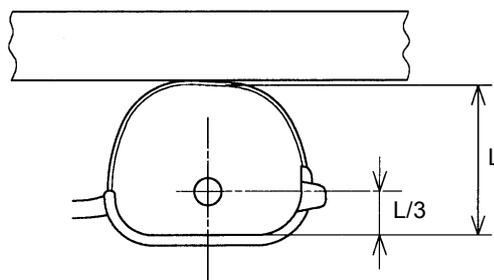


#### 2. Set the lens.

See “4.3.2 Setting mounted lenses”.

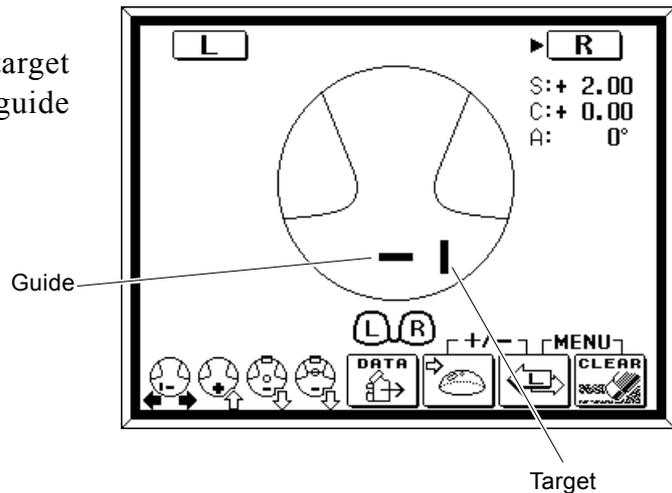
#### 3. Bring the distance part onto the nosepiece.

Place the upper-third part of the lens.

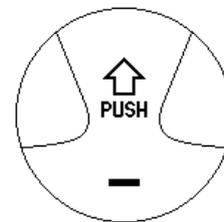


**4. Bring the target onto the guide.**

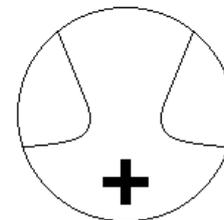
Move the lens sideways to bring the target (vertical line) onto the middle of the guide (horizontal line).



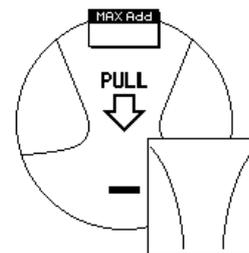
A “PUSH” sign will appear when the target comes right in the middle of the guide.

**5. Change the target to the large cross ( + ).**

Push the lens slowly forward until the shape of the target changes to the large cross ( + ).

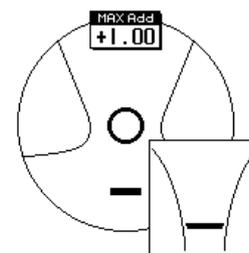


When the measured value becomes stable, the instrument will beep and the distance data will automatically be fixed. The “PULL” sign and addition power graph (ADD graph) will appear to show that the ADD power measurement is ready.

**6. Make the target ( O ) appear.**

Pull the lens slowly toward yourself.

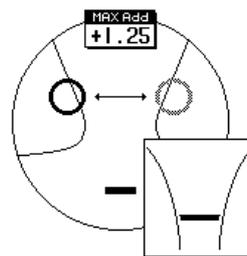
When the ADD power is detected, the “PULL” sign will disappear and the target ( O ) will appear.



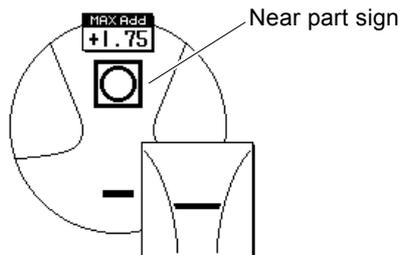
### 7. Search for the near part.

Pull the lens slowly more.

If the target is shifted out of the progressive channel, slide the lens laterally to bring the target in.



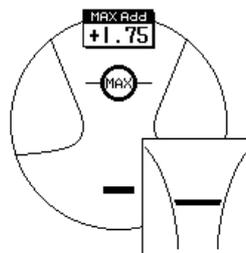
When the near part of the lens comes onto the nosepiece, the near part sign (□) will appear.



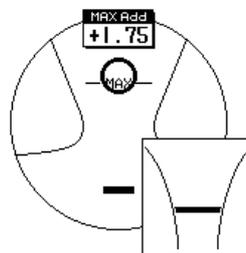
### 8. Search for “-MAX-” indication point.

At close to the position that the near part sign is illuminated, search for the point that the ADD power is highest.

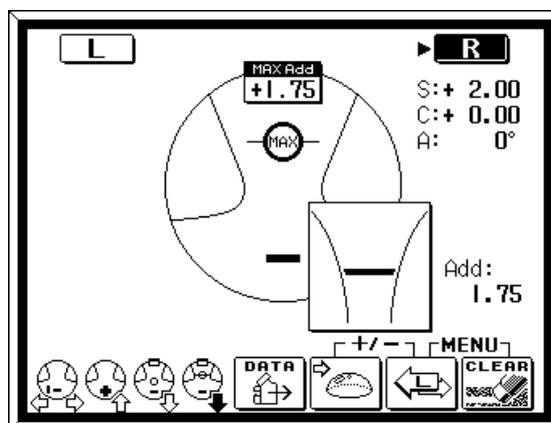
When the maximum ADD power is detected, the near part sign will disappear and “-MAX-” will appear.



If the target went past the position of “-MAX-”, move the lens back onto “-MAX-”.



### 9. Press the read button.



**NOTE**

- When the near part is located close to the frame, the near part sign sometimes does not appear.  
In such a case, press the read button at the point that the ADD power is highest regardless of the sign.
- Some lenses are designed to increase the addition power continuously even beyond the near part. If such lenses are measured, “-MAX-” will not appear.  
In such a case, press the read button at the point that the near part sign appears.

**10. Return to the normal measurement mode.**

Press the mode change button  twice to return to the normal measurement mode. By pressing it once, the icon changes to . Press it again.

## 4.4.4 Measuring prismatic lenses

To measure the prism power, set the “PRISM” parameter on the MAIN MENU display to “ $\Delta\theta$ ” or “BU/D BI/O”.

$\Delta\theta$   $\Rightarrow$  Polar coordinates

BU/D BI/O  $\Rightarrow$  Rectangular coordinates

**O** : Base Out

**I** : Base In

**U** : Base Up

**D** : Base Down



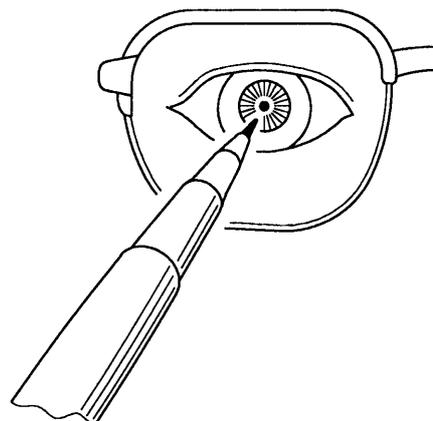
### [Measuring mounted prismatic lenses]

#### 1. Mark the pupil center.

Instruct the customer to wear spectacles and look straight. Mark the pupil center on each lens.

#### NOTE

- The mark should be smaller than 1mm in diameter.  
If the mark is too big, it may interfere with the measurement.

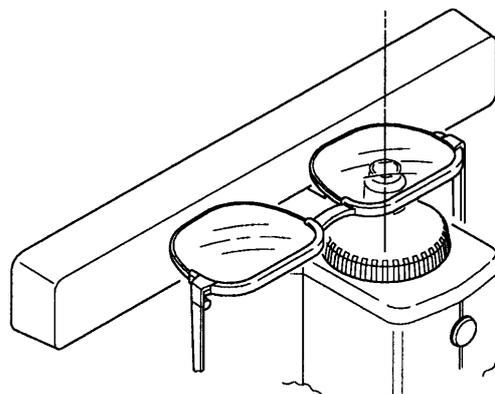


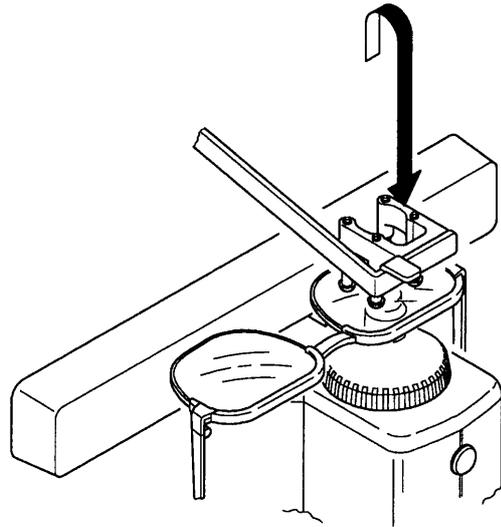
#### 2. Specify the lens side.

Press  or  to specify the right-eye lens or left-eye lens.

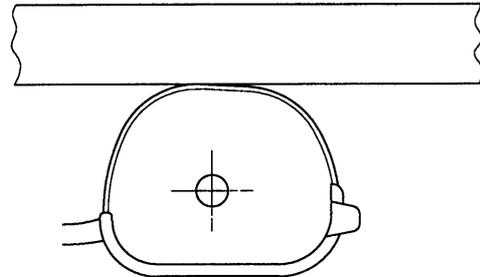
#### 3. Set the lens.

Place the lens center on the nosepiece, as shown, with the convex side up.



**4. Fix the lens with the lens holder.****5. Bring the eye point mark on the center of nosepiece.****NOTE**

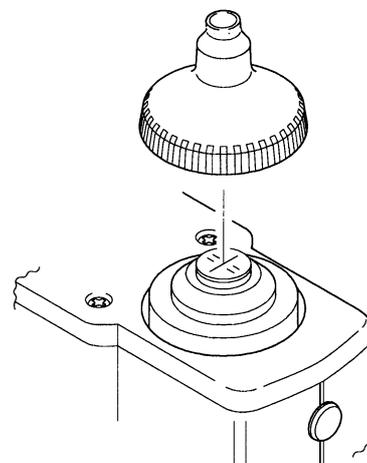
- It is not necessary to align the target.

**6. Press the read button.****NOTE**

- If "Data Err" appears, the mark will be in the way of the measuring light pencil. Move the lens a little to achieve the measured data.

## 4.4.5 Measuring contact lenses

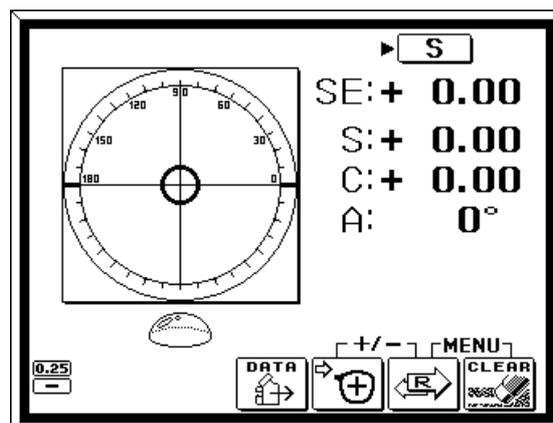
1. Change the nosepiece to the one for contact lenses (CL).



2. Establish the CL measurement mode.

Press the mode change button  twice.\*1

The figure on the right is the display for this mode.

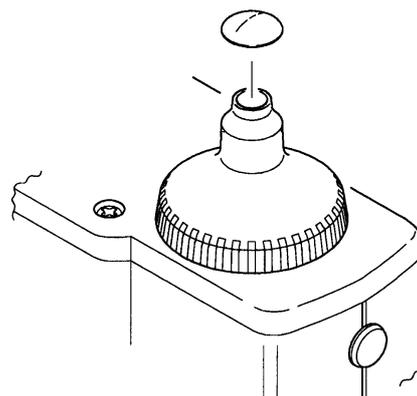


3. Set the CL.

Place the lens on the nosepiece with the convex side up.

### NOTE

- Hold the CL with tweezers or fingers. Be careful not to damage the CL. Only use tweezers with round tips.
- Do not press the lens holder down on the CL.  
It damages the CL.



\*1 When the "CONTACT" parameter on the SUB MENU display is set to "ONLY", the mode change button will not function. The mode is restricted to the CL measurement. If the "CONTACT" parameter is set to "OFF", the CL measurement will be disabled. Select "ON" or "ONLY".

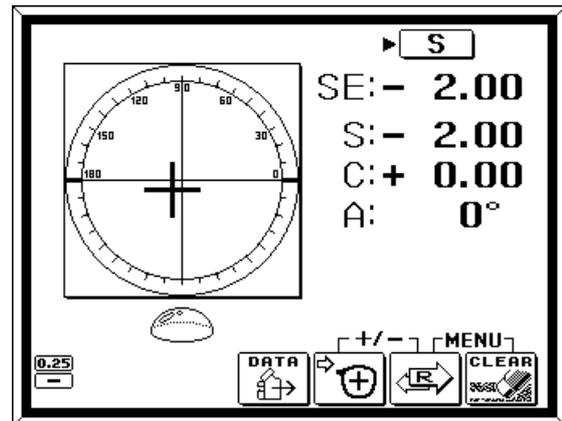
#### 4. Align the target.

#### 5. Press the read button.

In the CL measurement mode, SE value\*<sup>2</sup> will be shown over the S, C and A measured values.

#### 6. Press the mode change button .

The mode will return to the normal measurement mode.



## NOTE

- Measure the soft contact lens as quickly as possible so that its lens surface will not become dry. Since the lens contains water and is made of soft material, the lens cannot stay spherical for a long time, altering the measured value.

#### \*2 SE (Sphere Equivalence) value

This is 1/2 of the cylinder value added to the spherical value. When a non-cylindrical CL is measured and still a cylinder value is detected, the SE value will be more reliable than the SPH value to know the total spherical value since it reduces the error in the measured value made by a bend or a contortion of the lens.

## 4.5 Markings

### 4.5.1 Marking on the optical center

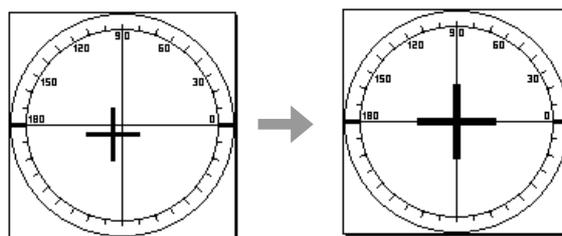
This is a method used to mark lenses in order to specify the optical center and horizontal direction.

#### 1. Bring the target to the center.

#### 2. Align the target to the center cross.

Move the lens more to align the target to the center cross so that the shape of the target will change from the cross line ( + ) to the large cross ( + ).

For spectacles, move the lens table until it touches the bottoms of frames.

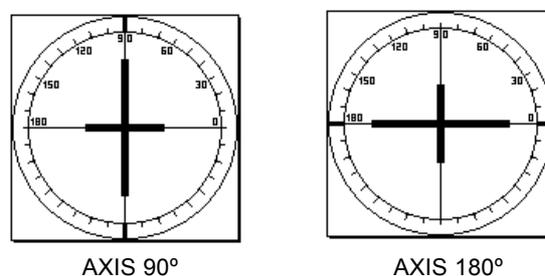


#### 3. Set the axis to the prescribed value.

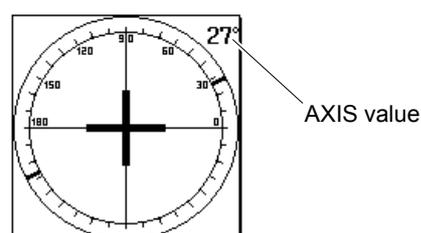
While watching the axis value on the display, rotate the lens until the value shows its prescription. \*1

If the large cross ( + ) changes back to the cross line ( + ), align again.

When the axis indicates  $90^\circ$  or  $180^\circ$ , the shape of the target will change as shown on the right.

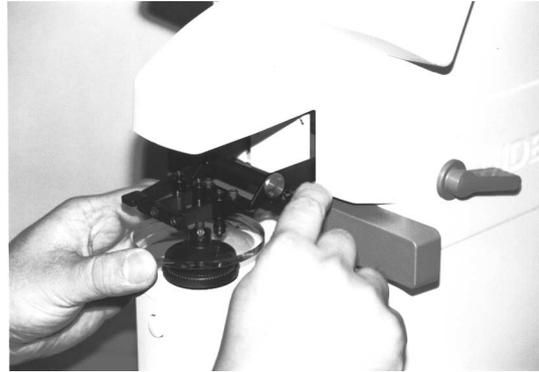


\*1 When the “A. READ S” or “A. READ R/L” parameter is set to “+” or “+”, the measured value will automatically be fixed after the target is aligned. Watch the value shown on the top right of the alignment circle to set the axis.



#### 4. Mark the lens.

Press down the marking lever to mark the lens.  
Three points in a line parallel to the lens table will be marked.



#### 5. Remove the lens.

To remove the lens, raise the lens holder lever until it clicks.

### NOTE

- Do not touch the markings as the ink is easy to smear.

## 4.5.2 Marking for prism prescriptions

This is a method used to mark lenses for heterophoria prescriptions.

[For rectangular coordinates]

1. Set the parameter "PRISM" on the MAIN MENU display to "BU/D BI/O".  
See "5.3 Parameter Settings".



2. Press  or  to specify the right-eye lens or left-eye lens.

The blinking ◀ or ▶ mark indicates the measuring lens side.

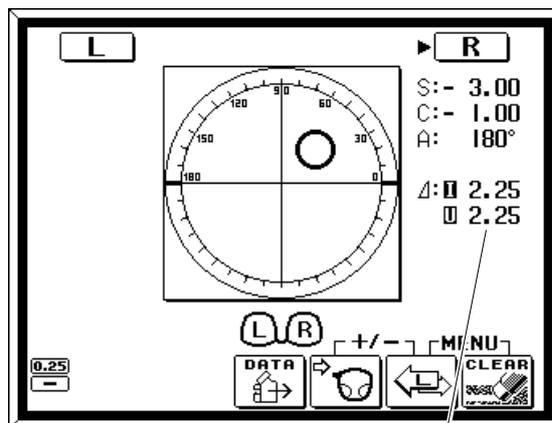
## NOTE

- Be sure to specify the right-eye lens or left-eye lens for rectangular coordinates.

3. While watching the prism value on the display, move the lens until the value shows its prescription.

**O**, **I**, **U** or **D** indicates the following direction.

- O** : Base Out  
**I** : Base In  
**U** : Base Up  
**D** : Base Down



Prism indication

4. If the lens contains cylinder power, while watching the axis value on the display, rotate the lens until the value shows its prescription.

5. Mark the lens.

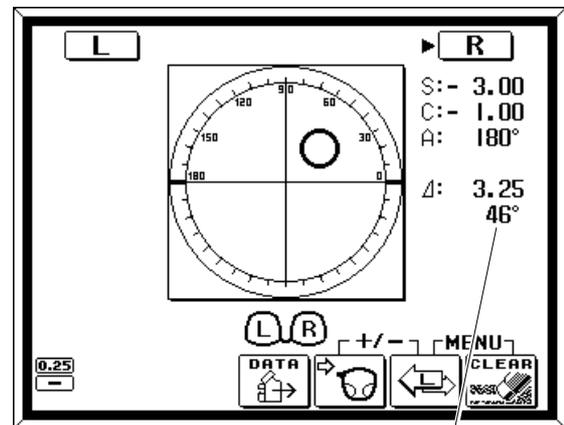
Press down the marking lever to mark the lens.

[For polar coordinates]

1. Set the parameter “PRISM” on the MAIN MENU display to “ $\Delta\theta$ ”.  
See “5.3 Parameter Settings”.



2. While watching the prism value on the display, move the lens until the value shows its prescription.  
Prism power is indicated by an absolute value ( $\Delta$ ) and a base direction ( $^\circ$ ).



Prism indication

3. If the lens contains cylinder power, while watching the axis value on the display, rotate the lens until the value shows its prescription.
4. Mark the lens.  
Press down the marking lever to mark the lens.

## 4.6 After Use Care

1. Turn OFF the power.
2. Put the dust cover on the instrument.

### CAUTION

- If the instrument will not be used for a long time, disconnect the power plug from the wall outlet.  
Otherwise, a fire may occur.

### NOTE

- Put the dust cover whenever the instrument is not in use.  
If dust settles on the optical parts, it may affect the measurement accuracy.

# §5 OTHER FUNCTIONS

## 5.1 Printout (on the AR printer)

Measured data can be printed out on the AR printer by connecting the LM-970 with the NIDEK AR-600 series or ARK-700 series.

### [Preparation]

#### 1. Connect the AR with the LM-970 by the optional interface cable (OPIF-6).

- 1) Turn OFF the AR and LM-970.

### NOTE

- Turn OFF the power when connecting the interface cable.  
If wiring is installed while the power is ON, it may cause a malfunction.

- 2) Connect the AR with the LM-970 by the optional interface cable (OPIF-6).  
See “4.2.2.2 Connection of the interface cable”.  
Connect the interface cable to the “” side of the interface connector on the AR.

#### 2. Set the parameters of the AR as follows.

(Refer to the AR operation manual for further information.)

IN port (LM)= NIDEK\*

LM Data Prt.=YES

Baud-Rate=9600\*

Bit Length=8\* (\* mark means that the indication is its factory setting.)

#### 3. Set the parameters of the LM-970 as follows.

See “5.3 Parameter Settings”.

Parameter on the SUB MENU display

PRINTER=COM PRINT

Parameters on the RS-232C MENU display

RS-232C=NIDEK

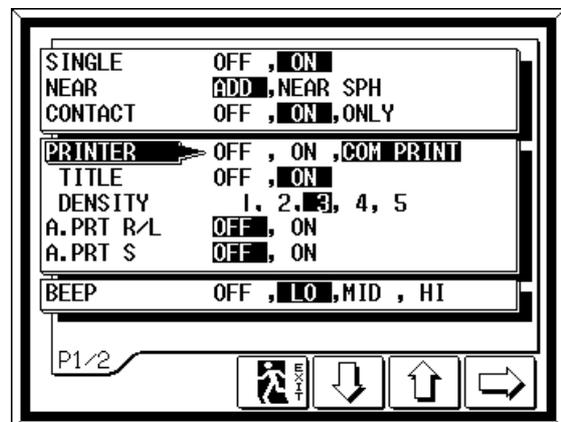
BAUD RATE=9600\*

PARITY=ODD\*

DATA BITS=8\*

STOP BITS=1\*

(\* mark means that the indication is its factory setting.)



**[Printout]****Press** .

The fixed measured data will be printed out on the AR printer.

The measured data will be automatically cleared after the printout, and the R/L display will return to the  display.

**NOTE**

- During the AR measurement,  does not function.

## 5.2 Data Transmission to Optometry Systems

The measured data can be transmitted to the connected NIDEK AOS or COS series.

**1. Measure spectacles.****2. Press  when the measurement is finished.**

The fixed measured data will be transmitted to the AOS or COS.

The measured data will be automatically cleared, and the R/L display will return to the  display.

The data No. for the optometry system will be shown for a while on the LM-970 display.

**3. Check the data No. shown on the display.**

This data No. is used for recalling the measured data stored in the optometry system.

## 5.3 Parameter Settings

### 1. Set the MAIN MENU display.

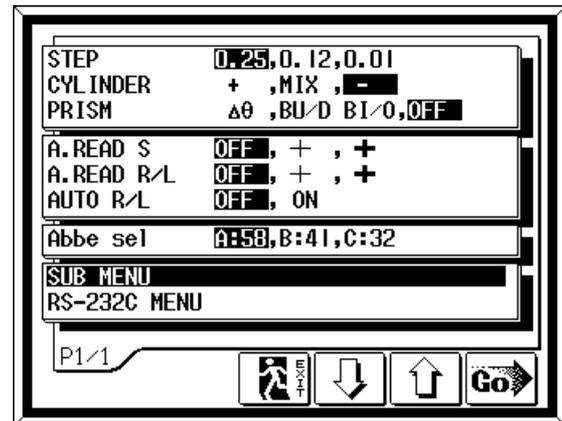
Press  simultaneously with the R/L button (/).



### 2. Set the SUB MENU display or RS-232C MENU display for changing their parameters.

1) Press  or  to select "SUB MENU" or "RS-232C MENU".

2) Press .



### 3. Align the cursor to an item.

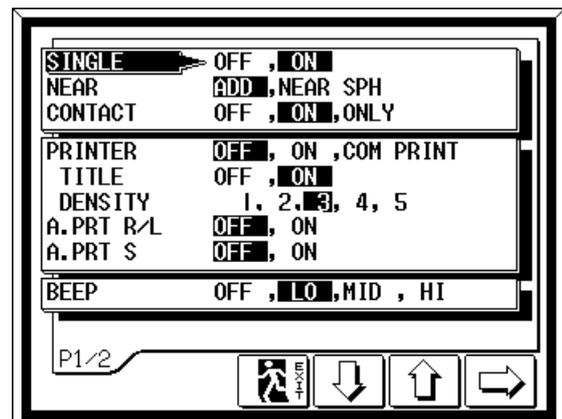
Press  or  to align the cursor (  ) to the desired item.

### 4. Change the setting with .

The reversed sign shows that it has been selected.

### 5. Press to return to the measurement display.

The instrument will memorize its new settings.



[Parameter items and their settings on the MAIN MENU display]

● Settings related to the indication types

**STEP** : 0.25, 0.12, 0.01 [D]

Factory setting : 0.25

This is for selecting the indication step of the measured value.

**CYLINDER** : +, MIX, -

Factory setting : -

This is for selecting the cylinder reading direction from +, -, or mixed readings.

**PRISM** :  $\Delta\theta$ , BU/D BI/O, OFF

Factory setting : OFF

This is for selecting the indication form of measured prism value. When "OFF" is selected, the prism value will not be shown.

● Setting related to the auto-read, auto-R/L functions

**A. READ S** : OFF, +,  $\oplus$

Factory setting : OFF

This is for selecting or disabling the auto-read function on the **[S]** display.

OFF  $\Rightarrow$  Read Button must be pressed to save the data in memory.

+  $\Rightarrow$  When the lens is centered until target changes to the cross line (+), the measured value will be fixed without pressing the read button.

$\oplus$   $\Rightarrow$  When the lens is aligned to the center cross until the target changes to the large cross ( $\oplus$ ), the measured value will be fixed without pressing the read button.

**A. READ R/L** : OFF, +,  $\oplus$

Factory setting : OFF

This is for selecting or disabling the auto-read function on the **[R]** / **[L]** display.

OFF  $\Rightarrow$  Read Button must be pressed to save the data in memory.

+  $\Rightarrow$  When the lens is centered until target changes to the cross line (+), the measured value will be fixed without pressing the read button.

$\oplus$   $\Rightarrow$  When the lens is aligned to the center cross until the target changes to the large cross ( $\oplus$ ), the measured value will be fixed without pressing the read button.

**AUTO R/L** : OFF, ON

Factory setting : OFF

This is for selecting whether or not to switch the R/L signs automatically after the measuring lens is changed.

ON  $\Rightarrow$  After the value is fixed, the R/L signs automatically switches by removing the lens without pressing **[R]** or **[L]**. However, when both R and L data are fixed, the sign does not change after removing the lens.

eg.: R data is fixed.  $\rightarrow$  R lens is removed.  $\rightarrow$  L data is fixed.

**[L]**  $\blacktriangleright$  **[R]**      **[L]**  $\blacktriangleleft$  **[R]**      **[L]**  $\blacktriangleleft$  **[R]**  
 $\rightarrow$  L lens is removed.

**[L]**  $\blacktriangleleft$  **[R]**

(" $\blacktriangleleft$ " does not move since both data are fixed.)

### ● Setting 1 related to the abbe number

**Abbe sel** : A, B, C

Power ON setting : A

Error in measured values made by measuring high-power lenses can be compensated for by using the abbe number. This is for selecting the abbe number from A, B or C.

To change the value of A, B or C from its factory setting (A: 58, B: 41, C: 32), set it at “A”, “B” or “C” on the SUB MENU display.

### [Parameter items and their settings on the SUB MENU display]

#### ● Settings related to the measurement display

**SINGLE** : OFF, ON

Factory setting : ON

This is for selecting whether or not to use the  measurement display.

**NEAR** : ADD, NEAR SPH

Factory setting : ADD

This is for selecting the near power indication from addition or spherical value.

**CONTACT** : OFF, ON, ONLY

Factory setting : ON

This is for selecting or disabling the CL measurement mode.

OFF ⇒ This is a setting to disable the CL measurement mode.

The measurement mode alternates between the regular measurement mode and PPL measurement mode for each press of the mode change button.

ON ⇒ The measurement mode switches among the regular measurement mode, PPL measurement mode and CL measurement mode in turn for each press of the mode change button.

ONLY ⇒ This is a setting to restrict the mode to CL measurements.

The mode change button does not function. The mode is restricted to CL measurements.

The current setting can be confirmed by the icon for the mode change button on the measurement display.

OFF ⇒   
 ON ⇒  or  or   
 ONLY ⇒ No icon

● **Settings related to the printer**

This is a setting to print out on the connected AR printer.

**PRINTER** : OFF, ON, COM PRINT

Factory setting : OFF

Set “COM PRINT” when printing out on the connected AR printer. Set “OFF” for other cases.

**TITLE** : OFF, ON

Factory setting : ON

This is for selecting whether or not to print “NIDEK LM-970” at the end of the printout.

**DENSITY** : 1, 2, 3, 4, 5

This parameter is not used.

**A.PRT R/L** : OFF, ON

Factory setting : OFF

This is for selecting whether or not to automatically print the measured data after both R and L values are fixed and the lens is removed.

**A.PRT S** : OFF, ON

Factory setting : OFF

This is for selecting whether or not to automatically print the measured data after the values on the  S display are fixed and the lens is removed.

● **Setting related to beeps**

**BEEP** : OFF, LO, MID, HI

Factory setting : LO

This is for selecting the volume of beeps, which sound for each press of the button and when the value is auto-read.

● **Setting 2 related to the abbe number**

Error in measured values made by measuring high-power lenses can be compensated for by using the abbe number.

**Abbe sel** : A, B, C

Power ON setting : A

This is the same as “Setting 1 related to the abbe number” on the MAIN MENU display.

**A set** :

**B set** :

**C set** :

Factory setting : A:58, B:41, C:32

These are for specifying the abbe number for A, B or C in the range of 20 - 60 in accordance with the lens material by pressing  →.

● **Setting related to measuring wavelength**

**Wavelength** : e, d

Factory setting : e

This is for selecting a measured value from the one to be obtained with the e-line wavelength (546.07 nm) or that with the d-line wavelength (587.56 nm).

● **Setting related to auto-OFF function**

**AUTO OFF** : NO, 1, 3, 5, 10, 15, 30, 60 (min.)

Factory setting : 30

This is for selecting NO auto-OFF or auto-OFF time. If set to other than “NO”, the display will turn OFF automatically with a certain period of non-use.

**[Parameter items and their settings on the RS-232C MENU display]**

**RS-232C** : NIDEK, COMPUTER

**BAUD RATE** : 1200, 2400, 4800, 9600 [bit/sec]

**PARITY** : OFF, ODD, EVEN

**DATA BITS** : 7, 8

**STOP BITS** : 1, 2

**CR Code** : OFF, ON

**PRISM Tx** : OFF, ON, DISPLAY

Factory setting : RS-232C:NIDEK, CR Code: OFF, PRISM Tx:DISPLAY

When using the optional IC card system or NIDEK-brand instruments in communication with the LM-970, select “NIDEK” in the “RS-232C” parameter.

The “PRISM Tx” parameter is for selecting whether or not to transmit the measured prism data. When it is set to “DISPLAY”, the prism data will be transmitted only when the data is on the display.

If you want to interface the LM-970 with external computers, you may ask for the interface manual to your authorized distributor, which explains the details of the communication functions.

# §6 COMMON PROBLEMS AND CORRECTIONS

When any trouble occurs on the LM-970, check the following troubleshooting guide before asking for repair.

PROBLEM	CORRECTION
The pilot lamp does not light after turning ON the power.	Replace fuses. See “7.3 Replacing Fesus” .
The display does not appear after turning ON the power.	Adjust the contrast knob.
The display is unclear.	Adjust the contrast knob.
The display disappears suddenly.	It seems that the auto-OFF function has been executed. Press any button to recall the ON state.
“Init Err” appears.	If the power has been turned ON with a lens on the nosepiece, remove the lens and turn ON the power again. If not, clean off any dust on the protective glass. See “7.1 Cleaning the Protective Glass” .
“!!CHECK NOSEPIECE!! ” appears.	Change the nosepiece to the regular one and turn OFF and ON the power. To only measure contact lenses, press  .
“Data Err” appears.	Clean the protective glass and the measuring lens. See “7.1 Cleaning the Protective Glass” . Spread a cloth under the instrument to reduce any efection from the table surface. Move the instrument to any other place to avoid room illumination to reflect on the measuring lens.
“COM PRINT Err” appears.	Check the connection of the interface cable. Check the AR parameter settings.
“COM Err” appears.	Check the connection of the interface cable.
“Center Overflow” appears.	The prism value exceeds the measurable range.
“SPH Overflow” appears.	The sphere value exceeds the measurable range.
“CYL Overflow” appears.	The cylinder value exceeds the measurable range.
“ADD Overflow” appears.	The ADD value exceeds the measurable range.

Contact your authorized distributor if the system does not go back even after checking the system according to the guide above.

# §7 MAINTENANCE

## 7.1 Cleaning the Protective Glass

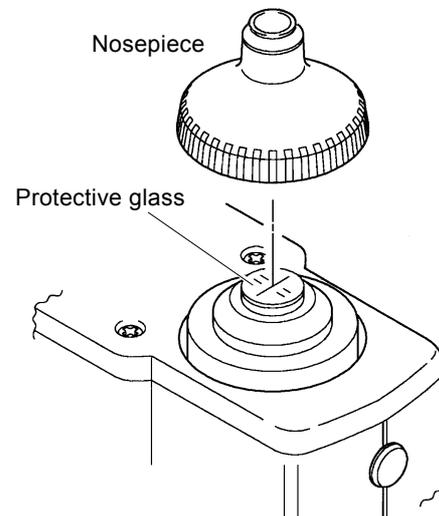
It is necessary to regularly clean dust from the protective glass underneath the nosepiece.

### 1. Remove the nosepiece.

### 2. Clean the protective glass.

Blow off any dust on the glass with a blower.

If it is still dirty, wipe gently with a lens cleaning paper.



### NOTE

- Take special care not to scratch the protective glass.  
Flaws on the glass substantially lower the reliability of measurements.

## 7.2 Ink Refilling

### 7.2.1 Ink cartridge type

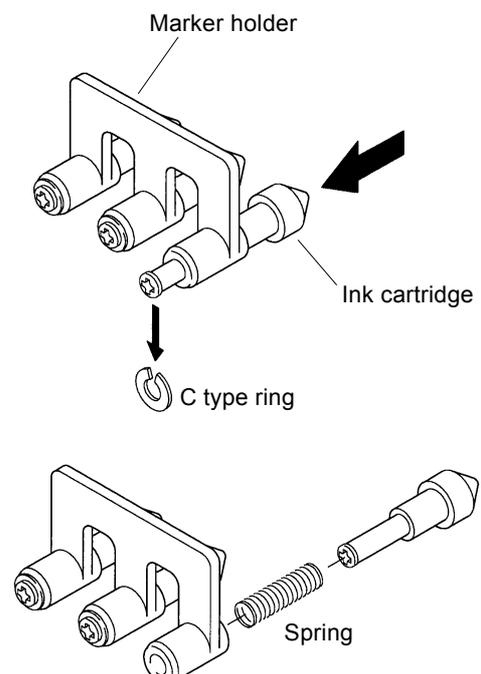
When markings become faint, replace the ink cartridge. Use the specified cartridge for refills.

### 1. Remove the ink cartridges.

Press the tip of the ink cartridge and remove the C type ring with tweezers.

### NOTE

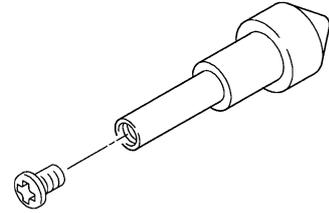
- During work, take enough care not to lose the C type ring.
- The spring and cartridge fall off when the C type ring is removed.  
Take care not to lose them.



**2. Remove the screw from the detached ink cartridge.**

**3. Attach the removed screw to a new ink cartridge.**

Leave the space of 0.5 - 1 mm between the screw head and the cartridge for the C type ring.

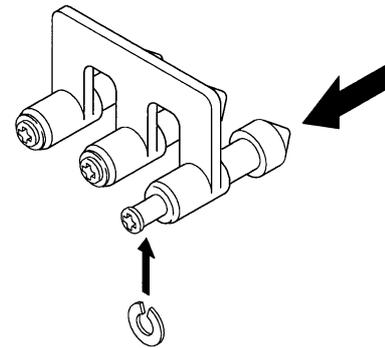


### ⚠ CAUTION

- Take care of the following when attaching the screw.
    - Use a screwdriver whose bit fits the recess of the screw.
    - Tighten the screw securely holding the cartridge firmly.
- Be careful not to hurt your fingers or damage the screw head. As the cartridge needs to be tapped with a normal screw, strongly insert the screw.

**4. Set the cartridge.**

Insert the spring and the new cartridge into the marker holder, and fit the C type ring between the screw and ink cartridge.



## 7.2.2 Ink pad type

When markings become faint, add some ink.

**1. Remove the ink pad.**

Push the ink pad to the right and pull it out from the holder.

**2. Add ink.**

Add some ink to the pad.

## 7.3 Replacing Fuses

When the instrument does not normally turn ON, the fuses may be blown. Replace them with the spare fuses provided.

### ⚠ CAUTION

- Always use the specified fuses. Substitutes may cause a fire.

Fuse rating: T-1 A 250 V (100-120 V -)

T-0.5 A 250 V (200-240 V -)

1. Turn OFF the power.
2. Disconnect the power cord from the power inlet.

### ⚠ CAUTION

- Replace fuses after turning OFF the power switch and disconnecting the power cord. You may get an electric shock.

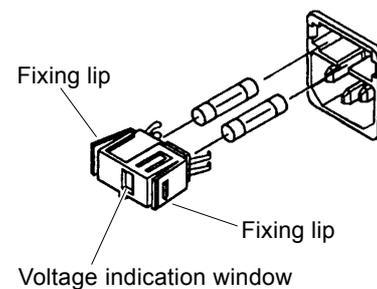
3. Remove the fuse holder.

Push both sides of the fuse holder with a thin screwdriver to release the fixing lips, and pull the holder out.

### ⚠ CAUTION

- The fuse holder is also used as a voltage selector. Be careful not to change the numbers shown in the voltage indication window.

If the voltage setting does not match the supplied power voltage, it may cause a fire or malfunction.



#### 4. Replace the fuses.

Set the fuse holder back into position.

### ⚠ CAUTION

- If the fuses blow again, do not touch the internal structure and contact your authorized distributor.  
Never touch the inside of the instrument or you may get an electric shock.

## 7.4 Changing the Setting of the Voltage Selector

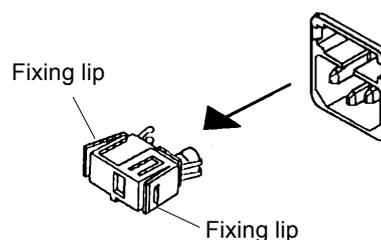
If the voltage of power source is changed, change the condition of main body.

#### 1 Turn OFF the power.

#### 2. Disconnect the power cord from the power inlet.

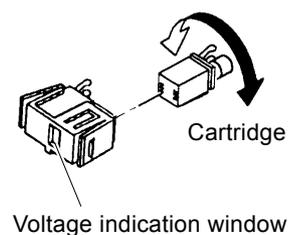
#### 3. Remove the fuse holder.

Push both side of the fuse holder with a thin screwdriver to release the fixing lips, and pull the holder out.



#### 4. Remove the cartridge of the fuse holder.

#### 5. Fit the cartridge in order to see the set voltage which matches to the voltage of wall outlet, at the voltage indication window.



Voltage of wall outlet	Voltage indication window
100-120V -	110
200-240V -	230

#### 6. Fit the fuse holder as before.

## 7.5 Cleaning Exterior

When the exterior parts of the instrument become dirty, wipe with a dry and soft cloth. For stubborn dirt, immerse the cloth in a neutral detergent, wring well and wipe. Finally wipe off with a dry and soft cloth.

### NOTE

- Never use an organic solvent such as paint thinner to clean the instrument. It may ruin the surface of the instrument.

## 7.6 List of Parts for Replacement

Articles	Order Number
Ink cartridge	30291-M3261
Fuse (100-120 V -)	804-02-02039
Fuse (200-240 V -)	804-02-02037

# §8 SPECIFICATIONS

## 1. Measuring range

Sphere

: 0 to  $\pm 25$  D (0.01 / 0.12 / 0.25 D steps)

[Accuracy]

**Values in diopters (D)**

Measuring range		Accuracy
< 0 $\geq -5$	> 0 $\leq +5$	$\pm 0.06$
< -5 $\geq -10$	> +5 $\leq +10$	$\pm 0.09$
< -10 $\geq -15$	> +10 $\leq +15$	$\pm 0.12$
< -15 $\geq -20$	> +15 $\leq +20$	$\pm 0.18$
< -20	> +20	$\pm 0.25$

Cylinder

: 0 to  $\pm 9.99$  D (0.01 / 0.12 / 0.25 D steps)

Axis

:  $0^\circ$  to  $180^\circ$  ( $1^\circ$  step)

[Accuracy]

$\pm 1^\circ$

ADD

: 0 to +9.99 D (0.01 / 0.12 / 0.25 D steps)

Prism

: 0 to 9.99  $\Delta$  (0.01 / 0.12 / 0.25  $\Delta$  steps)

(0 to 8  $\Delta$  at + 15 D to + 25 D and - 15 D to - 25 D)

[Accuracy]

**Values in diopters (D)**

Measuring range	Accuracy
> 0 $\leq 5$	0.1
> 5 $\leq 10$	0.2

## 2. Cylinder mode

: - / MIX / +

## 3. Prism mode

:  $\Delta$ ,  $\theta$  or BI/O, BU/D

## 4. Measuring time

: 0.5 sec. (Internal measurement period 0.05 sec.)

## 5. Measurable transmissivity

: 10% and over  
(20% and over at  $\pm 15$  D to  $\pm 25$  D)

## 6. Display

: Full graphic LCD with back light (Black/White)

## 7. Contact lenses

: 0 to  $\pm 25$  D, BC 6.00 to 9.00

## 8. Compensation of high index lenses

: Abbe number range : 20 to 60

## 9. Interface

: RS-232C

- 10. Marking system** : Ink cartridge type or ink pad type
- 11. Power source** : 100 - 120 V - / 200 - 240 V - ( $\pm 10\%$ ) changeable  
50 or 60 Hz  
(Main supply voltage fluctuation should not exceed  $\pm 10\%$  of the nominal voltage)
- 12. Power consumption** : 40 VA
- 13. Dimensions** : 200 (W)  $\times$  420 (H)  $\times$  290 (D) mm
- 14. Weight** : 7 kg
- 15. Environmental condition**
- 1) Temperature : 5 - 40 °C (41 - 104 °F)(In usage)  
– 20 - 60 °C (In storage/ Transference)
  - 2) Humidity : 30 - 85 % (Non-condensing)(In usage)  
10 - 95 % (In storage/ Transference)
  - 3) Atmospheric pressure : 700 - 1060 hpa
  - 4) Altitude : Up to 2000 m
  - 5) Others : No harmful dust or smoke, Indoor use
- 16. Transient overvoltages**  
**according to Installation categories** : II  
(OVERVOLTAGE CATEGORIES)
- 17. Pollution Degree** : 2 (IEC60664)

# **§9 ACCESSORIES**

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## **9.1 Standard Accessories**

Dust cover	1
Spare fuses	2
Power cord	1
Nosepiece for contact lens	1
Operator's manual	1

## **9.2 Optional Accessories**

IC Card system  
Footswitch  
Interface cable