AUTO PHOROPTOR® RS™

Auto Refraction System

User's Guide

Reichert
TECHNOLOGIES

Introduction

Congratulations on your purchase of the Reichert, Inc. (hereafter referred to as Reichert®) Auto Phoroptor® RS™.

This manual is designed as a training and reference manual. We recommend that you carefully read and follow the steps in this guide to ensure optimum performance from your new instrument. Please retain this guide for future reference and to share with other users. For additional copies of this manual or questions related to the Auto Phoroptor RS™, contact your local authorized Reichert, Inc. dealer or contact our Customer Service department directly at:

Tel: 716-686-4500
Fax: 716-686-4555
E-mail: info@reichert.com

Indications for Use

The automatic refractor Auto Phoroptor RS™ is designed for:

- Subjective refraction.
- Determination of correction data for refraction anomalies and binocular functions as the basis for manufacturing eyeglasses and contact lenses.
- Use in refraction rooms in clinics, physicians; or optometrist's or optician's practices.
- Connection to other medical examination equipment or to an office EMR system.
- Operation by physicians, optometrists, opticians, or properly trained clinical personnel.
- Installation under the conditions for medical equipment.

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Warnings and Cautions

Reichert, Inc. (Reichert) is not responsible for the safety and reliability of this instrument when:

- Assembly, disassembly, repair, or modification is made by unauthorized dealers or persons.
- Instrument is not used in accordance with this Service Manual.

WARNING: AN INSTRUCTION THAT DRAWS ATTENTION TO RISK OF INJURY OR DEATH.

WARNING: ANY REPAIR OR SERVICE TO THIS INSTRUMENT MUST BE PERFORMED BY EXPERIENCED PERSONNEL OR DEALERS THAT ARE TRAINED BY REICHERT SO THAT CORRECT OPERATION OF THIS INSTRUMENT IS MAINTAINED.

WARNING: THIS INSTRUMENT IS NOT SUITABLE FOR USE IN THE PRESENCE OF FLAMMABLE ANESTHETIC MIXTURES, SUCH AS OXYGEN OR NITROUS OXIDE.

WARNING: ENSURE THAT THE VOLTAGE APPLIED TO THE UNIT IS THE SAME AS THE VOLTAGE THAT IS INDICATED ON THE DATA PLATE OR DAMAGE TO THE UNIT MAY OCCUR.

WARNING: THIS INSTRUMENT MUST BE PLUGGED INTO AN OUTLET WITH AN EARTH GROUND THAT IS CONNECTED TO THE RECEPTACLE OR DAMAGE TO THE UNIT MAY OCCUR. DO NOT DISABLE OR REMOVE THE GROUND PIN.

WARNING: PRIOR TO OPENING THE UNIT, DISCONNECT THE PLUG.

CAUTION: AN INSTRUCTION THAT DRAWS ATTENTION TO THE RISK OF DAMAGE TO THE PRODUCT.

CAUTION: DO NOT USE SOLVENTS OR STRONG CLEANING SOLUTIONS ON ANY PART OF THIS INSTRUMENT OR DAMAGE TO THE UNIT MAY OCCUR.

CAUTION: USE OF AMMONIA BASED CLEANERS ON THE LIQUID CRYSTAL DISPLAY (LCD) OR ANY PLASTIC SURFACE MAY CAUSE DAMAGE TO THE INSTRUMENT.

CAUTION: PORTABLE AND MOBILE RF COMMUNICATIONS EQUIPMENT CAN AFFECT MEDICAL ELECTRICAL EQUIPMENT.

CAUTION: THIS INSTRUMENT HAS ELECTROSTATIC DISCHARGE SENSITIVE DEVICES (ESDS) WHICH ARE SENSITIVE TO STATIC HIGH VOLTAGES STORED IN AND TRANSFERRED BY THE HUMAN BODY. OBSERVE CORRECT ESDS PRECAUTIONS OR PREMATURE MALFUNCTION OF THIS INSTRUMENT WILL OCCUR.

CAUTION: MEDICAL ELECTRONIC EQUIPMENT NEEDS SPECIAL PRECAUTIONS REGARDING EMC AND NEEDS TO BE INSTALLED AND PUT INTO SERVICE ACCORDING TO THE EMC INFORMATION PROVIDED IN THE ACCOMPANYING DOCUMENTS.

CAUTION: THIS INSTRUMENT IS NOT TO BE USED NEAR HIGH-FREQUENCY EMITTING SURGICAL EQUIPMENT.

CAUTION: AVOID COLLISION WITH OTHER EQUIPMENT.

Symbol Information

The following symbols appear on the instrument.

Caution Symbol indicating important information and maintenance instructions that are included in the User's Guide.

Type B Product Classification.
Class 1 Equipment, Continuous Operation.

Alternating current power.

ON / OFF.

Date of Manufacture.

[REF] Catalog Number.

Waste of Electrical and Electronic Equipment.

Compliance to Medical Device Directive 93/42/EEC.

Instrument Setup

Unpacking Instructions

Great care has been taken to deliver your Auto Phoroptor RS™ to you safely. Please read this User's Guide before operating the unit.

The instrument is packaged in a shipping container to protect the instrument from damage during shipment. Please remove the Auto Phoroptor RS™ and the accompanying equipment from the packaging material in the following manner.

Note: Please retain the packaging so that if future transportation is required, the instrument can be sent in its original packaging.

1. Open the top of the outer box and then remove the top cover.
2. Open the top of the inner box and remove the accessories from the shipping container.
3. The box contains the following:
    - Central Unit
    - Controller
    - Projector (Optional- will come with unit if customer ordered item specifically.)
    - Accessories Box- Contains the following accessories:
        - Dust Covers - for the Phoroptor Head and the Controller
        - User's Guide
        - Power Cord

Note: If any of the above accessories or parts are missing, immediately contact Reichert so that the missing accessories or parts can be shipped.

4. Pull the inner box up and out of the outer box.
5. Separate the foam packaging and remove the Auto Phoroptor RS™ from its box.
6. Lay the Auto Phoroptor RS™ on it's side and remove the tape from the bottom that secures the bag.
7. Remove the bag.
8. Place the packaging in a safe place so that if transportation is required in the future, it will be available.

Accessories

Description	Part Number
Near Vision Rod with Optical Test Chart	559-415
Dust Cover - Phoroptor Head	559-153
Dust Cover - Controller	16204-020
Phoroptor Cable	559-275
Projector Cable	559-262
Power Cord 115V	WCBL10018
Power Cord 230V	XCBL10027

For more accessories or to order any of these accessories, contact your authorized Reichert dealer.

Parts Identification

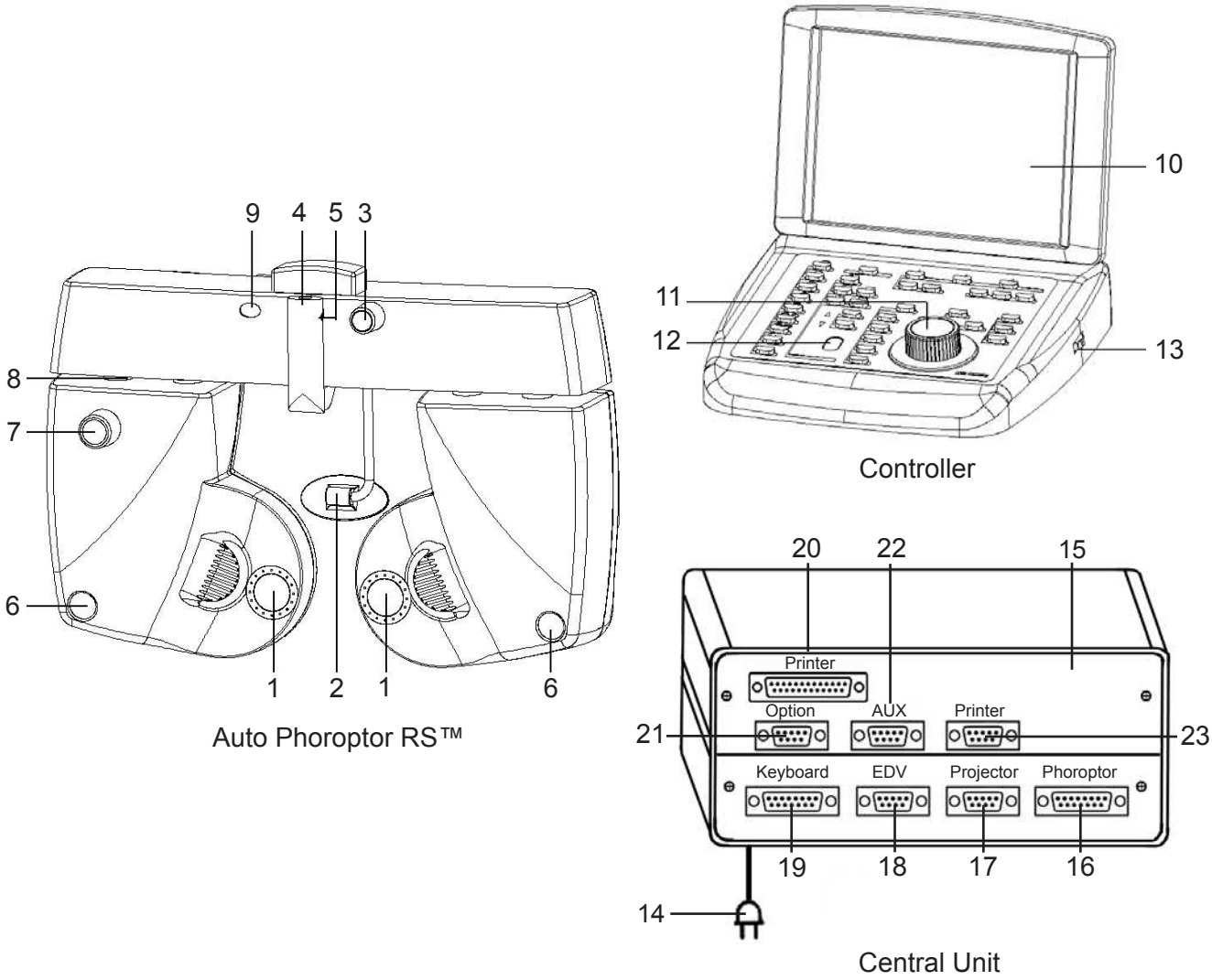


Figure SU-1 Parts Identification

1. Lens Apertures
2. Forehead Rest
3. Forehead Rest Knob
4. Convergence Lever
5. Threaded Pin for Near Vision Rod
6. Target Device Corneal Vertex Distance
7. Height Adjustment Knob
8. Mid Position Height Marking
9. Illuminated Bubble Level
10. Display
11. Control Knob
12. Scroll Wheel for Chart Selection
13. Brightness Setting Wheel
14. Power Cord
15. Central Unit
16. Auto Phoroptor RS™ Connection
17. Projector Connection Port
18. EDV Connection Port for connecting a computer or auxiliary equipment
19. Controller Connection Port
20. Parallel Printer Port
21. Open Port to configure for additional equipment
22. Auxiliary Port for connecting Autorefractors or Lensmeters
23. Serial Printer Port

Note: You can adjust the brightness of the display screen by turning the Brightness Setting Wheel (13).

Parts Identification (continued)

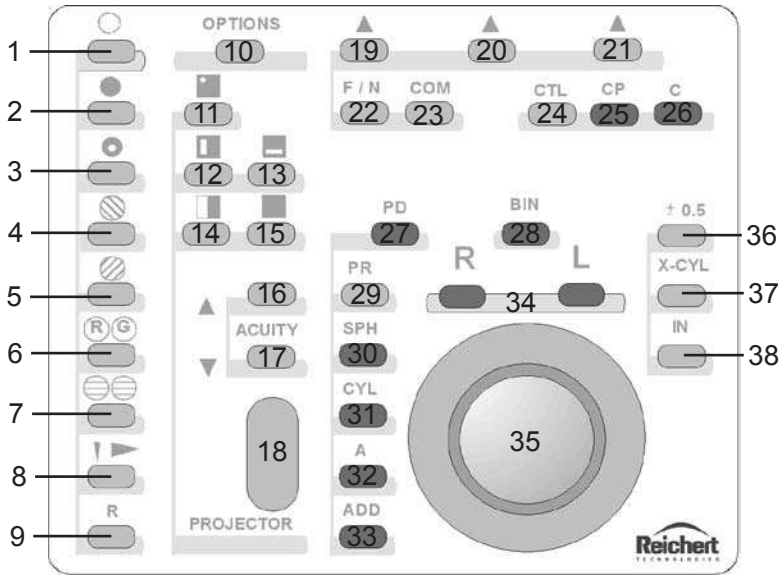


Figure SU-2 Keypad

1. Open Lens Aperture
2. Close Lens Aperture
3. Pinhole Mask
4. Left Polarized Filter
5. Right Polarized Filter
6. Red/Green Filter
7. Maddox Cylinder
8. Disassociation Prisms
9. Retinoscopy Lens
10. Options Menu
11. Single Optotype Mask
12. Vertical Line Mask
13. Horizontal Line Mask
14. Red/Green Filter
15. No Mask (All lines displayed)
16. Improved Visual Acuity or Increase Optotype Size
17. Decreased Visual Acuity or Decrease Optotype Size
18. Scroll Wheel - Chart Selector
19. Function Button - Left For Autorefraction Data
20. Function Button - Middle For Lensmeter Data
21. Function Button - Right For EMR or Storing Data
22. Far/Near Vision Selection
23. Save/Transmit to EMR System
24. Control Button
25. Clear Partial Data
26. Clear All Data
27. Pupillary Distance Measurement
28. Binocular Vision Measurement
29. Prism Adjustment
30. Sphere Adjustment
31. Cylinder Adjustment
32. Axis Adjustment
33. Near Vision Addition
34. Right Eye/Left Eye Selection Buttons
35. Control Knob
36. Cross Cylinder Value Step Change (±.25 to .5)
37. Cross-Cylinder Adjustment
38. Store Cross Cylinder Value

Note: In this manual, when asked to press a button, the instruction will simply say: Press XXX (with the name of the button in all caps.) Example: Press CTL.

Shortcuts

The following is a list of button combinations that when pressed will activate a shortcut.

BUTTON(S)	SHORTCUT
CTL + C	Clears all data and resets the Phoroptor.
CTL + 	Switches from Program Mode to Normal Mode. (Exit program.)
CTL + ACUITY UP ▲	Turn on Projector Lamp (Except Polaphor)
CTL + ACUITY UP ▲	Random Function (Only Polaphor)
CTL + ACUITY DOWN ▼	Turn Off Projector Lamp
CTL + Left Function Button	Import AR Data
CTL + Middle Function Button	Import LM Data
CTL + Right Function Button	Print
CTL + C-C	Resets the Phoroptor and Switchboard.
CTL + CYL	Switch from + to - cylinder and vice versa
CTL + Open Lens Aperture	Fills memory with demo values
CTL + R (Retinoscopy)	Enters the actual visual acuity values in the corrected vision memory for the active phoroptor side.
CTL + WHEEL	Inhibits synchronization of Projector & Phoroptor. Allows selection of a different chart without displaying all of the charts as the scroll wheel is moved.
CTL + IN	Undo - only up to 3 times (For axis and cylinder power adjustment only.)
CTL + R/G + PD	In Options Menu/Settings/Aux Port, this sequence opens the window for selecting auxiliary equipment.
CP-BIN	Clears the memory for both eyes and resets to 0 values or unaided vision.
CP + R	Save Visual Acuity Measurement.
 + BIN	Exchanges lens in right and left eyes simultaneously in PD Mode only.
 +  + BIN	Both halves move in the same direction in PD Mode only.

Icon Description

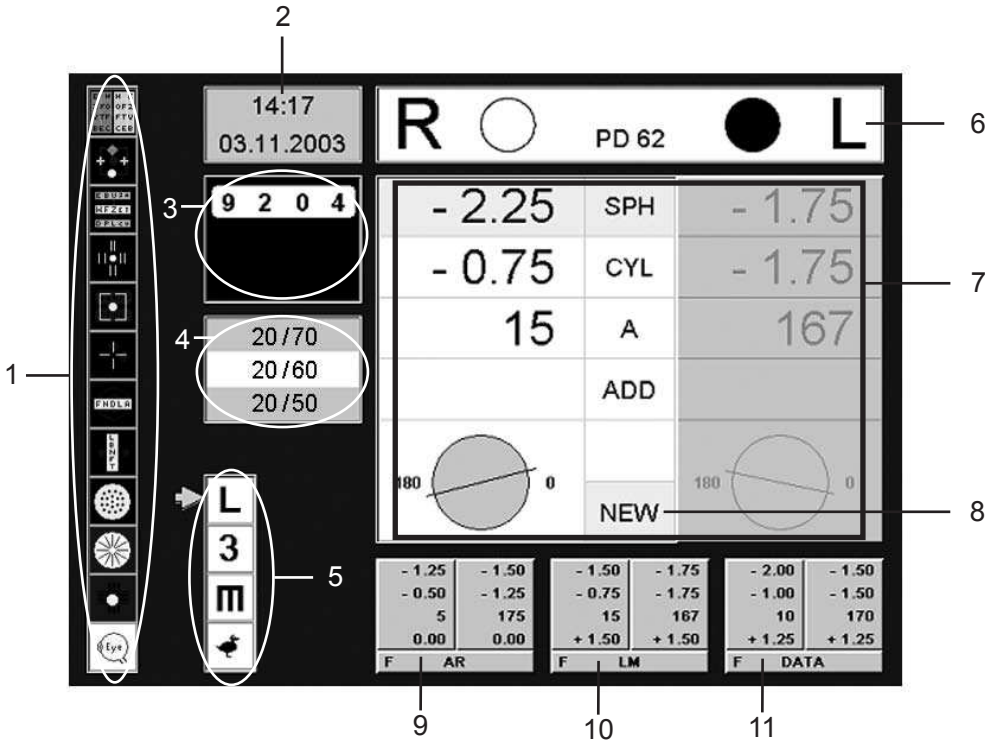


Figure SU-3 Display Screen

1. Acuity Test Charts (P. 12)
2. Date and Time (P. 20)
3. Projected Chart View/Patient Chart View (P. 12)
4. Optotype Size (P. 12)
5. Optotypes (P. 12)
6. Active Lenses/Filters (P. 26)
7. Active Data Field (P. 30)
8. New Data (Appears when data from saved/input data is changed.) (P. 29)
9. Autorefractor Data (Entered manually or electronically.) (P. 28)
10. Lensmeter Data (Entered manually or electronically.) (P. 28, 40)
11. Prescription Data (From EMR System or new prescription to send out.) (P. 28)

Active Data Field

The larger box with data is the current/active prescription that is being adjusted. The individual measurement boxes can be one of four colors. The following indicates what each color means:

White - Active field that can be adjusted.
Yellow - Active field that is currently being adjusted.
Blue - Active field that is currently being adjusted.
Grey - Inactive field that cannot be adjusted.

Icon Description (continued)

Test Icons

The following is a list of the icons on the left side of the Controller screen and their description.

The small green arrow indicates the active test type or optotype, and can be moved using the scroll wheel. At the end of a line, the arrow wraps around to the next column. In the refractor, polarization or color filters will automatically be switched in if they are required by a test type.

Note: The figures here are featured on the AP250 projector. If using other projectors, the tests and their order may change but the operating principle is the same.

Shortcut: Press CTL and ▲ to turn the projector ON. (Except with a Polaphor. On a Polaphor, it goes to a random function.)
Press CTL and ▼ to turn the projector OFF.

The Controller indicates if the projector lamp is turned ON or OFF. The Projected Test Type window is an accurate reflection of what is being projected. If the projector goes to sleep and turns the lamp OFF, any command to the projector will automatically turn it ON again.

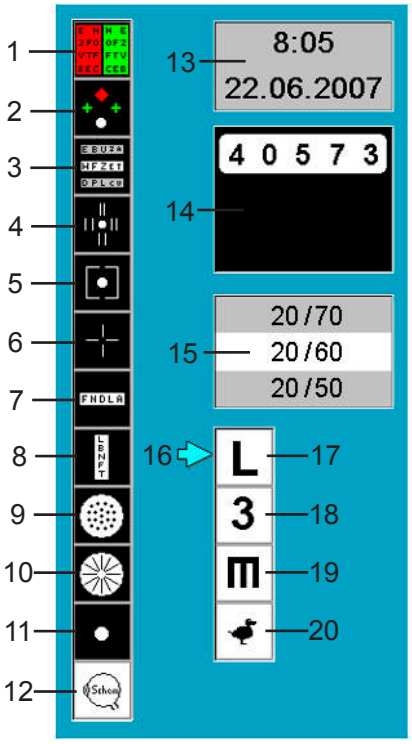


Figure SU-4 Test Icons

1. Red/Green Test- Shows optotypes in black with two different colored backgrounds. The left half of the background is green, while the right half is red.
2. Worth 4 Test
3. Binocular Balance Test
4. Minute Stereo Test
5. Vertical Coincidence Test
6. Phoria Test
7. Horizontal Phoria Test
8. Vertical Phoria Test
9. Cross Cylinder Test
10. Astigmatic Dial
11. Fixation Target- Shows a dot on the screen for the patient to focus on.
12. Eye Schematic
13. Date and Time- Shows current date and time.
14. Projected Test Type with Mask- Window that shows what is currently being projected/ shown to the patient.
15. Visual Acuity- The number corresponding to the size of the optotypes being projected.
16. Green Arrow- Indicates which test is selected and projected. Can be moved with the Scroll Wheel.
17. Letters- Optotypes consisting of different letters.
18. Numbers- Optotypes consisting of different numbers.
19. Tumbling E's- Optotypes consisting of the upper case letter E shown in different directions.
20. Children's Pictures- Optotypes consisting of easily identifiable pictures, such as houses, umbrellas, ducks, and cars.

Icon Description (continued)

Mask and Acuity Buttons

This is a description of the buttons on the Controller and how they affect the projected optotypes during testing. Any of the following buttons can be pressed at any point during refraction to change the projected image.

Note: This does not change which optotypes are being projected (example, letters or numbers), only the format in which they are being shown.

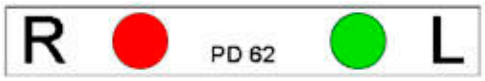
1. Projects only one single optotype to patient.
2. Vertical Line Mask- Projects a single vertical row of optotypes.
3. Horizontal Line Mask- Projects a single horizontal row of optotypes.
4. Red/Green Mask- Splits the screen with the left side of the chart covered with the red filter and the right side with the green filter.
5. No Mask- Projects the entire optotype field.
6. Acuity Arrow Up- Either increases optotype size or increases visual acuity with each press of the button, depending on the setting entered in the options menu.
7. Acuity Arrow Down- Either decreases optotype size or decreases visual acuity with each press of the button, depending on the setting entered in the options menu.
8. Scroll Wheel- Shifts the small green arrow on the Controller screen to the different tests types and projects the selected test.

Figure SU-5 Mask and Acuity Buttons

Icon Description (continued)

Filters

The circles adjacent to the R and L above the Active Data Field indicate which filters are in place in the phoroptor apertures. The following is an example of the R/L indication on the Controller monitor for the Red/Green filter with the red filter in the right eye and the green filter in the left eye:



The left column of each button on the Controller will activate the filters and lenses in the phoroptor. The function is always applied to the right eye first (except for the Open and Close Occluder Aperture buttons.) A second press will either switch the filters in the left and right eye or activate the filters in both eyes. The following is a description of the Controller buttons and the effect they have on the phoroptor:

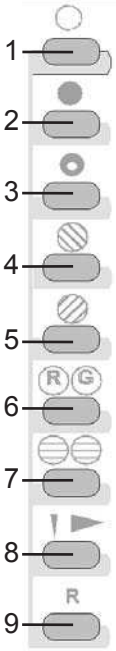
1. Open Occluder Aperture- Press to open the right aperture. Press it again to open both eyes.
2. Close Occluder Aperture- Press to close the right aperture. Press it again to close both eyes.
3. Pinhole Mask - Press to set a pinhole mask in front of the right eye and occlude the left. Press it again to switch, occluding the right eye and placing a pinhole mask in the left eye.
4. Left Polarization Filter - Press to put a left polarized filter in the right eye, and a right polarized filter in the left. Press it again to have left polarization filter set in both eyes.
5. Right Polarization Filter - Press to put a right polarized filter in the right eye, and a left polarized filter in the left. Press it again to have right polarization filter set in both eyes.

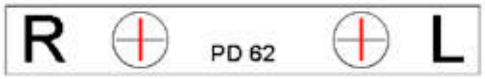
Note: The Polarized filters can be removed by pressing the open occluder button. The Polarization image on the chart window can be removed by pressing the 'no mask' button for optotypes.

6. Red Green Filters - Press to change both filters so that the right eye has a red filter, and the left has a green filter. Press it again and the red filter stays while the green filter goes away. Press it again to switch back.

Note: The Worth 4 Dot Chart will automatically be presented with the Red/Green filters.

7. Maddox Cylinder - Press to place a horizontal maddox cylinder in the right eye. Press it again to place a vertical Maddox cylinder in the left eye. Press it again to switch back.
8. Dissociation Prisms - Press to place a base in prism in the right eye. Press it again to place a base out prism in the left eye. Press it again to switch back.
9. Retinoscopy Lens - Press to increase the spherical effect in both eyes by +1.5 D or +2.0D. This will NOT be indicated in the main field. Press again and a pinhole mask will be placed in the left lens. Press a third time and the pinhole switches to the right eye and the retinoscopy lens is placed in front of the left eye. Press it a fourth time and the pinholes are removed and both the retinoscopy lenses are in place.





Note: Fixed cross cylinders do not have a button. They will be automatically switched in when necessary, at ±0.5 D minus axis 90°. The icon will be shown on the Controller in the Active Lenses/Filters as shown above. The fixed cross cylinders will be switched in for PD Measurement.

Note: Fixed cross cylinders can be activated by scrolling to the eye schematic chart on the screen and then the chart behind it which is the horizontal and vertical lines. This chart will not be projected on the screen and will not be visible to the patient. The fixed cross cylinders can be used for near vision testing.

Default Settings

The Auto Phoroptor RS™ is an Auto Refraction System that is customized at the factory to interact with accessories and equipment purchased in combination with the unit. The default factory settings are determined by the particular setup of each order, so that the equipment is ready to use and should require no software updates. Software packages that allow connecting to different auxiliary instruments can be ordered after delivery of the auto refraction system by providing the serial number of the Controller to the manufacturer.

The basic setup contains three items which are programmed to interact with each other: the Auto Phoroptor RS™, the Central Unit, and the Controller. The Central Unit directs communication between the Phoroptor, Controller, and other equipment, while the Controller acts as the user interface and controls the Phoroptor and the Input/Output of data.

The Auto Phoroptor RS™ is designed to communicate with a digital projector. The AP250 Projector is available from Reichert and was designed for the Auto Phoroptor RS™.

Note: Ensure the instrument you are interfacing with is compatible with the Auto Phoroptor RS™.

A list of instruments that can be connected to the Auto Phoroptor RS™ can be found in Appendix A.

Setup

WARNING: ENSURE THAT THE VOLTAGE APPLIED TO THE UNIT IS THE SAME AS THE VOLTAGE THAT IS INDICATED ON THE DATA PLATE OR DAMAGE TO THE UNIT MAY OCCUR.

WARNING: DO NOT PLUG IN THE UNIT UNTIL THE COMPUTER SYSTEM IS SET UP.

Note: Connection cables for the Auto Phoroptor RS™, the Controller, the Central Unit, and the Projector are provided with the instrument. Cables for connecting Lensmeters, Autorefractors and Keratometers need to be purchased separately.

1. Connect the Auto Phoroptor RS™ unit to the Central Unit using the Phoroptor Cable (P/N 559-275) and connect the cable to the Phoroptor port.
2. Connect the Controller to the Central Unit by attaching the built-in cable to the keyboard port.
3. Connect the Projector or other compatible instrument to the Central Unit using the cables provided and connect it to the Projector port.
4. You may connect the Central Unit to a computer with a cable to the EDV port.
5. Connect additional equipment to the Central Unit (such as Lensmeters, Autorefractors, etc.) through the Aux or EDV port, as needed.
6. Plug in the power cord to an appropriately volted outlet.

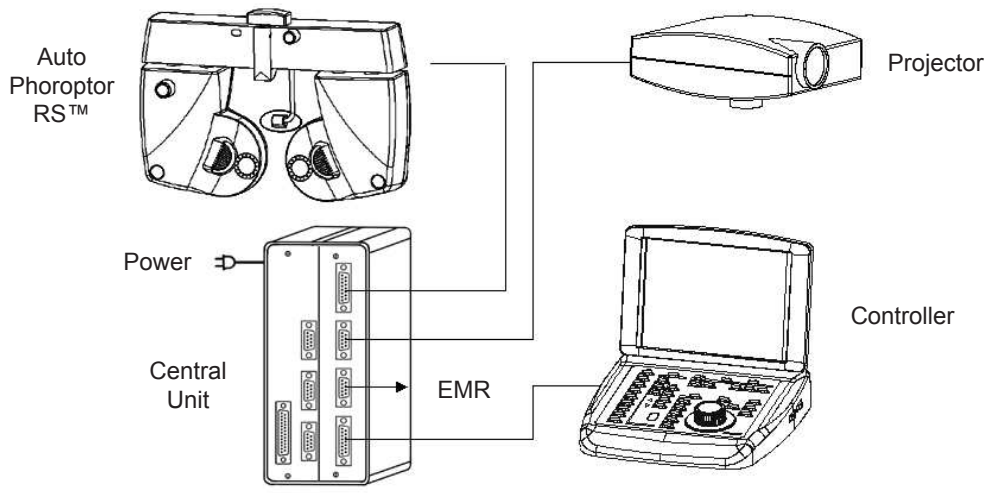


Figure SU-6 Connection Diagram

Switching On and Off

An ON/OFF switch for the Auto Phoroptor RS™ is located on the Central Unit. As a standard, the entire system (phoroptor, Controller, and projector), is connected to the Central Unit and turned ON/OFF from this unit.

The initialization time of the computer in the Auto Phoroptor RS™ is approximately 50 seconds. When the Phoroptor is turned ON, it automatically starts to check all lenses and settings, cycling through all possible lens changes and moving the PD back and forth to check for any malfunctions.

To shut down the computer, set the ON/OFF switch to OFF.

Operating Principle

All known refraction methods can be performed on the Auto Phoroptor RS™. The order of the examination steps is freely selectable by the user.

The operating system of the Auto Phoroptor RS™ is WINDOWS CE. However, there is no keyboard or mouse available. The functions are activated using the Controller of the Auto Phoroptor RS™ using the buttons and the Control Knob.

In this operating manual, the Control Knob is shown as the following two images:  and  .

When there are arrows above the knob, you are directed to turn the knob either clockwise or counterclockwise. Turning the knob changes the numerical values and selection of fields as follows:

- Clockwise rotation means '+' (increases the value) or 'to the right side'.
- Counterclockwise rotation means '-' (decreases the value) or 'to the left side'.

Note: If the knob is pressed during rotation, the changes are performed in larger steps.

When you see the side view of the button with the arrow pointing down (pressed), you are directed to press the button. This does the following:

- Enters the data.
- Moves on to the next step.
- Finishes the operation.

Note: Generally, to adjust a specific measurement, simply press the corresponding button to activate it, and turn the knob to adjust the value, then press the knob to enter it.

Options/Set-Up Menus

The following is a summary of the options menu and all of the corresponding drop down menus that coincide with each selection in the options menu. To access the Options Menu press OPTIONS (the button on the top left of the Controller). To exit out of the options menu, press OPTIONS again.

1. Press OPTIONS and the options menu appears in the upper left part of the display. The settings on the unit and auxiliary functions can be changed in this screen.
2. Turn  to select the field you wish to edit and press  to move on to the next menu.

Note: Turn the Control Knob to the right to move the menu selection from the top down, and to the left to move the menu selections from the bottom up. To return back to the main options menu after opening a sub menu, press OPTIONS.

3. Press  to enter a setting.
4. Once you enter a setting by pressing  your setting is saved, and you go back to the measurement window.
5. To set other options, just press OPTIONS again.
6. The following callouts are valid:
   - ▶ - There is another menu that will appear.
   - ... - There will be an instruction box that pops up.
   - Black Writing- Setting is active/selected.
   - Gray Writing- Setting is either not selected or unavailable in the software version.
   - ✓ - The specific setting is selected/active.

Settings

The following screen appears when you press OPTIONS and select Settings. The categories are broken down in the following pages.

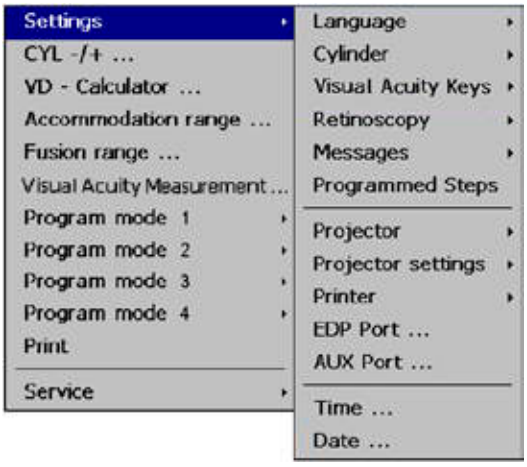


Figure SU-7 Settings Menu

Shortcut: Press CTL + R/G + PD to access the Settings Menu in Figure SU-7.

Options/Set-Up Menus (continued)

Settings (continued)

Language

Use this option to scroll through different languages and select one. Turn the control knob to select one, and press it to enter the selection and go back to the main screen. The date format may change based on the language selected.

Cylinder

Use this option to change the default to either:

- Prefer Plus Cylinder
- Prefer Minus Cylinder

Turn the control knob to select one, and press it to enter the selection and go back to the main screen.

Visual Acuity Key

Use this option to set the Visual Acuity button preferences. Options are:

- UP - Increase Size
- Up - Increase VA (Visual Acuity)
- Down - Decreases Optotype Size
- Down - Decreases VA (Visual Acuity)

If you select Increase Size, when you press the Visual Acuity Up button, it will increase the size of the optotypes being displayed. If you select Increase Visual Acuity, when you press the Visual Acuity Up button, it will decrease the size of the optotypes.

Retinoscopy

Use this option to set the default Retinoscopy lens preferences. Options are:

- Sphere +1.5 dpt
- Sphere +2.0 dpt

When the gray R button among the lens selection is pressed, the phoroptor will automatically bring in your default sphere preferences.

Messages

Use this option to set the Error Messages preferences. Options are:

- Error Messages Off
- Info Forehead Rest Fully Off
- Only Forehead Rest Beep Off (Beep will not sound when the patient's forehead is not against the head rest.)

Programmed Steps

Use this option to enable a program that was previously created. Press the Control Knob to select one and run the program. Refer to Program Mode 1-4.

Projector

Use this to select which compatible projector is connected to the unit. You can only chose from the compatible options listed in the menu. Refer to Appendix A for a detailed list of all compatible projectors.

Options/Set-Up Menus (continued)

Settings (continued)

Projector Settings

Use this to select which settings to enable for the connected projector. You can select to have certain tests performed automatically without having to select them. The options are:

- Autom. set to defaults
- Set Defaults
- Select Charts
- XCYL 6/9 automatic check
- XCYL 6/9 automatic A
- XCYL 6/9 automatic CYL
- XCYL 6/9 automatic fine
- XCYL Dots automatic check
- XCYL Dots automatic A
- XCYL Dots automatic CYL
- XCYL Dots automatic fine

Autom. set to defaults - When this setting is selected, the chart selection will automatically return to the default setting when the data are cleared after completing a refraction.

Set Defaults - Select a chart and use this setting to set it as the default chart. This chart will be the starting point of the refraction.

XCYL 6/9 - These settings refer to the X Cylinder test. An isolated number chart will be activated when visual acuity is 20/40 or better if the XCYL 6/9 is selected for any or all of the steps of the cross cylinder test.

XCYL Dots - The X Cylinder dot chart can be selected for any or all of the steps of the X Cylinder Test.

“Select Chart” - is only available when the Block Polaphor and DOMS Polastar European digital acuity systems are selected.

Note: Projector starts out with the default settings on. Once a setting has been changed, you can select SET DEFAULTS to restore the default settings.

Printer

Use this option to select the printer that is connected to the Central Unit. Printer will not print unless it is selected in this menu. If no printer is connected to the Central Unit or installed, the only option will be None.

Options/Set-Up Menus (continued)

Settings (continued)

EDP Port

Use this option to view the port configuration information. The auxiliary device (such as a Lensmeter, Autorefractor, or computer) and EDP communication protocol can be set using this key. Refer to Figure SU-8.

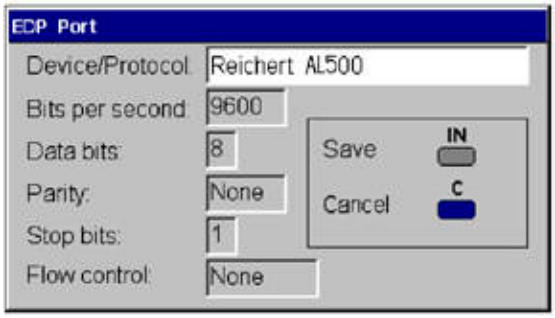


Figure SU-8 EDP Port

Aux Port

Select either a Lensometer or Autorefractor auxiliary device using this key, when a software package has been purchased and activated.

Time

Use this option to set the time. Follow the instructions on the screen to set the hours and minutes.

Date

Use this option to set the date. Follow the instructions on the screen to set the month, day, and year.

Cylinder +/-

The +/- cross cylinder setting allows the provider to select a preference for + or - cylinder. Use this option to change the default to either plus or minus cylinder. Use the Control Knob to select and go back to the measurement screen. This is the same option as in Settings-Cylinder, but is slightly faster to get to.
Refer to Figure SU-9.

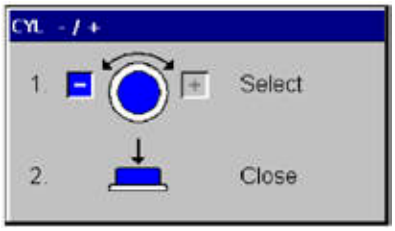


Figure SU-9 CYL +/-

Note: Press CTL and CYL together during refraction and the setting will be switched to plus or minus cylinder. Press again to switch back.

Options/Set-Up Menus (continued)

VD-Calculator

Using the corneal vertex distance calculator, the refraction values in the active data field can be converted to other corneal vertex distances and the spherical equivalent. As you turn the knob selecting different conversion values, the values for sphere, cylinder, and axis will change on the pop up screen. This allows you to see the numerical conversion only; it does not store or save the values. It is for reference only. The phoroptor and the active data field are not changed or affected by the conversion. Below is an example of the VD-Calculator screen. Refer to Figure SU-10.

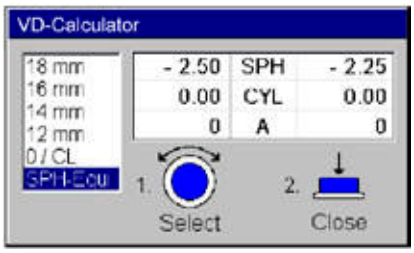


Figure SU-10 VD-Calculator

Accommodation Range

This allows you to change the accommodation range (ACC) of the sphere value of the right and left eye. Adjust the sphere power to determine the point at which the patient's vision begins to blur in the right and left eyes. Refer to Figure SU-11.

1. Turn the control knob to set the desired minimum value.
2. Press the control knob in to set the right eye and move to the left eye.
3. Press the control knob again to save the accommodation range data and exit.

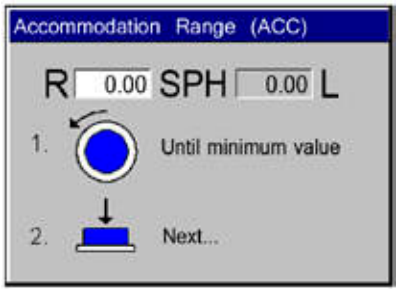


Figure SU-11 Accommodation Range

Note: If you go back and reset these values, you will be asked to press C to clear the old values and enter new ones.

Fusion Range

This allows you to change the prism compensation for the exam. Refer to Prism Compensators.

Options/Set-Up Menus (continued)

Visual Acuity Measurement

The visual acuity measurement option allows for recording visual acuity in the right eye, left eye and for binocular vision, with or without correction. The visual acuity can be changed by using the up and down acuity arrows to increase or decrease acuity, or by turning the control knob.
Refer to Figure SU-12.

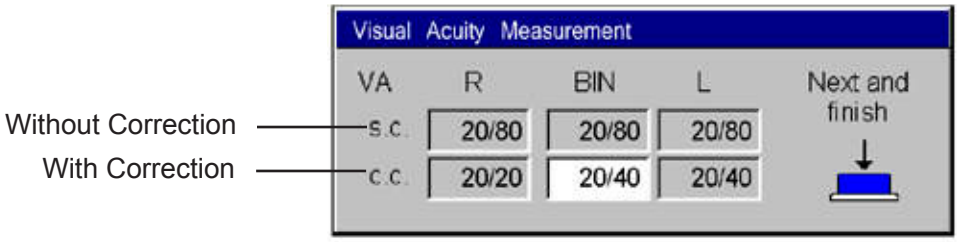


Figure SU-12 Visual Acuity Measurement

Note: A projector must be connected.

Note: It is recommended to set the chart mask to the single optotype when measuring and recording visual acuity.

1. The visual acuity on the projector can also be set in this mode by turning  .
2. Visual acuity can be performed any time.
3. If visual acuity is measured before entering any lensmeter or autorefractor data, and before beginning the exam, the visual acuity can be measured without correction by turning the control knob to the right or left and pressing the control knob to enter the acuity level for the right eye, then the left eye, and finally binocular vision.
4. When the exam is complete, corrected visual acuity can be measured by opening up the visual acuity measurement option, turning the control knob to select visual acuity, and pressing the knob to enter the value for right eye, left eye, and binocular vision.
5. Both uncorrected and corrected visual acuity can be measured during the exam by opening up the visual acuity option. If there are no stored values for uncorrected visual acuity, the lenses will automatically clear to 0.00. Enter the values for unaided visual acuity by turning and pressing the control for the right eye, left eye and binocular vision. After unaided visual acuity is entered, the values and lenses for the most recent refraction data will be restored and aided visual acuity can be measured by turning and pressing the control knob.
6. After completing measurement of visual acuity the values are saved but the data are not visible.
7. In the event that further changes to the refraction data are made, visual acuity can be measured and stored again. The current saved visual acuity can be removed in the visual acuity measurement option by pressing the CP (clear partial) button to clear corrected values and acuity can be re-measured.
8. Another way to save visual acuity (if no corrected values have been measured yet) is to press CTL and R. The data will be saved automatically. CTL and R can be pressed to measure acuity in the right eye, left eye, and for binocular vision.

Options/Set-Up Menus (continued)

Program Mode 1-4

In program mode, the individual succession of the examination steps can be set. Options are:

- Play
- Record
- Edit
- Print

Note: If no program has been recorded, the only available option will be Record. The other options can only be accessible with a program already saved in memory.

Play

Press  under the Play option to begin the program, or press CTL and  .

1. A box appears indicating the current step. Example: 

Note: When the unit is turned ON, if a Program Step box is displayed, the unit is already running an individual program and the options menu will be very limited.

Shortcut: To close the program, press CTL and  .

Record

In the Record option under Program Mode, you can set the refraction steps in the order of your choosing. Up to four different programs can be recorded. Record the refraction steps only. Specific charts can be brought in when you play the program and move through the steps.

Figure SU-13 Record

1. Enter the order of the refraction steps by pressing the corresponding buttons on the Controller. The items will automatically pop up on the screen. Refer to Figure SU-13.
2. If you wish to delete a step, press the Function Button corresponding with the Delete button.

Note: You can only delete the last step and the steps above in order. The Control Knob does not scroll through the steps when you turn it.

3. Finish by pressing the Function Button corresponding with the Save option.
4. If you don't want to save the program, simply press the Function Button corresponding with Cancel.

Options/Set-Up Menus (continued)

Program Mode (continued)

Edit

Programmed steps can be added or deleted in this menu. Select Options, Program Mode 1, 2 ,3 or 4 and Edit.

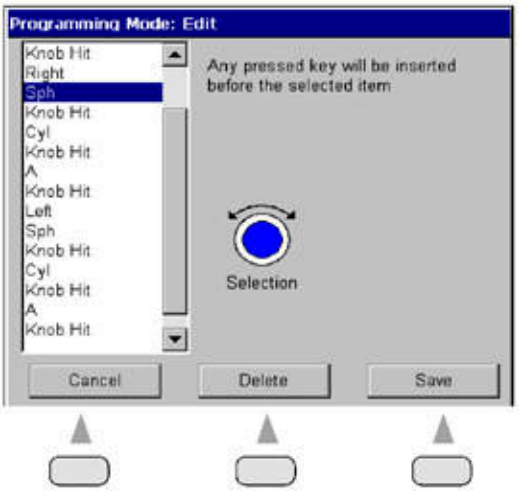


Figure SU-14 Edit

1. If you want to delete a step, turn  to the left until you highlight the step you wish to delete.
2. Press the Function Button corresponding to the delete key to remove the highlighted step. Refer to Figure SU-14.
3. If you want to add a step, highlight a step where you want to insert another step above it.
4. Press the button of the step you want to add. The step will be added above the highlighted step.
5. Press the Function Button corresponding to the Save key to save the program.
6. Press the Function Button corresponding to the Cancel key to exit and not save any changes.

Switch Program

1. Press CTL and  at the same time to switch from the recorded program to the default program.
2. Press the same buttons to switch back again.
3. The individual program is indicated on the step counter in the bottom left corner of the screen: 

Print

This option is only available when you have a printer set up and connected to the Central Unit. A compatible printer can be selected in the settings menu. Software package 3 is required to activate the printer connection.

Options/Set-Up Menus (continued)

Service

This selection is to access all the service settings and information. Refer to Figure SU-15.

Figure SU-15 Service Menu

Info

This option provides the system information for the unit as indicated below. The serial number, Software version, projector, printer, etc. are listed. Refer to Figure SU-16.

Unlock Packages

Use this option to unlock packages for other instruments and software packages from Reichert. Please refer to Finding and Entering Software Package Keys, under Software Update. Refer to Figure SU-16.

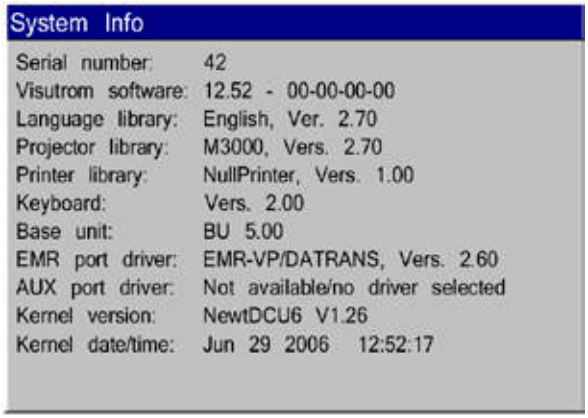


Figure SU-16 System Info

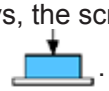
Error Log

This is a log of all the errors that have occurred in the Controller. You can press the corresponding keys to Refresh, Delete, or go on to the Next page. If you press CTL, the Print and Send options are activated.

Get Phoroptor Error Byte

This is a log of all the errors that have occurred in the Phoroptor.

Keyboard Test

Use this to perform a self test of the Controller. A screen will pop up, with the keyboard laid out on it. As you press a key, it will turn from blue to green, indicating that it is functioning properly. Test all the keys, the scroll wheel, and knob, and make sure everything is functional. To exit, press CTL and  . If there is any malfunction of any of the keys, please contact Reichert at the contact information on the last page.

Phoroptor Test

This will test the lens movement in the Phoroptor and all other functions of the Phoroptor head. Hit the arrow key corresponding to “stop” to interrupt the test process and the arrow key corresponding to “close” to close the window.

Show Pho. Test Report

This is a log of all the errors that have occurred in the Phoroptor. You can press the corresponding keys to Refresh, Delete, or go on to the Next page. If you press CTL, the Print and Send options are activated. Press the multi function knob to close all windows.

Options/Set-Up Menus (continued)

Service (continued)

Show Error Log File

This is a log of all the errors that have occurred in the entire system. You can press the corresponding keys to Refresh, Delete, or go on to the Next page. If you press CTL the Print and Send options are activated.

Factory Settings

This option prompts you with a screen that asks if you want to reset all options to factory settings. Press either IN for yes, or C for no.

Introduction

The Auto Phoroptor RS™ needs to be aligned with the patient before reliable measurements can be taken. Once the Phoroptor has booted up, it is ready to be aligned and measurements can be taken immediately afterward.

Alignment of Refractor

Initial Alignment

The first alignment that needs to be made is the general alignment of the phoroptor to the patient.

1. Place the refractor in front of the patient and center it in front of the patients eyes.
2. Use the Illuminated Bubble on the phoroptor to make sure that the phoroptor is level.
3. Once the phoroptor is level, physically adjust the phoroptor to line up the left side with the patient's eye.

Note: Do not worry about the alignment of the right side of the phoroptor to the patient's other eye. This will be adjusted later.

Pupillary Distance

The next adjustment that needs to be done is the pupillary distance (PD). Using the Controller, adjust the pupillary distance between the right and left apertures on the phoroptor. The PD can be adjusted either monocularly or binocularly.

1. Press PD. Both apertures will display fixed cross cylinder lenses.
2. Use the crosses in the lenses to line up the center of the patient's eye.
3. The Illumination for Corneal Vertex will light up to help with alignment.
4. The left refractor half is active first, indicated by this image on the Controller display screen:

5. Turn  to change the pupil distance.
6. Press  to set the distance and move to the right eye.
7. Press  to save the right eye measurement and exit.

Shortcut: When turning the Multifunction Knob:
Press BIN, and both refractor halves simultaneously move together or apart.
Press BIN and the multifunction knob, both halves move in the same direction.

Shortcut: Press CTL and C to move the Phoroptor to the innermost position.

Alignment of Refractor (continued)

Corneal Vertex Distance

The next measurement that must be taken is the corneal vertex distance, to make sure that the refractor's lenses are at the proper distance from the patient's eyes.

Note: The default vertex distance is 16mm.

1. Look into the Corneal Vertex Distance Windows and line up the corneas so that the target line and the target mark superimpose.
2. Turn the Forehead Rest Knob so that the patients forehead is resting against the Forehead Rest.

3. If the Forehead Rest is not pressed against the patient's head, the following warning signs appear:
   - POS will appear in red on the screen and blink.
   - User Information : Attention : Forehead Rest
   - A beep will sound intermittently.

Note: The warning beep and User Information warning can be inactivated by changing the settings in the Options Menu. Follow these steps:

OPTIONS → Settings → Messages → Info Forehead Rest Fully Off
Only Forehead Rest Beep Off

Height Level of Eyes

Next, it is necessary to adjust the refractor so that the height of each side is level with the patient's eyes.

1. Center the left aperture in front of the patient's left eye.
2. Center the other half of the refractor with the patient's right eye by turning the Height Adjustment Knob.

Inputting Data

Now that the refractor is aligned, you may begin to take measurements. You can select to import previous measurements or values and use that data as a starting point for a refraction. To do so, a basic understanding of the storing and inputting of data is necessary.

Storage Boxes

On the bottom right of the Controller display screen are 3 gray Storage Boxes. Storage Boxes can be used to store:

- Data transferred from an EMR system.
- Data transferred from connected equipment such as Lensmeters or Autorefractors.
- Data from refraction.
- Manually entered data.

Figure IS-1 Storage Boxes

Under each Storage Box is a small field labeling the boxes. The fields are labeled:

- **AR** - Autorefractor
- **LM** - Lensmeter
- **DATA** - Refraction data from EMR.

Data can be transferred from any of these boxes to the phoroptor using the function keys below each box so that refractions may begin from this starting point. New refraction measurements can be saved and stored in these boxes, and measurements may be switched back and forth from the storage boxes to the active field at any point. Refer to Figure IS-1.

Data Transfer From Online EMR or Directly Connected External Equipment

Transferred data is assigned to the corresponding storage places:

- **AR** - Autorefractor
- **LM** - Lensmeter
- **DATA** - Refraction data from EMR

To import data, you must make sure the settings are set up for data import.

Note: The instrument must be connected to the Main Unit using the appropriate cable.

1. Press OPTIONS and turn  to select Settings and press  .
2. Turn  to select AUX Port and press  .

Inputting Data (continued)

Storage Boxes (continued)

Data Transfer From Online EMR or Directly Connected External Equipment (continued)

3. The following screen will appear. Refer to Figure IS-2.

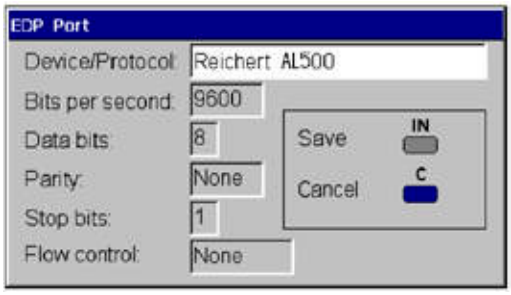


Figure IS-2 EMR Port

Note: When you first access the box, the data are highlighted in gray, meaning you cannot edit it. You must press several buttons together to access the fields.

4. Press CTL+R/G+PD to activate the AUX Port fields.
5. Use the control knob to enter the information for the Unit, Baud Rate, Data Bits, Parity, Stop Bits, and Flow Control.
6. When all the data are correct, press IN to save and exit the screen.

Note: You must set the correct setting for output/export on the instrument you are transferring the data FROM. You must make sure the Baud Rate and other data are correct for the instrument. If the settings are not correct, data will not transfer.

7. Press CTL and the corresponding Function Button to import data from the connected equipment, or press the data output button on the instrument you want to import data from. Example, on the AL500, it is the far right button. This would be a data output function button on the instrument.
8. Data will export to the Controller and appear in the corresponding box.

Shortcut: Press CTL and the Left Function Button to Import Autorefractor (AR) Data.
Press CTL and the Middle Function Button to Import Lensmeter (LM) Data.

Adjusting Values

Now that the patient is aligned you may start the refraction.

Adjusting a Refraction From Previously Saved, Transferred or Input Data

1. Press the Function Button on the Controller corresponding with the storage box measurements you want to send to the phoroptor (i.e., Lensmeter, Autorefractor, EMR.).
2. The data in the box is transferred to the refraction data fields above and becomes active.
3. The data are labeled the same way as in the data storage area. Example, LM.
4. The phoroptor automatically switches in the lenses to reflect the information in the active field.
5. Measurements can be adjusted from this starting point.
6. Once new measurements are taken, the label changes from the previous label (LM, AR, etc) to NEW.

Shortcut: Press CTL and Open Lens Aperture to fill the memory with demo values.

Eye Selection

Press R, L, or BIN (binocular) to open the apertures for the right eye, left eye, or both eyes.

Note: The aperture for the inactive eye will automatically be closed during refraction.

Note: The default setting after turning the unit on is to have the right eye active and both viewing apertures open.

Sphere

1. Press SPH to activate the sphere value field or scroll through the options until you reach sphere by turning  .
2. The sphere box will be highlighted, indicating it is the active data field.
3. Turn  to adjust the sphere value by ±0.25 D each.

Note: Move the knob to the right to increase sphere power and to the left to decrease sphere.

Note: Press in and turn the knob together to adjust the sphere value by ±1.00 D per click stop.

4. Press  to enter the value and to move on to the next step.

Adjusting Values (continued)

Cylinder

1. Press CYL to activate the cylinder value.

Note: Press  to move from Sphere to Cylinder.

2. The cylinder box will be highlighted, indicating it is selected. Refer to Figure IS-3.
3. Turn  to adjust the cylinder value by ±0.25 D each.

Note: Press in and turn the knob together to adjust the cylinder value by ±1.00 D per click stop.

4. Press  to enter the value and to move on to the next step.

Sphere and Cylinder

You can adjust both the sphere and cylinder values simultaneously by activating this function.

1. Double-click CYL.
2. Both the Cylinder and Sphere values will be highlighted, indicating they are both active.
3. Turn  to change the sphere and cylinder value together.
4. The first click stop will adjust the cylinder power by ±0.25D.
5. The next click stop will adjust the cylinder power by another ±0.25 D, while the sphere value will adjust by ±0.25 D.

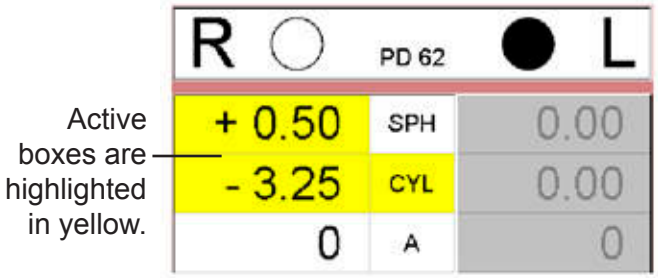


Figure IS-3 Active Boxes

6. Press  to enter the value and to move on to the next step.

Note: Once you move on to another value, for example A or ADD, the combination cylinder and axis alteration will be deactivated and you will have to double click on CYL again to enter the mode where both Cylinder and Sphere values are adjusted simultaneously.

Adjusting Values (continued)

Axis

1. Press A to activate the Axis or press  until you reach axis.
2. The axis box will be highlighted, indicating it is selected.
3. Turn  to change the axis value by 1° following the TABO scheme.

Note: Press in and turn the knob together to adjust the axis value by ±10° per click stop.

Note: The actual position of the axis is graphically shown on the display.

4. Press  to enter the value and to move on to the next step.

Near Vision Addition

1. Press ADD to change the Near Vision Addition value.
2. The ADD box will be highlighted, indicating it is selected.
3. Turn  to change the near vision addition value.

Note: Press in and turn the knob together to adjust the near vision addition value by larger steps.

4. Press  to enter the value and to move on to the next step.

Cross Cylinder

The Auto Phoroptor RS™ has a cross cylinder function activated by the X-CYL button that allows for:

- Examination for astigmatism.
- Axis adjustment.
- Cylinder power adjustment.
- Cylinder fine adjustment.

Taking into account the already set correction values and the visual acuity set on the projector, the next logical examination steps are presented automatically.

Changing the Cross Cylinder Power Step

1. The default setting is ±0.25D. Refer to Figure IS-4.
2. Press the ±0.5 button once to change the cross cylinder step from ±0.25 D to ±0.5 D.
3. Press the ±0.5 button a second time, and the cross cylinder step goes back to ±0.25.
4. From visual acuity of 20/60 or worse, the cross cylinder step is switched to ±0.5 D automatically.
5. This can be reset any time by pressing the ±0.5 button.

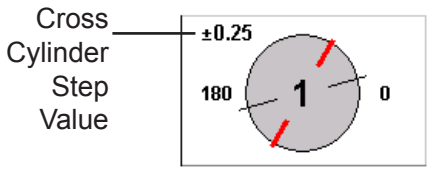


Figure IS-4 Step Value

Changing the Spherical Effect in Cross Cylinder Mode

1. Press and hold SPH and turn  to change the spherical value.

Cross Cylinder (continued)

Examination for Astigmatism

If the cross cylinder mode (X-CYL) is activated and a cylinder value is not present, you will be prompted to perform an astigmatism check.

1. Press X-CYL and the Astigmatism Check screen will appear. Refer to Figure IS-5.
2. Turn  to change the cross cylinders in 0° and 90°, or in a second round in 45° and 135°.
3. Press IN to save the cross cylinder value and add it to the spherical value.
4. Press A once to delete the cross cylinder value.
5. Press A again to reset it to the previous axis position.
6. Continue on with the Axis adjustment and Cross Cylinder adjustment.

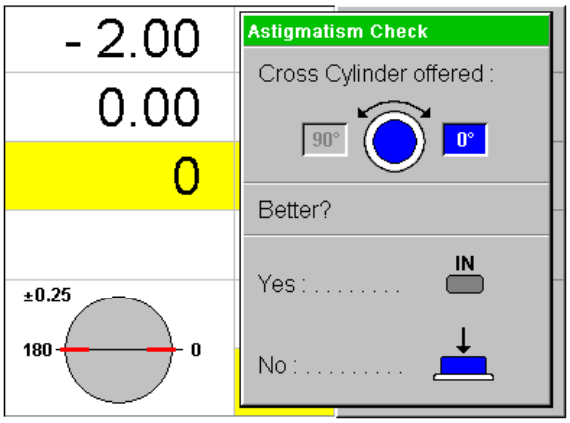


Figure IS-5 Astigmatism Check

Cross Cylinder (continued)

Axis Adjustment

1. Press X-CYL to set the Auto Phoroptor RS™ to cross cylinder mode. Refer to Figure IS-6.

Note: Axis Adjustment will automatically be the next step if the astigmatism check is done first.

2. If both eyes are open, one eye will be covered.
3. If a cylinder value is already selected, the axis adjustment will be performed first.

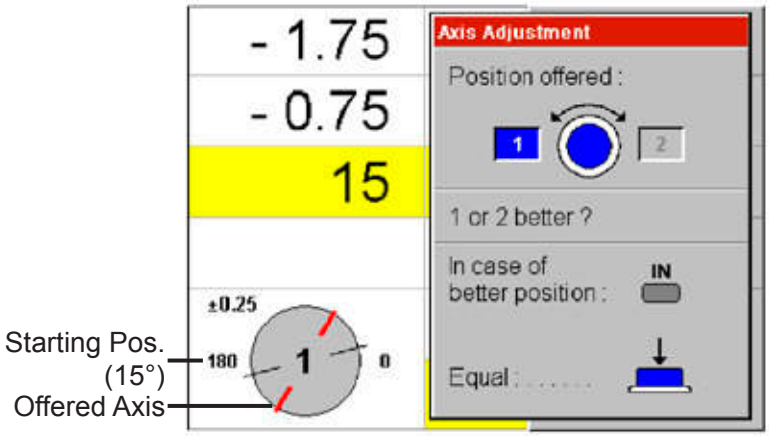


Figure IS-6 Axis Adjustment

4. Turn  to change the position of the conventional cross cylinder.
5. If the patient prefers a position, the cylinder axis must be changed to this preferred direction. To do this, you have 2 options:

Shortcut: Press CTL and IN to undo an adjustment. Will back up only to three adjustments.

Programmed Axis Adjustment

1. Press IN to change the axis value in pre-programmed steps.
2. The degree of the first change depends on the cylinder power. The higher the cylinder power, the smaller the change:

Cylinder Power	First Alteration
0.25 to 0.75 D	20°
1.00 to 2.75 D	10°
3.00 to 8.00 D	5°

3. Once axis adjustment is determined, the next step is cylinder power adjustment.
4. Press CTL and IN to return to the previous setting.

Freely Selectable Axis Adjustment

1. Turn  to adjust an individual axis measurement.
2. Axis adjustment in a single degree starts after turning the knob in the direction preferred by the patient until the Controller beeps. Then move the knob two more click stops until the axis changes.
3. By this procedure, the user determines the amount of adjustment.
4. Press  to save the axis settings.

Cross Cylinder (continued)

Cylinder Power Adjustment

1. Press  and Cylinder Power Adjustment is selected if not done automatically. Refer to Figure IS-7.
2. If minus cylinder is selected in the Options menu, turning the knob left increases the value (axis on axis), and turning the knob right decreases the value (axis against axis).
3. Conversely, if plus cylinder is selected in the preprogrammed menu, turning the knob left will decrease the cylinder value, and turning the knob right will increase the value.

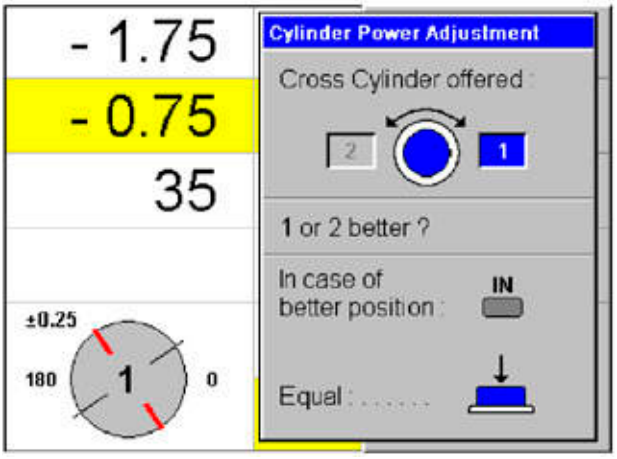


Figure IS-7 Cylinder Power Adjustment

Note: The plus axis of the cross cylinder is marked white.

Note: The minus axis of the cross cylinder is marked red.

To adjust the cylinder power you have 2 options :

Programmed Cylinder Power Adjustment

1. Press IN and cylinder power adjustment will be done in pre-programmed steps.
2. The cylinder power and sphere will both be changed, according to the entire cross cylinder value.

Note: The instructions in the pop up window will assist you during this procedure.

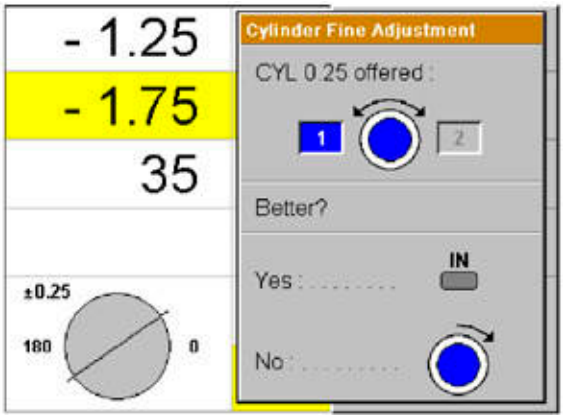


Figure IS-8 Cylinder Fine Adjustment

Freely Selectable Cylinder Power Adjustment

1. Starting with the position preferred by the patient, the cylinder power can be adjusted by turning the knob in the direction preferred by the patient until a beep sounds, and then turn the knob two more click stops.
2. The first click stop adjusts the cylinder power by ±0.25 D.
3. The next click stop adjusts the cylinder power by ±0.25 D, and the sphere value ±0.25 D with the reverse sign.
4. Press  to save and exit cylinder power adjustment.
5. To move on to the next eye, press either R or L.
6. Press A to go back to the Axis Adjustment and make further changes if necessary.

Cylinder Fine Adjustment

After finishing the pre-programmed cylinder power adjustment, a correction of ±0.25 D may be required. The patient will choose a preferred position. Press IN and the cross cylinder test will be completed. Refer to Figure IS-8.

Near Vision Test

If required, a near vision test can be performed with an optical test chart on a near vision rod. In order to complete the near vision test the Near Vision Rod and Test Chart needs to be inserted into the Convergence Lever on the bridge of the Phoroptor. A small metric Allen screwdriver is needed to loosen the threaded pin in the Convergence Lever, and then tighten the pin to secure the Nearpoint Rod.

1. Lower the near vision rod.
2. The following fields and the settings will be highlighted :
   - The functions ADD and BIN.
   - Both refractor halves will converge to 15.75 in. When you raise the near vision rod, the add fields will no longer be active and the near vision lenses will be removed.
3. This function allows you to calculate comfortable near vision.

Comfortable Near Vision Addition

1. Press ADD. The Comfortable Near Vision Determination box will appear. Refer to Figure IS-9.
2. Turn the knob to the left until the patient can no longer see comfortably.
3. Press the ADD again- turn the knob to the right until the patient's near vision is no longer clear.
4. Lower and upper limit values need to be determined from which the comfortable near vision addition will be calculated and set.
5. While setting ADD, if the convergence setting were not entered, this request appears.

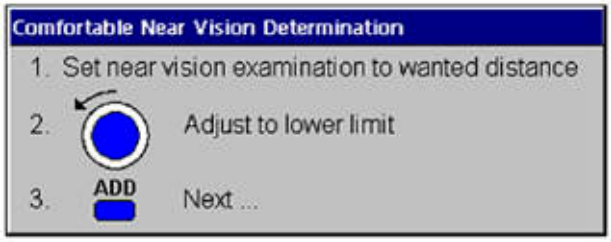


Figure IS-9 Near Vision Addition

Note: The forehead rest must be positioned.

Prism Compensators

With the prism compensators in place, prismatic effects can be applied to compensate heterophorias. The prism compensators are manually shifted in front of the apertures and back.
Refer to Figures IS-10 and IS-11.

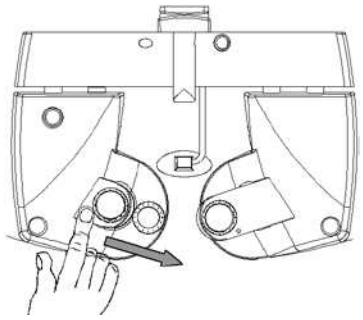


Figure IS-10 Place Prisms

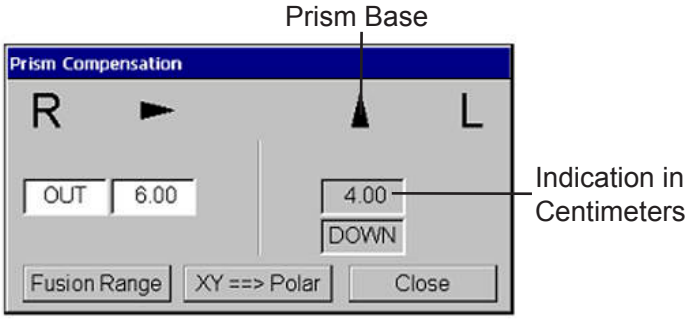


Figure IS-11 Prism Compensation Screen

Note: Yellow caution symbols blink in this window if the prism compensators are not located in front of the apertures.

Note: Not all models of the Auto Phoroptor RS™ come with prism compensators.

In 'Prism Compensation' mode, the buttons work as follows:

PR	Recall Prism Values/ Close (Set values remain unchanged.)	**R**	Prism Effect - Right Eye horizontal (OUT – IN) Left Eye vertical (UP - DOWN)
	Changes the Prism Values.	**L**	Prism Effect - Left Eye horizontal (IN – OUT) Right Eye vertical (UP - DOWN)
	Switches the settings.	**BIN**	Apply the Prism Effect to Both Eyes. Change back by pressing R or L.

Note: Press and turn the Control Knob to change the base of the prism (IN-OUT or UP-DOWN) in each eye.

Prism Indication in Polar Coordinates or in X-Y Coordinates

1. Press the corresponding Function Buttons on the Controller to select any of the 3 options on the bottom of the Prism Compensation box. Refer to Figures IS-12 and IS-13.

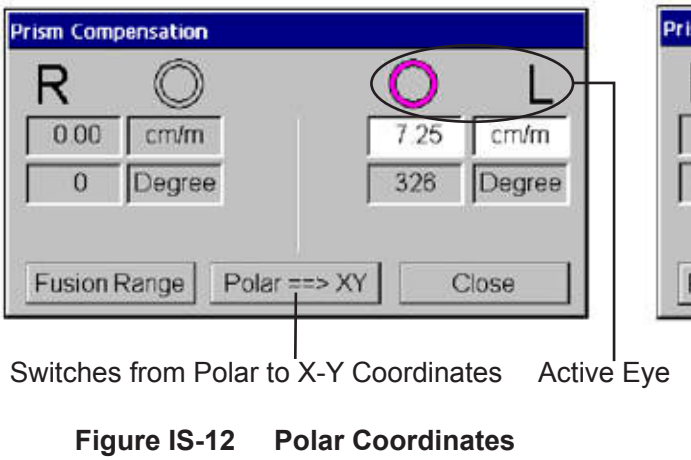


Figure IS-12 Polar Coordinates

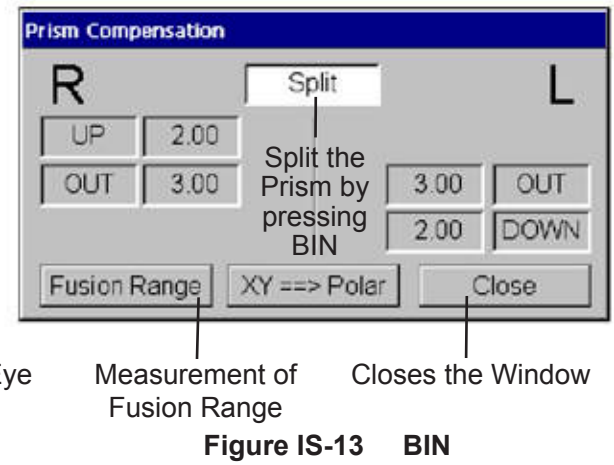


Figure IS-13 BIN

Prism Compensators (continued)

Prism Indication in Fusion Range

For measuring the fusion ranges you have to engage the prism compensators.

1. Press the Left Function Button below the “Fusion Range” box when the Prism Compensation window appears to activate the Fusion Range Measuring window. Refer to Figure IS-14.

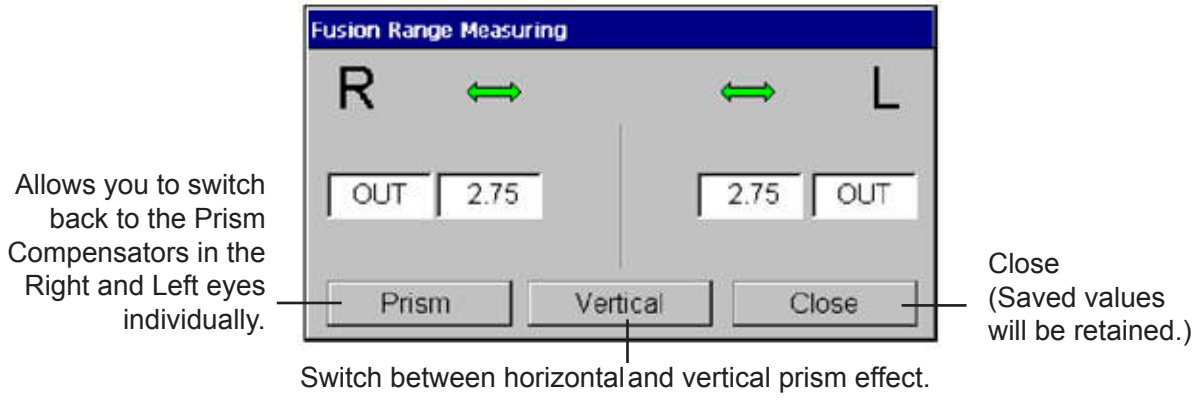


Figure IS-14 Fusion Range Measuring

2. Turn  to choose the ‘Break Point’.
3. Save the value by pressing  .
4. The following appears: Memory
5. Turn  to choose the ‘Recovery Point.’
6. Press  to automatically calculate, show, and store the ‘Blur Point.’
7. After switching over, the same is applicable to vertical prism effect.

Note: The saved prism values will be presented on the screen in the box below the ADD line of data. The top value indicates the prism in the right eye, base in or out, up or down. The bottom value indicates prism in the left eye, base up or down, in or out.

Saving Refraction Data

Once the values for a refraction are completed, you can transfer the values to a storage box to save. The storage areas are located at the bottom of the screen.

1. Press the Function Button on the Controller corresponding with the storage box you want to transfer the refraction data to.

Note: You must select an empty box or data will not transfer.

2. The data is transferred to the storage box.
3. Saved refraction values will be labeled. For example: MEM3.

Shortcut: Press CTL and R and the visual acuity will automatically be transferred to the CC line (with correction.)

Viewing Impressions

One of the advantages of a digital phoroptor is having the ability to easily and quickly compare different refractions, or old and new refractions, with the push of a button. This allows patients to see the difference between their old and new prescriptions, or the difference between two possible prescriptions.

After completing a refraction, measurements in the storage boxes and the current measurements can be switched as needed so different prescriptions can be compared. Once data are transferred to the large active data field, the phoroptor switches the lenses to reflect that data. This is what allows for easy comparison.

1. Push the corresponding storage box Function Button for the data you wish to make active, and the data and corresponding lenses will be switched in. For example, you can switch in the lensmeter data and compare it with the new refraction data.
2. Push the button again to switch back.

Note: When switching the data from current to stored, your current readings will NOT be deleted. Readings are just stored and can be recalled at any time by pressing the corresponding button.

3. Stored measurements are highlighted in red and cannot be changed.
4. Press F/N to select the data to transfer:
   - **F** Far Distance Value Only
   - **N** Reading Glasses
   - **F/N** With Addition (Bifocals)

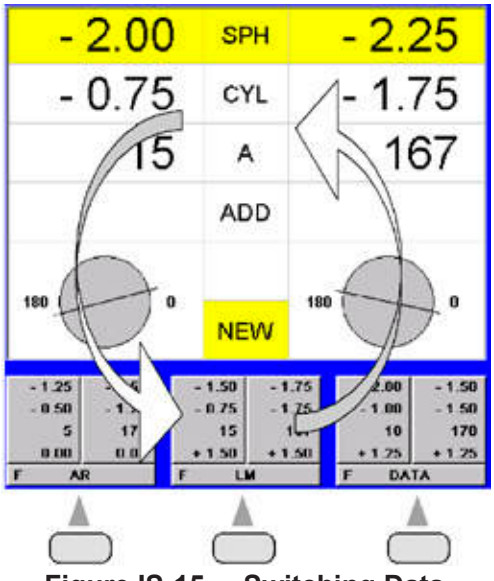


Figure IS-15 Switching Data

Note: The example in Figure IS-15 illustrates the switching of values between Lensmeter data and actual refraction data.

Clearing Data

Different clearing procedures are accomplished with the following buttons:

C -	Clear
CP -	Clear Partial
CTL -	Control

Clearing All Data

1. Press C and a safety check comes up to make sure you want to clear all the data.
2. Press C once more to clear all the data.
3. All the data will be cleared in both the active refraction and all the storage boxes.
4. PD will move back to 62 mm.

Clearing Individual Data

1. Press CP and either the SPH, CYL, or A buttons, depending on the data you want to clear.

Clearing Data for One Eye

1. Press CP and the R or L button, depending on the data you want to clear for one eye.

Clearing Active Refraction Data

1. Press CP and BIN.
2. The data for both eyes in all rows in the active refraction box will be cleared.

Resetting Phoroptor

1. Press CTL and C and a safety check comes up to make sure you want to reset the Phoroptor to the default position.
2. Press C once more to have the refractor go back to it’s standard position.

Note: Manually entered data can be cleared as well.

Note: Saved values are not affected by the above clearing procedures.

Data Transfer

1. Press COM to transfer the new refraction information to the EMR (Electronic Medical Records) system.
2. The window in Figure IS-16 will appear.
3. The volume of the transferred data depends on the actual EMR software.

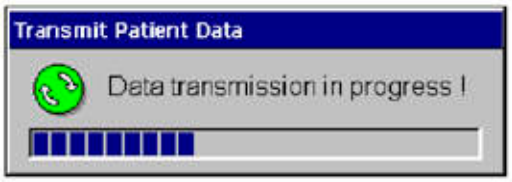


Figure IS-16 Transmit Patient Data

Note: The actual software version can be found in 'Options- Service- Info'.

4. Press  to access the settings menu and select the EDP Port from the scroll down menu. Refer to Figures IS-17 and IS-18.

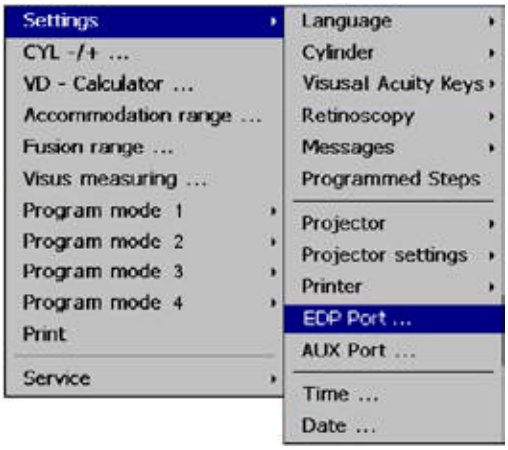


Figure IS-17 EDP Port Settings

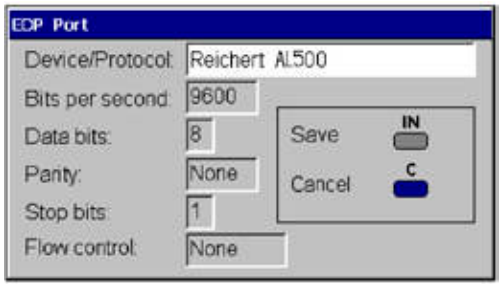


Figure IS-18 EDP Port Screen

Data Output

Each patient data record can include:

- Sphere (Near and Far)
- Cylinder
- Axis
- Prism
- Uncorrected and Corrected Visual Acuity
- Vertex Distance
- Pupillary Distance
- Accommodation Range
- Blur Point

Printing

To print data, the following must be set:

- A compatible printer must be connected to the Central Unit.
- Software package 3 must be enabled.
- Under ‘settings’ the printer must be selected.

1. Press OPTIONS to enable the options menu. Refer to Figure IS-19.
2. Select Print.
3. Press the corresponding Function Button on the Controller to select which data to print. Refer to Figure IS-20.
   - F/N – Both distance and near vision values.
   - N – Near vision values.
   - F – Distance vision values.
4. Press CTL to switch the F/N button to F/ADD.

Shortcut: Press CTL and the right function button together and the ‘Print’ window will automatically pop up.

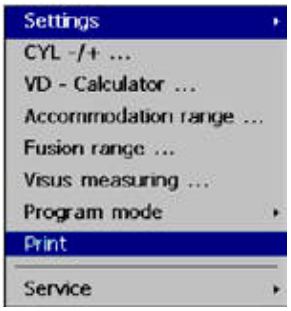


Figure IS-19 Print Menu

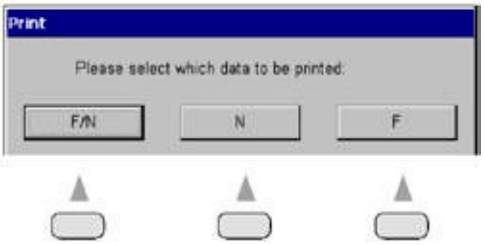


Figure IS-20 Print Screen

Printer Data Output

The following information can be sent to the printer:

- Date and Time
- Sphere
- Cylinder
- Axis
- Prism
- Vertex Distance
- Pupillary Distance
- ADD
- Visual Acuity

Software Update

Updating Software: USB stick

1. Turn the unit ON.
2. Insert the USB stick. Refer to Figure IS-21.
3. The window in Figure IS-22 appears.
4. Follow the instructions shown in the window.
5. If required, remove the USB stick.

Note: The USB stick can be removed while the unit is switched ON.

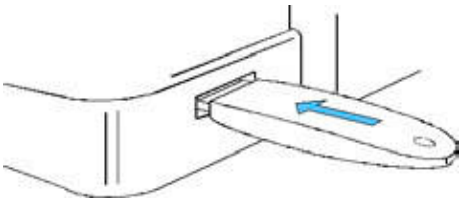


Figure IS-21 USB Stick

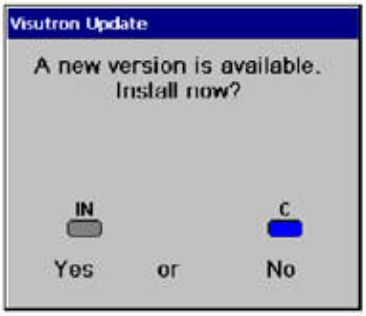


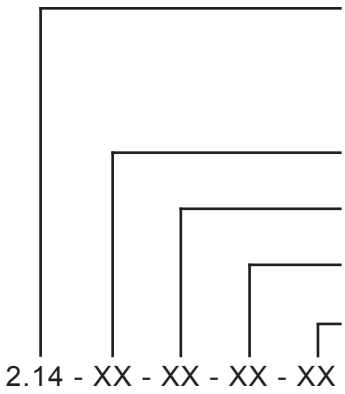
Figure IS-22 Update

Software Update (continued)

Package Keys

If one or more external units are directly connected to the Auto Phoroptor RS™, from version 2.14 onwards the corresponding software packages have to be enabled.

The keys to enable the software consist of a numerical code corresponding to the Controller. You can get these keys from Reichert or their representatives by stating the numerical code in the Controller.



		Enabling Code
Standard	Standard – Software + EDV / VP + EDV 900 + projectors AP250 M2000 M3000 L 29 B	Automatically*
Version for package 1	Lensmeters & Projectors	Key 1
Version for package 2	Autorefractor	Key 2
Version for package 3	Printer	Key 3
Version for package 5	Special Acuity Systems	Key 15

Note: Package 4 consists of the packages 1+2+3.

Note: New instruments may be added to the software packages as they become available.

Software Update (continued)

Finding and Entering Package Keys

1. Press OPTIONS to access the Settings menu and turn  to scroll down to Service.
2. Press  and move on to the next scroll down menu. Refer to Figure IS-23.
3. Press  to select Info. The System Info screen pops up. Refer to Figure IS-24.

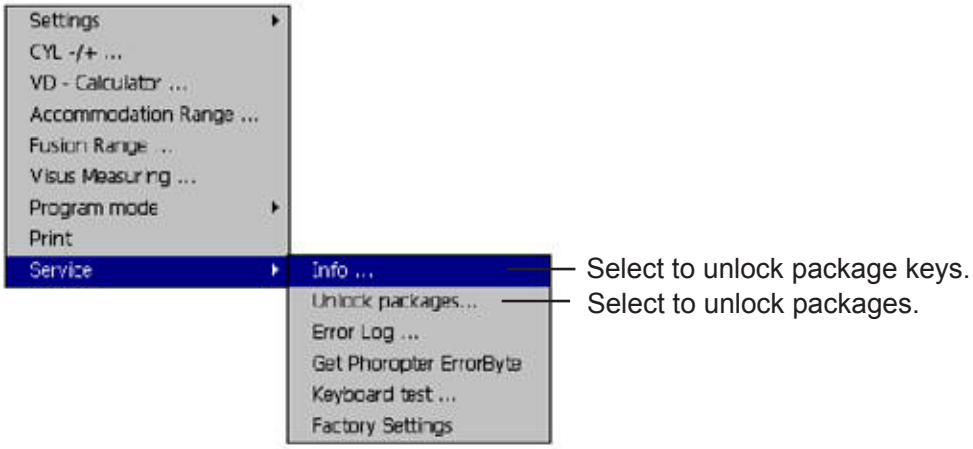


Figure IS-23 System Info

4. The Auto Phoroptor RS™ Software Number is the key to unlock the software packages.
5. Go to Unlock Packages under Service.
6. Use the Scroll Wheel to enter the corresponding numbers into the packages, and press  to enter. Refer to Figure IS-24.

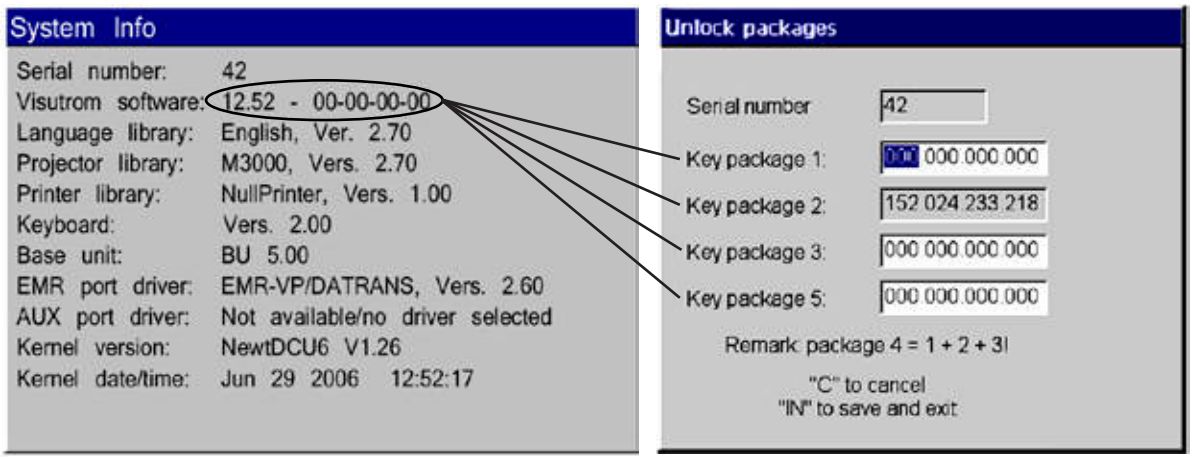


Figure IS-24 Package Keys

7. Press IN to enter the data and save it.
8. Once the above is completed, the software is available on your unit.

Note: The Auto Phoroptor RS™ Software number is the key to unlocking the software packages.

Maintenance

Cleaning

The Auto Phoroptor RS™ is a sealed unit, and access to the lenses and other internal parts cannot be accessed by the operator for cleaning.

It is recommended that you send in your Auto Phoroptor RS™ for routine cleaning to the Reichert Factory.

WARNING: ANY REPAIR OR SERVICE TO THIS INSTRUMENT MUST BE PERFORMED BY EXPERIENCED PERSONNEL OR DEALERS THAT ARE TRAINED BY REICHERT SO THAT CORRECT OPERATION OF THIS INSTRUMENT IS MAINTAINED.

WARNING: ALWAYS UNPLUG THE POWER CORD TO THE INSTRUMENT BEFORE CLEANING ANY SURFACE ON THE INSTRUMENT.

To ensure that your Auto Phoroptor RS™ remains clean, cover your phoroptor with the dust cover when not in use. Consistent use of the dust cover will help keep dust and other contaminants off of the unit and from getting inside and possibly affecting operation.

Note: Make sure the power to the phoroptor is OFF before you cover the instrument.

Keep the exterior surfaces clean by periodically wiping it with a clean, dry cloth. If there are stains that are hard to remove, moisten the soft cloth with a mild soap solution (1 cc of liquid dish soap to one liter of clean, filtered water (filtered below 5 microns)).

CAUTION: DO NOT USE SOLVENTS OR STRONG CLEANING SOLUTIONS ON ANY PART OF THIS INSTRUMENT OR DAMAGE TO THE UNIT MAY OCCUR.

CAUTION: USE OF AMMONIA BASED CLEANERS ON THE LIQUID CRYSTAL DISPLAY (LCD) OR ANY PLASTIC SURFACE MAY CAUSE DAMAGE TO THE INSTRUMENT.

Troubleshooting

Only those errors indicated on the display are directly important to the user and are listed below. In case of support requests, please refer to the Error Log File (OPTIONS - Service - Show Error Log File) where you will find a detailed listing of all errors, warnings, and status messages.

Error Source [identification code]; Necessary for all support requests.
Brief Description.

Error Source	Probable Cause	Solution
Refractor [PH:yy]	• Cable to refractor defective, damaged, or loose. • Incorrect initiation. • Defective refractor electronics.	• Button combination CTL + C. • Turn the unit on and off. • Check the cable to the refractor.
EMR-Port [Dxx.yy]	• Wrong unit driver. • Wrong interface parameters. • Connection cable defective, damaged, or loose.	• Set the correct unit driver and interface parameters by pressing the button combination CTL+R/G+PD in the EMR port dialogue (Options-Settings-EMR Port). • Check the connection cable.
AUX-Port [Dxx:yy]	• Wrong unit driver. • Wrong interface parameters. • Connection cable defective, damaged, or loose.	• Set the correct unit driver and interface parameters by pressing the button combination CTL+R/G+PD in the Aux-Port dialogue. • Check the connection cable.
Projector [Pxx:yy]	• Projector not connected. • Projector turned off. • Wrong projector driver. • Projector cable defective, damaged, or loose.	• Connect the projector to the central unit and turn on. • Select a suitable projector driver. • Check the connection cable.
Base-Unit [BU:yy]	• Incorrect power supply. • Defective central unit.	• Check the power supply.
Application [MA:yy]	• Defective software. • Defective Controller. • Cable to central unit defective, damaged, loose, or positioned near an interfering source. • Defective power supply.	• Perform a software-update. • Check the cable to the central unit. • Check the power supply.
Green LED on the central unit not lit.	• Cable not connected. • Switch set to OFF.	• Connect the cable. • Set the switch to ON.
No image in the display despite switched-on unit.	• Defective fuses on the cable plug of the central unit.	• Exchange the fuses on the cable plug of the central unit.
Time and date do not work.	• Time and date do not work. • Long-life battery empty or defective.	• The service technician should insert a new battery.

xx = Driver identification code.
yy = Identification code for error, warning, or status messages.

If failures cannot be remedied by one of these measures, please contact Reichert Customer Service as indicated on the back of this manual.

Technical Data

Refractor

Spherical Effects	17.75 to 22.25 D
Steps	0.25 and 1.0 D
Cylinder Power	-8.0 to +8.0 D
Steps	0.25 and 1.0 D
Axis Adjustment	0° to 179°
Steps	1° and 10°
Cross Cylinder Test	±0.25 and ±0.5 D
Prismatic Effects (Optional)	to 20 cm/m per eye
Steps	0.5 cm/m binocular 0.25 cm/m monocular
Corneal Vertex Distance	16 mm
Pupil Distance	50 to 80 mm
Steps	1 mm binocular
Convergence	400 mm
Height Level of Eyes, adjustment	±3 mm
Leveling	via bubble level
Free Aperture	19 mm
Thickness of Housing at the Viewing Aperture	26 mm
W x H x D (at PD = 64 mm)	12.2 x 8 x 2.8 in
Weight Without Prism Compensator	7.6 lb

Controller With Display

Controller (W x H x D)	9.2 x 1.8 x 6.6 in
Display (W x H x D)	8.8 x 6.2 x 0.6 in
Weight	4.2 lb

Note: A unit-specific software is required for each instrument.

Central Unit

W x H x D	8 x 3.5 x 10.8 in
Weight	9.9 lb
Power Consumption	max. 80 VA
Interfaces	1x Refractor, 1x Controller, 1x Projector, 1x EMR, 1x Printer Serial, 1x Printer Parallel, 1x Option, 1x AUX (e.g. for Lensmeter or Autorefractor), (RS 232, e.g. for Office Computer or DATRANS or Lensmeter or Autorefractor)
Operating Voltages	100 VAC/ 50 Hz ..... 115VAC/ 60 Hz, 230 VAC/ 50 Hz
Fuses	F1/F2 T 1.6A, F1/F2 T 1.6A, F1/F2 T 0.8A

Note: In case of any system extension, the requirements according to EN 60 601-1-1 have to be observed.

Operating and Storage Conditions

Operating Conditions:	+50° to +104 °F
Storage Conditions:	-4° to +140 °F
Relative Air Humidity:	10 to 85 %
Air Pressure:	600 to 1060 hPa

Operation permitted in explosion proof atmosphere only.
Due to continuous technical improvements, the figures shown in this manual may not be identical with the equipment delivered to you.

Technical Description

The Auto Phoroptor RS™ system consists of the following units:

- Refractor
- Controller
- Central Unit
- Connecting Cables

Classification:

MDD 93/42/EEC:	Class I
EN 60 601-1:	Class I Type B

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

Type B: Equipment which provides an adequate degree of protection against electrical shock, particularly regarding allowable leakage currents and reliability of the protective earth connection.

For this system, the following connection lines are available:

Mains:	H05VV-F3G 0.5, 6.6 ft (2m) long
Controller:	Lütze Superflex tronic (C) PUR 7 x 0.14; maximal 16.4 ft (5m) long
Refractor:	Lütze Superflex tronic (C) Y 12 x 0.14; maximal 22.9 ft (7m) long

Disposal

For proper disposal or recycling purposes, Reichert will take back the Auto Phoroptor RS™. Please contact Reichert.

The Auto Phoroptor RS™ must not be disposed of with residential waste.

Table 201 – Guidance and Manufacturer's Declaration

Electromagnetic Emissions

All Equipment and Systems

Guidance and Manufacturer's Declaration – Electromagnetic Emissions
The Auto Phoroptor RS™ is intended for use in the electromagnetic environment specified below. The customer or user of the Auto Phoroptor RS™ should ensure that it is used in such an environment.

Emissions Test	Compliance	Electromagnetic Environment - Guidance -
RF Emissions CISPR 11	Group 1	The Auto Phoroptor RS™ uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF Emissions CISPR 11	Class B	The Auto Phoroptor RS™ is suitable for use in all establishments other than domestic and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonics IEC 61000-3-2	Class A	
Flicker IEC 61000-3-3	Complies	

Table 202 – Guidance and Manufacturer's Declaration

Electromagnetic Immunity

All Equipment and Systems

Guidance and Manufacturer's Declaration – Electromagnetic Immunity
The Auto Phoroptor RS™ is suitable for use in all establishments, other than domestic, and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes is intended for use in the electromagnetic environment specified below. The customer or user of the Auto Phoroptor RS™ should ensure that it is used in such an environment.

Immunity Test	IEC 60601 Test Level	Compliance Level	Electromagnetic Environment - Guidance
ESD IEC 61000-4-2	±6kV Contact ±8kV Air	±6kV Contact ±8kV Air	Floors should be wood, concrete or ceramic tile. If floors are synthetic, the r/h should be at least 30%
EFT IEC 61000-4-4	±2kV Mains ±1kV I/Os	±2kV Mains ±1kV I/Os	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	±1kV Differential ±2kV Common	±1kV Differential ±2kV Common	Mains power quality should be that of a typical commercial or hospital environment.
Voltage Dips/ Dropout IEC 61000-4-11	>95% Dip for 0.5 Cycle 60% Dip for 5 Cycles 30% Dip for 25 Cycles >95% Dip for 5 Seconds	>95% Dip for 0.5 Cycle 60% Dip for 5 Cycles 30% Dip for 25 Cycles >95% Dip for 5 Seconds	Mains power quality should be that of a typical commercial or hospital environment. If the user of the Auto Phoroptor RS™ requires continued operation during power mains interruptions, it is recommended that the Auto Phoroptor RS™ be powered from an uninterruptible power supply or battery.
Power Frequency 50/60Hz Magnetic Field IEC 61000-4-8	3A/m	3A/m	Power frequency magnetic fields should be that of a typical commercial or hospital environment.

Annex:
CISPR 11 Class B is applicable for medical equipment, measurement of RF emission 30/37dB.
Class A is applicable for industrial equipment, the limit value 10dB is higher than Class B (40/47dB).
Harmonic current Class A is applicable for all units which do not belong to B (tools), C (photometric units), or D (special kind of current 50W, running of a motor).

Warranty

WARRANTY AND LIMITATION OF LIABILITY
Reichert warrants that the equipment is free from manufacturer defects in material or workmanship for a period of one year from the date of original purchase when used in accordance with manufacturer's manual. In case of any defect during the warranty period, customer shall give Reichert prompt notice and Reichert will repair or replace the equipment at its option. This warranty shall be void if the equipment is modified or serviced by persons not authorized by Reichert, in case of improper maintenance (in the case of maintenance not carried out by Reichert), or in the case of improper handling of the equipment.

THE FOREGOING IS A LIMITED WARRANTY AND REICHERT MAKES AND CUSTOMER RECEIVES NO OTHER WARRANTY EXPRESSED OR IMPLIED AND ALL WARRANTIES OR IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE EXPRESSLY EXCLUDED.

This express warranty is in lieu of all other liabilities and obligations of Reichert with respect to the equipment. In no event shall Reichert be liable to customer for any claims for damages whether direct, indirect, incidental, special, or consequential, including but not limited to lost business and lost profits whether foreseeable or not, even if Reichert has been advised of the possibility of such damage.

Special Important Information for Technical Services
All installations, repairs, modifications, maintenance, or other technical services must be carried out by personnel who are trained and explicitly authorized by Reichert for such work. Only original parts from Reichert must be used for maintenance or repairs.
Installations, maintenance, and repairs must be carried out according to technical manuals provided by Reichert. Modifications must be approved by the factory. After all technical services the equipment must be tested and re-adjusted according to Reichert´s technical instructions.
For technical inquiries the part number should be indicated. When parts are replaced, added, or removed, the laws or regulations concerning medical equipment (e.g. traceability, approvals for added parts, electrical safety, etc.) have to be considered. In any case of doubt, please contact Reichert for clarification.

Notes
Year of manufacturing and serial number of the unit: See the identification label. Keep the operating manual for later use.

Safety Notes
This unit is only permitted to be operated according to this operating manual also including the destined use. For user's and patient's safety the maintenance instructions according to this operating manual should be followed, the minutes of which have to be written down and stored. Although no regular maintenances are required we recommend to perform a yearly preventive inspection.
Under all circumstances, the manufacturer or a person or a company authorized by the manufacturer should be addressed at least once within 3 years for information concerning safety measures.

Declaration
Medical electrical equipment are subject to special precautions according to the electromagnetic compatibility (EMC) and must be installed and started up according to the EMC notes in this operating manual.
Portable and mobile RF communication equipment can disturb medical electrical equipment.

EMC Notes
The accessories used with this system must properly be mounted according to the corresponding directions. The connection lines must safely be tightened to secure proper shield connection and EMC protection.

Warning Note
Only accessories described in this operating manual are permitted to be used with this equipment. Other combinations have to be approved by Reichert. Unsuitable accessories may cause a higher emission or reduce the noise immunity of the system.

Appendix A

Compatibility Chart

Autorefractors
Canon RF-10 (Select canonrf10)
Canon RK-F1 (Select canonrf10)
Canon RK-5 (Select canonrf10)
Humphrey HARK 599
Luneau L62
Nidek ARK-530A (Select nidek_ar2)
Nidek ARK-710A
Nidek AR-800/900
Nidek RKT-7700 (Select nidek_ar800)
Righton/Nikon Speedy 1
Righton/Nikon Speedy K
Righton/Nikon Retinomax
Rodenstock CX1000
Tomey TR-4000
Tomey RC-5000
Topcon KR-8x00
Topcon RMA6500

Lensmeters
Humphrey LA 350
Luneau L70
Nidek LM-970 (Select Nidek LM1)
Nidek LM-770 (Select Nidek LM1)
Reichert AL200
Reichert AL500
Reichert AL700
Rodenstock AL4500
Tomey TL-2000 (Select Tomey TL3000)
Tomey TL-3000
Topcon CL100 (Select CL2000)
Topcon CL200 (Select CL2000)
Topcon CL2000 (Select CL2000)
Topcon CL2500 (Select CL2000)

Projectors
A250 (Snellen Notation)
M2000 (Decimal Notation)
M3000 (Decimal Notation)
CSO 2047
Block Polaphor (Digital Acuity System for the European Market)
DOMS Polastar (Digital Acuity System for the European Market)

Printers
Star SP742
Epson TM-L6011-P