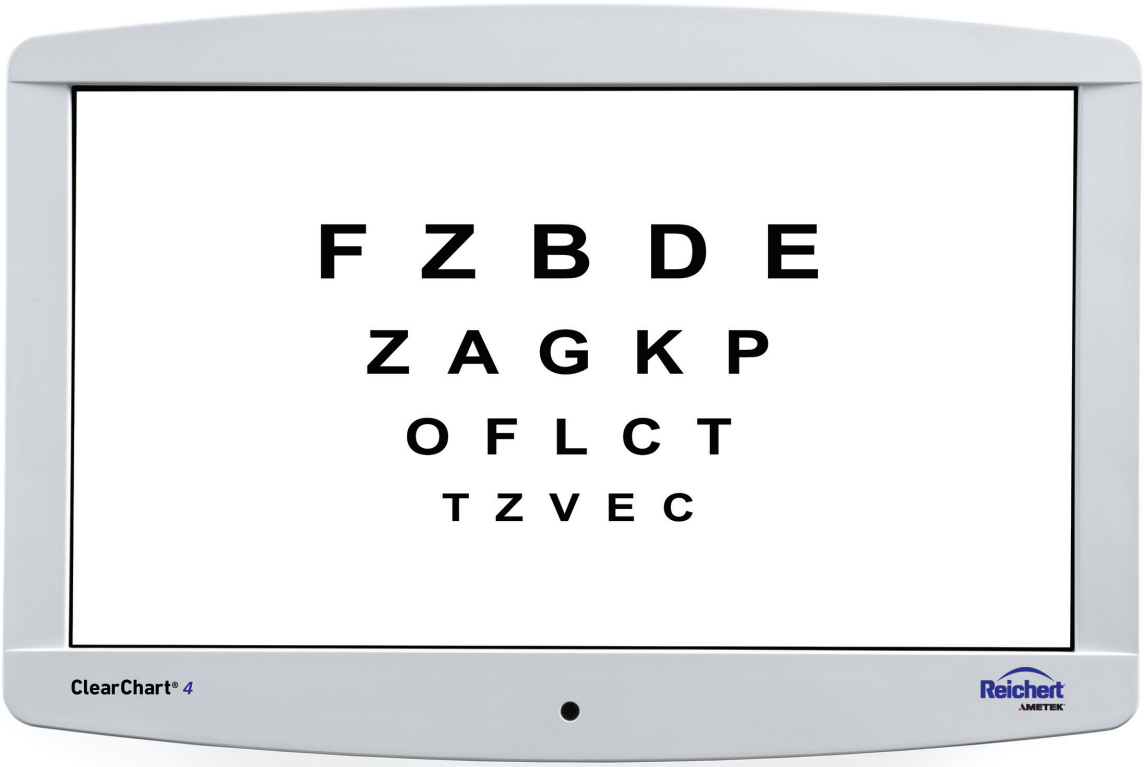
ClearChart® 4
Digital Acuity System

Instructions for Use



Reichert®
AMETEK®

Scan for additional information and languages:

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Caution: Federal law restricts this device to sale by or on the order of a licensed physician. Rx only.

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Warnings & 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 User's Guide.

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

WARNING: UNITED STATES FEDERAL LAW AND EUROPEAN REGULATIONS REQUIRE THAT THIS DEVICE BE PURCHASED ONLY BY A PHYSICIAN OR A PERSON ACTING ON BEHALF OF A PHYSICIAN.

WARNING: THIS INSTRUMENT SHOULD BE USED IN STRICT ACCORDANCE WITH THE INSTRUCTIONS OUTLINED IN THIS USER'S GUIDE. THE SAFETY OF THE OPERATOR AND THE PERFORMANCE OF THE INSTRUMENT CANNOT BE GUARANTEED IF USED IN A MANNER NOT SPECIFIED BY REICHERT TECHNOLOGIES.

WARNING: DO NOT REPAIR OR SERVICE THIS INSTRUMENT WITHOUT AUTHORIZATION FROM THE MANUFACTURER. ANY REPAIR OR SERVICE TO THIS INSTRUMENT MUST BE PERFORMED BY EXPERIENCED PERSONNEL OR DEALERS WHO ARE TRAINED BY REICHERT OR SERIOUS INJURY TO THE OPERATOR OR PATIENT MAY OCCUR.

WARNING: MODIFICATIONS TO THIS INSTRUMENT ARE NOT ALLOWED. ANY MODIFICATION TO THIS UNIT MUST BE AUTHORIZED BY REICHERT OR SERIOUS INJURY TO THE OPERATOR OR PATIENT MAY OCCUR.

WARNING: IF THIS INSTRUMENT IS MODIFIED, APPROPRIATE INSPECTION AND TESTING MUST BE CONDUCTED TO ENSURE CONTINUED SAFE USE OF THIS INSTRUMENT.

WARNING: TO AVOID RISK OF ELECTRIC SHOCK, THIS EQUIPMENT MUST ONLY BE CONNECTED TO A SUPPLY MAINS WITH PROTECTIVE EARTH OR DAMAGE TO THIS INSTRUMENT AND/OR INJURY TO THE OPERATOR OR PATIENT MAY OCCUR.

WARNING: ENSURE THAT THE VOLTAGE APPLIED TO THE UNIT IS WITHIN THE RANGE AS THE VOLTAGE 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. DO NOT REMOVE OR DEFEAT THE EARTH GROUND CONNECTION ON POWER INPUT CONNECTOR OR THE UNIT'S POWER CORD OR DAMAGE TO IT AND/OR INJURY TO THE OPERATOR OR PATIENT MAY OCCUR.

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

WARNING: THE BATTERY SHOULD ONLY BE REPLACED WITH THE BATTERY SPECIFIED IN THIS MANUAL. USE OF ANOTHER BATTERY MAY CAUSE FIRE OR AN EXPLOSION.

WARNING: DO NOT PLACE A SHORTING DEVICE BETWEEN THE BATTERY TERMINALS, OR ALLOW THE BATTERY TO BECOME WET. MISUSE OR IMPROPER DISPOSAL OF THIS BATTERY MAY CAUSE IT TO BECOME VERY HOT, IGNITE OR EXPLODE. DAMAGE TO THIS UNIT AND/OR SERIOUS PERSONAL INJURY MAY RESULT.

WARNING: DO NOT RECHARGE THE BATTERIES. THE BATTERY IS NOT DESIGNED TO BE CHARGED BY ANY ELECTRICAL SOURCE. CHARGING COULD GENERATE GAS AND INTERNAL SHORT-CIRCUITING, LEADING TO DISTORTION, LEAKAGE, OVERHEATING, EXPLOSION OR FIRE.

WARNING: DO NOT EXPOSE THE BATTERIES TO TEMPERATURES ABOVE 130ºF FOR ALKALINE BATTERIES, OR ABOVE 140ºF FOR LITHIUM BATTERIES, OR DAMAGE TO THIS UNIT AND/OR SERIOUS PERSONAL INJURY MAY RESULT.

Warnings & Cautions

WARNING: NEVER ALLOW LIQUID LEAKING FROM THE BATTERY TO GET IN YOUR EYES OR MOUTH AS THIS LIQUID COULD CAUSE SERIOUS PERSONAL INJURY. IF IT COMES IN CONTACT WITH YOUR EYES OR MOUTH, FLUSH THEM IMMEDIATELY WITH PLENTY OF WATER AND CONSULT A PHYSICIAN.

WARNING: ALWAYS KEEP BATTERIES OUT OF THE REACH OF INFANTS AND YOUNG CHILDREN TO PREVENT THEM FROM BEING SWALLOWED. IF SWALLOWED, CONSULT A PHYSICIAN IMMEDIATELY.

WARNING: REMOVE THE BATTERIES FROM THE REMOTE CONTROL IF THE DEVICE WILL NOT BE USED FOR AN EXTENDED PERIOD OF TIME. THIS WILL PREVENT POSSIBLE DAMAGE TO THE REMOTE CONTROL DUE TO BATTERY LEAKAGE.

WARNING: THE USE OF ACCESSORIES OR CABLES OTHER THAN THOSE SPECIFIED, WITH THE EXCEPTION OF THOSE SOLD BY THE MANUFACTURER AS REPLACEMENT PARTS FOR THE INTERNAL COMPONENTS, MAY RESULT IN INCREASED EMISSIONS OR DECREASED IMMUNITY OF THE EQUIPMENT OR SYSTEM.

WARNING: ANY NON-MEDICAL ELECTRICAL EQUIPMENT USED WITH THIS DEVICE MUST BE COMPLIANT WITH APPLICABLE IEC OR ISO SAFETY STANDARDS.

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 AS DAMAGE TO THE UNIT MAY OCCUR. SEE MAINTENANCE SECTION FOR DETAILED CLEANING INSTRUCTION.

CAUTION: USE OF AMMONIA BASED CLEANERS ON THE LIQUID CRYSTAL DISPLAY (LCD) MAY CAUSE DAMAGE TO THE DISPLAY. SEE MAINTENANCE SECTION FOR DETAILED CLEANING INSTRUCTION.

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

CAUTION: THE INTERNAL CIRCUITRY OF THE INSTRUMENT CONTAINS ELECTROSTATIC DISCHARGE SENSITIVE DEVICES (ESDS) THAT MAY BE SENSITIVE TO STATIC CHARGES PRODUCED BY THE HUMAN BODY. DO NOT REMOVE THE COVERS WITHOUT TAKING PROPER PRECAUTIONS.

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 THIS USER'S GUIDE.

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

CAUTION: THIS INSTRUMENT IS NOT INTENDED TO BE CONNECTED TO EQUIPMENT OUTSIDE THE CONTROL OF REICHERT TECHNOLOGIES UNLESS THE OTHER EQUIPMENT HAS BEEN TESTED TO APPLICABLE IEC OR ISO STANDARDS.

CAUTION: DO NOT INSTALL ANY ADDITIONAL SOFTWARE OTHER THAN WHAT WAS SUPPLIED WITH THIS INSTRUMENT. INSTALLATION OF ADDITIONAL SOFTWARE MAY CAUSE UNEXPECTED OPERATION RESULTING IN MALFUNCTION OF THIS INSTRUMENT.

Symbol Information

The following symbols appear on the instrument:

	Warning
	Alternating Current Power
	Follow instructions for use
	Protective Earth Connection
I O	ON / OFF
REF	Catalog Number
SN	Serial Number
 YYYY-MM-DD	Date of Manufacture
	Manufacturer
	Waste of Electrical and Electronic Equipment
	Compliance to relevant European standards
 9800131	Authorized to mark given by Intertek ETL Semko for conformance with electrical standards
	Fragile Contents in Shipping Container - handle with care
	Keep Dry - Package shall be kept away from rain
	This Way Up - Indicates correct upright position of package
EC REP	Authorized Representative in European Community
CH REP	Authorized Representative for Switzerland
MD	Medical Device

Introduction

Congratulations on your purchase of the Reichert® ClearChart® 4.

The ClearChart 4 is a remote controlled digital acuity system that have been designed to provide a comprehensive, versatile, and convenient system for measuring visual acuity.

This User's Guide is designed as a training and reference manual for operation, maintenance, and troubleshooting. We recommend that you read it carefully prior to use and follow the instructions in the guide to ensure optimum performance of your new instrument. Properly trained eyecare professionals such as ophthalmologists, optometrists, opticians and eye care technicians should operate this instrument.

Please retain this manual for future reference and to share with other users. Report any serious adverse events with this product to your national health authority. For additional copies of this manual or questions related to the ClearChart 4, contact your local authorized Reichert dealer or contact our Customer Service department directly at:

Tel: +1 716-686-4500
Toll Free: 888-849-8955
Fax: +1 716-686-4555
E-mail: reichert.information@ametek.com

Any serious incident associated with this device should be reported to Reichert and to your national health agency.

Indications for Use

The device provides images and charts, including those with letters and symbols in graduated sizes, intended for measuring visual acuity and determining patient subjective refraction.

Contraindications

None.

Installation, Features, & Functions

Unpacking and Contents

Great care has been taken to deliver your ClearChart 4 to you. The packaging was specifically designed to transport this instrument. Please retain the packaging for future use in case transportation is required. To remove the unit from its packaging:

1. Remove the accessories from the top tray in the box. Refer to Figure SU-01.
2. Remove the tray from the box. Refer to Figure SU-02.
3. Lift the ClearChart 4 out of the box. Refer to Figure SU-03.



Figure SU-01 Accessories



Figure SU-02 Top Foam



Figure SU-03 ClearChart 4

The items listed below should be included in the packaging container:

- ClearChart 4 (P/N 13795)
- Remote Control (P/N 13762)
- Two AAA batteries (P/N 13950000-902)
- Power Cords (P/N WCBL10018* and P/N 13375-409*) or (P/N WCBL10027† and P/N 13775-410†)
- Wall Mount with Screws** (P/N 13775-023) (Includes Thumb Screws (4) (P/N 13775-015)
- Wall Anchor Toggle Bolts Hardware (P/N 13775-026)
- User's Guide (P/N 13795-101)

Optional Accessories:

- USB Bluetooth Adapter (P/N 13779)
- Wireless Dongle Kit (P/N 13778)

If any of these items are missing, please contact the Reichert Customer Service Department. Contact information can be found on the back cover of this manual.

* These P/N's are for 120V operation.

† These P/N's are for 230V operation.

** There are two wall mount configurations. If you are unsure which wall mount you have received, follow the manufacturers instructions included with the wall mount that was shipped with the unit.

Installation, Features, & Functions

Wall Mounting Instructions

WARNING: IT IS IMPORTANT TO SAFELY SECURE THE EQUIPMENT. UNSECURED EQUIPMENT COULD POSSIBLY BECOME DISLODGED AND FALL, CAUSING INJURY TO EITHER THE PATIENT OR EXAMINER.

WARNING: CARE MUST BE TAKEN TO ARRANGE THE CABLES FOR THE ACCESSORIES SUCH THAT THEY DO NOT PRESENT A TRIPPING HAZARD TO THE EXAMINER OR A DANGER TO THE PATIENT.

WARNING: POSITION THE CLEARCHART 4 ON THE WALL SO THAT YOU ARE ABLE TO EASILY DISCONNECT THE POWER SUPPLY TO THE DEVICE.

Note: Make sure the position you choose to mount your ClearChart 4 is within the reach of a power outlet.

Direct-Throw: Your ClearChart 4 must be positioned at patient eye level directly in front of the patient. The minimum test distance is 6 feet (1.83 meters) with a maximum test distance of 31 feet (9.5 meters). Refer to the Direct Throw illustration in this section.

Mirror Arrangement: A first surface mirror is a useful space-saving device to increase the patient testing distance when the room does not permit a direct-throw arrangement. Typically, your ClearChart 4 will be positioned higher than patient eye level so that the examiner will not interfere with the patient's view of the ClearChart 4. Arrange the ClearChart 4 and mirror so that the ClearChart 4 can be seen by the patient through the mirror.

1. Find an appropriate spot on the wall that will support the ClearChart 4, which will hang from the VESA compliant Mounting Bracket. Ensure that the refraction distance meets the requirements for either Direct Throw or Mirror Arrangement.
2. Level the supplied Wall Mount Bracket and mark the holes on the wall. The mount should be installed in a solid wood stud or a rigid wall. If installing in drywall, use provided toggle bolts hardware kit to mount. Reference manufacturers' instructions on packaging for mount and all provided hardware.
3. Hang the ClearChart 4 by lining-up the holes on the back of the device with the four holes on the mounting bracket. Secure the ClearChart 4 to the mounting bracket with the 4 screws provided.

Installation, Features, & Functions

Wall Mounts

There are two configurations of wall mounts that may be shipped with the unit. Please refer to the following instructions for the specific configuration included with the unit. If you are unsure which wall mount you received, follow the included manufacturer's installation instructions for the specific wall mount included with the unit.

WARNING: BE SURE TO READ THE WALL MOUNT INSTRUCTIONS THOROUGHLY AND THAT YOU FULLY UNDERSTAND ALL THE INSTRUCTIONS AND WARNINGS BEFORE ATTEMPTING TO BEGIN YOUR INSTALLATION.

WARNING: THIS PRODUCT SHOULD ONLY BE INSTALLED BY SOMEONE WHO HAS A BASIC KNOWLEDGE OF BUILDING CONSTRUCTION, INSTALLATIONS AND FULLY UNDERSTANDS THESE INSTRUCTIONS.

WARNING: MAKE SURE THAT THE SUPPORTING SURFACE WILL SAFELY SUPPORT THE COMBINES LOAD OF THE MOUNT, THE DISPLAY AND ALL ATTACHED HARDWARE AND COMPONENTS.

WARNING: MAKE SURE THE MOUNTING SURFACE WILL SAFELY SUPPORT THE COMBINED LOAD OF THE EQUIPMENT AND ALL ATTACHED HARDWARE AND COMPONENTS.

WARNING: THIS BRACKET WILL ONLY SUPPORT FLAT PANEL DISPLAYS. THE MAXIMUM LOAD CAPACITY IS 30 POUNDS.

WARNING: ALWAYS HAVE SOMEONE ASSIST YOU TO LIFT AND POSITION YOUR EQUIPMENT.

WARNING: TIGHTEN SCREWS AND BOLTS FIRMLY, BUT DO NOT OVER TIGHTEN. OVER TIGHTENING CAN DAMAGE THE ITEMS AND GREATLY REDUCE THEIR ABILITY TO HOLD. PLEASE REFER TO SUGGESTED TORQUE VALUES WHERE APPLICABLE.

Parts Included in the Wall Mount

Make sure you have received all of the parts in the component checklist before installing the mount. Refer to Page 8. If any parts are missing or faulty contact Reichert for a replacement. (Contact information is located on the back page of this User's Guide.)



Thumb Screws
(4 Pc)

Wall Mounts

Attaching the ClearChart 4 to the Mount

1. Align the half of the mount that was removed in the previous steps to the back of the ClearChart 4, aligning it with the screw holes. Refer to Figure SU-10.



Figure SU-10 Align Holes and Attach Mount

Note: There is a slot on the back of the mount. Be sure this slot remains in the vertical position when aligning the mount to the back of the ClearChart 4. Refer to Figure SU-11.

2. Using the Thumb Screws, secure the mount to the ClearChart 4 by hand-tightening the 4 screws into the outer screw holes on the back of the case of the ClearChart 4. Refer to Figure SU-10.

Note: The screws must make at least three full turns into the mounting hole and fit snugly into place. Do not over tighten.



Figure SU-11 Align Slot Vertically

3. Slide the ClearChart 4 onto the mounting bracket that is already attached to the wall, so the square slides into the slot on the mount. Refer to Figure SU-12.
4. Secure the mount by tightening the two small flathead screws on either side of the mount where the ClearChart 4 attached to the wall mount. Refer to Figure SU-13.

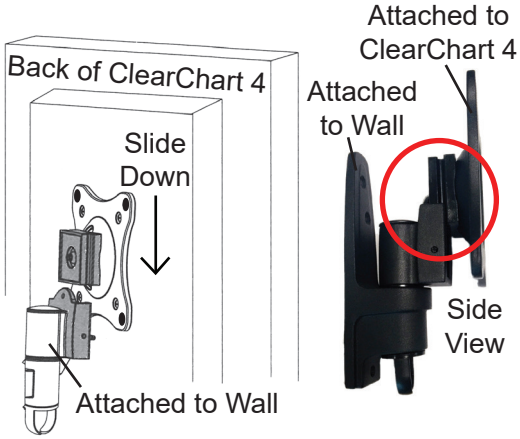


Figure SU-12 Attach ClearChart 4 to Wall Mount



Figure SU-13 Securing Screws

Maintenance

Once you have mounted the bracket and the ClearChart 4, check that they are secure and safe to use. Follow the included manufacturer's installation instructions for the specific wall mount included with the unit. Check that the screws are fixed well every two months. If you have any concerns about the installation contact Reichert Technical Service. Contact information can be found on the back cover of this User's Guide.

Attaching ClearChart 4 to the Mount

1. Align the half of the mount that was removed in the previous steps to the back of the ClearChart 4, aligning it with the screw holes. Refer to Figure SU-19. Use all hardware provided in the wall mount kit, do not discard any components. Follow the instructions provided by the wall mount manufactuer.

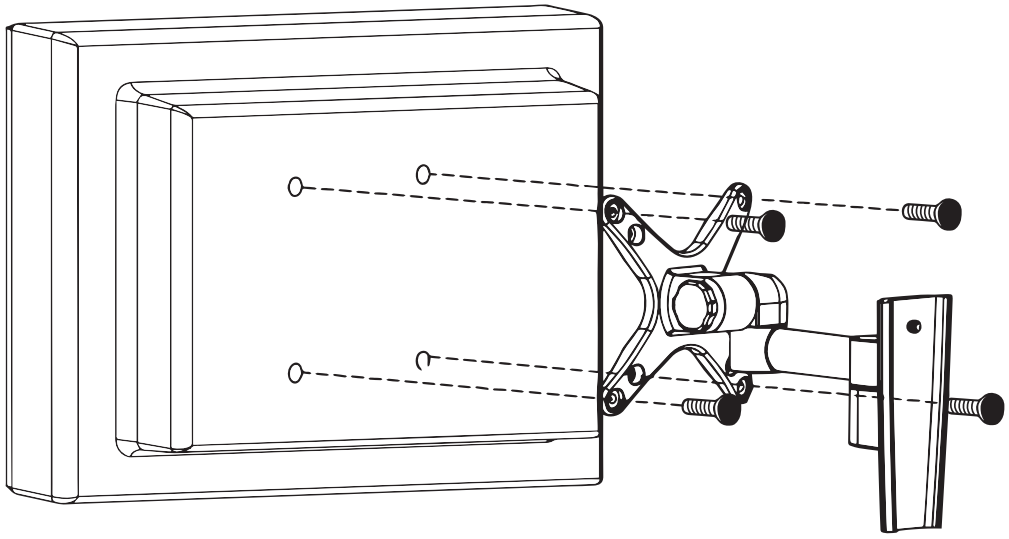


Figure SU-19 Align Holes and Attach Mount

Wall Mounts

Attaching ClearChart 4 to the Mount

Note: Be sure the mount is installed with the mount at the upper position, with the part that sides onto the wall mount in the lower position as in Figure SU-19.

1. Secure the mount to the ClearChart 4 by screwing in the Short machine Screws into the four screw holes on the back of the case of the ClearChart 4. Refer to Figure SU-19.

Note: The screws should fit snugly into place. Do not over tighten.

2. Slide the ClearChart 4 onto the mounting bracket that is already attached to the wall, so the square slides into the slot on the mount. Refer to Figure SU-20.
3. Using the Small Hex Wrench, secure the mount by tightening the set screw on the top of the mount where the ClearChart 4 attached to the wall. Refer to Figure SU-21.
4. Use the Large Hex Wrench to adjust the set screws that secure the three joints of the wall mount. Refer to Figure SU-22.

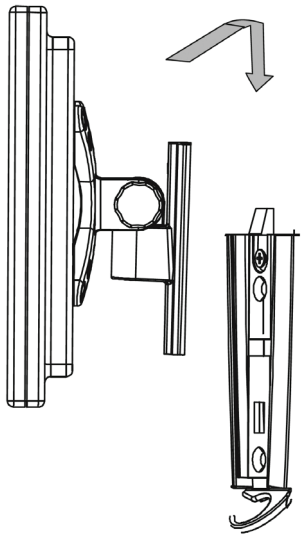


Figure SU-20 Attach ClearChart to Wall Mount

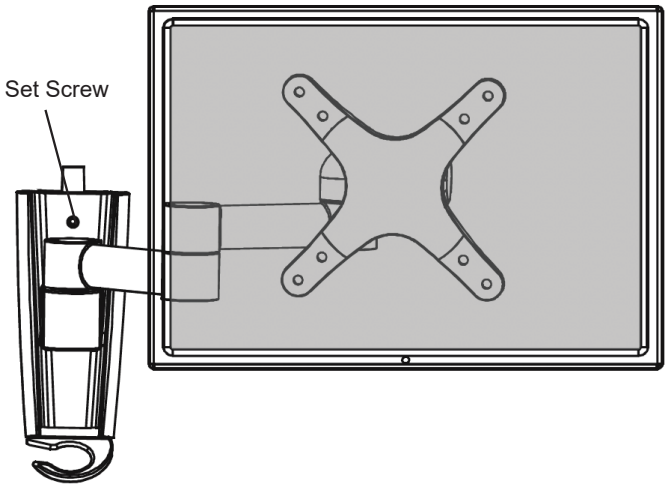


Figure SU-21 Tighten Set Screw

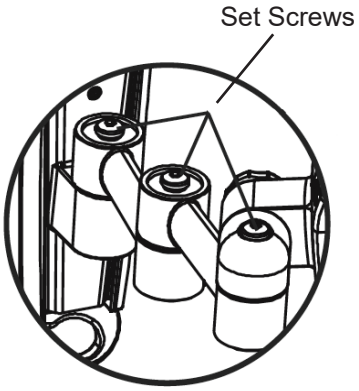


Figure SU-21 Adjust Set Screws

Application of Input Power

1. Using the provided power cord, insert the female end into the power input receptacle located at the bottom of the instrument. Refer to Figure SU-18.
2. Plug the male end of the power cord into a wall outlet of the appropriate voltage. Input voltage must not exceed the range listed in the Specifications section of this manual.
3. Set the ON / OFF switch to ON (I).

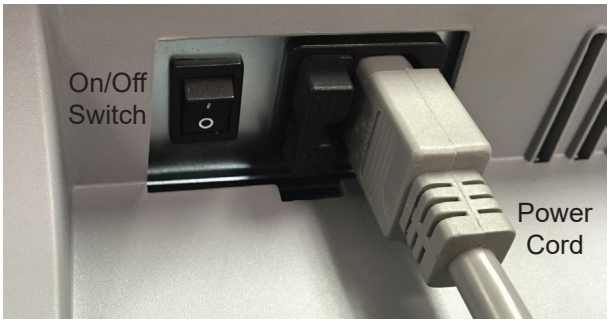


Figure SU-18 Power Cord and On/Off Switch

Disconnection of Input Power

At any time, the power switch can be set to OFF. The unit does not have a power down sequence. To terminate operation of the ClearChart 4, press the ON / OFF switch to the OFF position (O).

Note: If the ClearChart 4 is intended to be OFF for an extended period of time, the ClearChart 4 can be disconnected from power by detaching the power cord from the receptacle.

Note: Even though the system has a low power mode, it is recommended to shut the instrument off at the end of the day.

Communication Ports

The ClearChart 4 has a 9 pin female serial port on the bottom of the instrument housing that can be used for either hard-wired or wireless connection to a Reichert digital refraction system. ClearChart 4 also has two exposed USB ports to power a wireless serial adapter or connect a USB Bluetooth® adaptor. Refer to Figure SU-19.

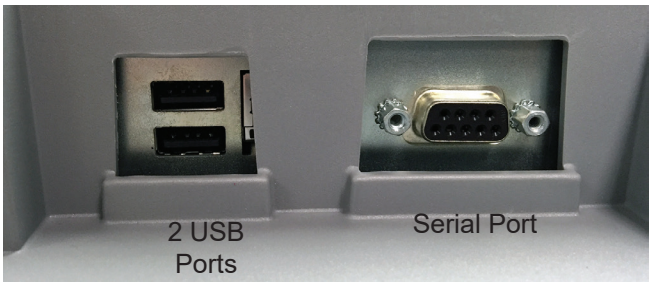


Figure SU-19 Ports

Connection with a Reichert Digital Refraction System

The ClearChart 4 can directly connect to a Reichert digital refraction system, using a cable or wirelessly connected using a Bluetooth serial adapter. Wired communication between the ClearChart 4 and the digital refraction system requires connection of a cable between the serial port on the ClearChart 4 and the digital refraction system.

Bluetooth Connection

Wireless communication between the ClearChart 4 and a Reichert digital refraction system requires connection of a Bluetooth device. Either a USB Bluetooth adapter (PN 13779) can be used, or a Bluetooth serial adaptor (PN 16251) powered by the USB port or with a separate AC adapter.

If using the USB Bluetooth adaptor (PN 13779), install the Bluetooth into one of the USB ports on the bottom of the ClearChart 4. Refer to Figure SU-20.

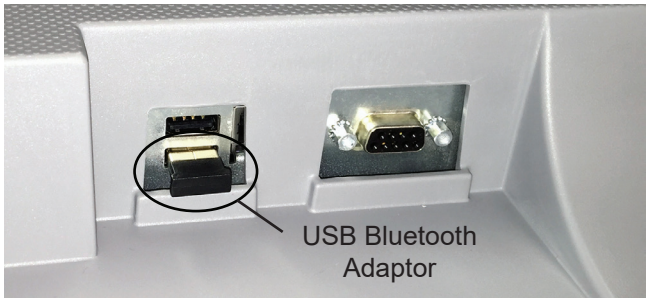


Figure SU-20 Install USB Bluetooth

Connection with a Reichert Digital Refraction System

Bluetooth Connection

If using the Bluetooth serial adaptor (PN 16251), connect the Bluetooth Dongle to the end of the Null Modem Cable. Refer to Figure SU-21.

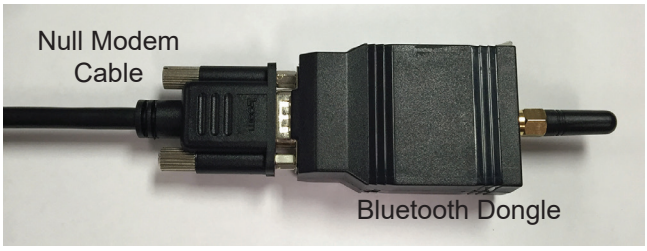


Figure SU-21 Connect Dongle to Cable

Connect the other end of the Null Modem Cable to the port on the bottom of the ClearChart 4. If using the USB Power Adaptor, connect it to the USB port on the bottom. Refer to Figure SU-22.

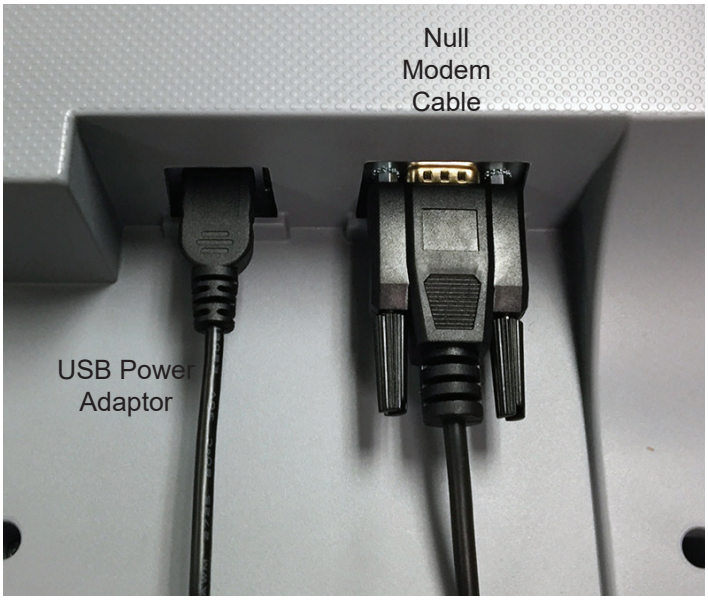


Figure SU-22 Connect USB Power and Null Modem Cable

If using an A/C power adaptor, plug the adaptor to a properly volted outlet. Connect the power cord to the Bluetooth Dongle. Refer to Figure SU-23.

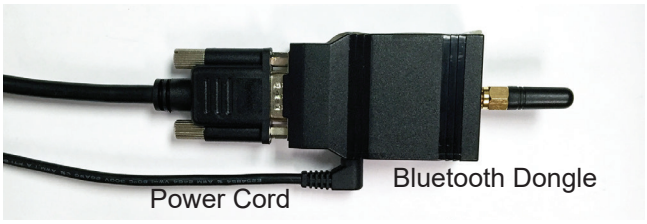


Figure SU-23 Connect Dongle to Power

Installation, Features, & Functions

Remote Control Power

1. Remove the back of the remote control by sliding it in the direction of the arrow.
2. Put in two AAA batteries in the position shown on the remote control.

Remote Control Layout

The remote control will operate all the test charts on your ClearChart 4. The image and chart below indicate the functions of each button. The numbered buttons in the image below represent the optotype progression.

EDU – Educational Slides only available on 4X and 4P
MOVIE – Children's Video or other imported videos

NUMBERS – Size of Optotypes in Decimal/LogMAR, Standard/Snellen, or Decimal/Linear
RED/GREEN – Red/Green Filters for Optotypes
RANDOM – Randomize Optotypes

▲ **UP ARROW** – Function depends on test chart
► **RIGHT ARROW** – Function depends on test chart
◄ **LEFT ARROW** – Function depends on test chart
▼ **DOWN ARROW** – Function depends on test chart
MENU – Menu options and settings

SAVE – Save menu item changes
OPTO – Change Optotype Selection

CONT – Contrast Sensitivity Testing (Sine Wave Grating)
LIGHT – Change Background Illumination
SIZE – Optotype size displayed on screen
ALT OPT – Change to Alternative Optotype Selection

MAX – Increase Contrast
MIN – Decrease Contrast
XCYL – Cross Cylinder Test Chart
ASTIG – Astigmatism Test Charts
T – Astigmatic T Test Chart

FIX – Fixation Test
HDISP – Horizontal Disparity Test Chart
VDISP – Vertical Disparity Test Chart

DARK – Dark Screen
WORTH – Worth 4 Dot Test
CBAR – Crowding Bars
SUPP – Suppression Tests

ANIM – Animate Current Optotype

☰ Display multiple lines of optotypes, same size

☲ Display multiple lines of optotypes, descending size

| Display a vertical line of optotypes

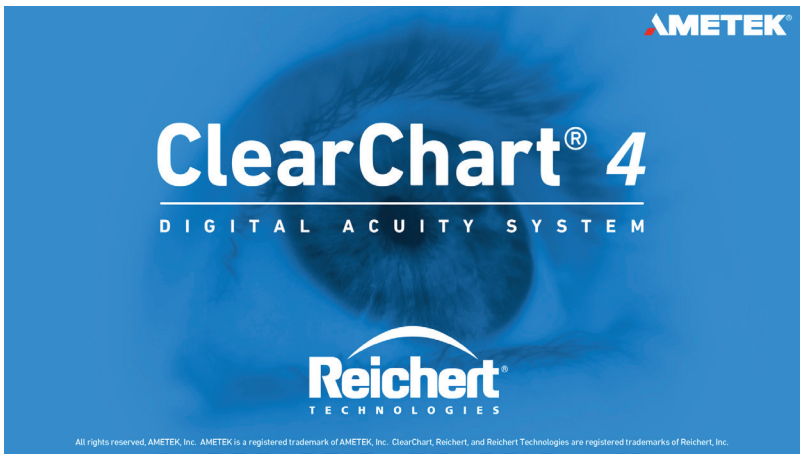
— Display a single optotype



Installation, Features, & Functions

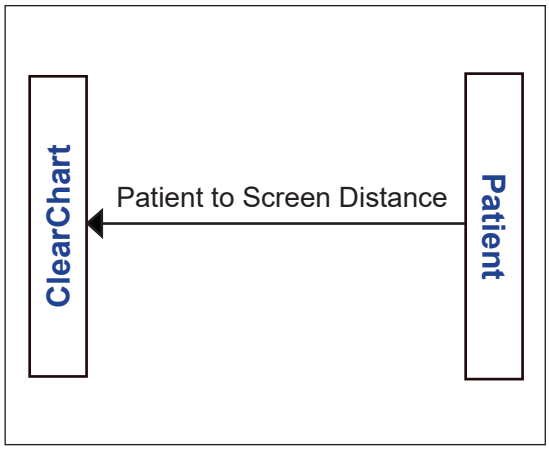
Configuring the ClearChart 4

Press the ON/OFF switch located on the bottom of the instrument. The ClearChart 4 will boot-up. When the ClearChart 4 displays “Press <menu> key to configure”, press the MENU button on the remote to enter the configuration mode. Use the UP and DOWN arrows to navigate through different options.

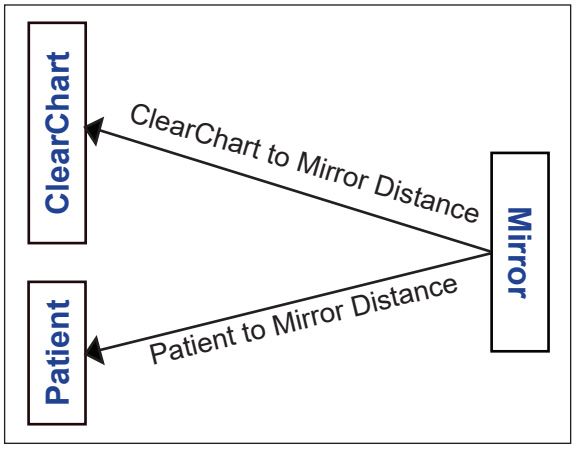


ROOM
Using the LEFT/RIGHT arrows on your remote, select DIRECT THROW or MIRRORED based on the configuration of your office. When you are finished, press the DOWN arrow.

UNITS
Using the LEFT/RIGHT arrows on your remote, select METRIC or ENGLISH units based on which units you use to measure your refraction distance. When you are finished, press the DOWN arrow.



Direct Throw



Mirror Set Up

Installation, Features, & Functions

ACUITY NOTATION

Using the LEFT/RIGHT arrows on your remote, select SNELLEN, METRIC, or DECIMAL for your acuity notation. When you are finished, press the DOWN arrow.

- Snellen - displayed as distance in feet / size in mm
- Metric - displayed as distance in meters / size in mm
- Decimal - displayed as the decimal equivalent for the distance in feet / size in mm

The 20/10 optotypes may not be available at test distances under 12 feet (3.66 meters) and the 20/400 optotypes may not be available at test distance over 22 feet (6.71 meters).

DISTANCE

Use the MAX and MIN buttons to adjust the testing distance from the patient's eye to the screen. The units are either inches or centimeters depending on whether you chose ENGLISH or METRIC earlier in the setup procedure. When you are finished, press the DOWN arrow.

Note: If MIRRORED was selected in the ROOM setup category entered above, then two distances will be required. First enter the distance from the patient to the mirror, then enter the distance from the mirror to the screen. Press the DOWN arrow after each distance is entered.

OPTOTYPES

Using the LEFT/RIGHT arrows on your remote, select the default optotype you would like the ClearChart 4 to display when first started. Available optotypes are:

- 17 Letter
- 8 Letter
- Sloan
- Tumbling E
- Landolt C
- O Landolt C
- HOTV
- Allen Symbols
- Kolt
- Children's Shapes
- Numbers

ALTERNATE OPTOTYPES

Using the LEFT/RIGHT arrows on your remote, select the alternate optotype you would like the ClearChart 4 to display when you press ALT OPT on your remote. When you are finished, press the DOWN arrow.

LINE PRESENTATION

Using the LEFT/RIGHT arrows on your remote, select the default line presentation you would like the ClearChart 4 to display. Presentation types:

- Triple Decreasing
- Quadruple/Same
- Quadruple/Decreasing
- Single Letter
- Column
- Column Uneven
- Single Line
- Double Same
- Double Decreasing
- Triple Same

Note: You will be able to access any line presentation while using the ClearChart 4. When you are finished, press the DOWN arrow.

PROGRESSION

Using the LEFT/RIGHT arrows on your remote, select standard or logmar for the default size progression you would like the ClearChart 4 to display.

Note: You will be able to change size progression while using the ClearChart 4. When you are finished, press the DOWN arrow.

DISPLAY OPTOTYPE SIZE

Using the LEFT/RIGHT arrows on your remote, select whether or not you would like the optotype size displayed on the screen at all times.

Options are: Display or No Display.

When you are finished, press the DOWN arrow.

MAXIMUM PER LINE

Using the LEFT/RIGHT arrows on your remote, select the maximum number of characters you would like displayed on any line.

Options are: 1, 2, 3, 4, 5, or 6

When you are finished, press DOWN arrow.

RED/GREEN ADJUST

Using the LEFT/RIGHT arrows on the remote, select recalibrate or factory default. If you choose to recalibrate your red/green settings, press the DOWN button to enter adjustment mode. To adjust red (R) use the MIN and MAX buttons to acquire proper tone. Press the RIGHT arrow key four (4) times to get to green adjust. Use MIN and MAX to adjust green to desired tone. Next press the DOWN arrow to enable adjustment of the red tone for the suppression letters. MIN and MAX buttons will again change the color tone. Press the RIGHT arrow button four (4) times to adjust the green tone for the suppression letters. Use MIN and MAX buttons to adjust the color. Press the DOWN arrow to re-enter the initial red/green setup screen. Using the RIGHT/LEFT arrows, move back to the no change option, then press the DOWN arrow to leave the red/green menu selection.

SCREEN SAVER

The ClearChart software displays a screen saver which will show a floating image when active. Either the default ClearChart image contained in the software or a user loaded screen saver image can be loaded

The ClearChart has an option to adjust the length of time the Screen Saver is active. The MIN (decrease) and MAX (increase) buttons are used to change the time the Screen Saver is active. After setting the preferred time, press the DOWN arrow to finalize the selection.

After the screen saver has been active for the default 30 minutes or the preferred time entered, the display will show a black screen to extend the lifetime of the display. Pressing any button will re-activate the screen.

Installation, Features, & Functions

Optotypes

All of the optotypes contained within the ClearChart 4 conform to the American National Standard Institute guidelines for general purpose clinical visual acuity charts. The optotypes are constructed on a 5 x 5 matrix such that their stroke width is one-fifth of their overall size. Letter optotypes are of Letter Gothic typeface.

The spacing between optotypes of the same size is between one and two times the width of that size optotype. The spacing between rows of descending size is between one and two times the height of the larger optotype.

The letters found in the seventeen letter set have been traditionally used in many visual acuity testing situations. This letter set consists of these letters: **A B C D E F G H K L N O P T U V Z.**

The eight letter set consists of these letters: **C D E K N P U Z**. The individual letters of this set have been shown to be equivalent to the Landolt ‘C’. Because of this, each letter is essentially equally legible to patients. Unlike the seventeen letter set, no letter is easier or harder to identify than another. Since these letters can be presented in many combinations by the ClearChart 4, the few letters in the letter set do not pose a problem of memorization.

The Sloan Letter Set consists of these letters: **C D H K N O R S V Z.**

The tumbling ‘E’s and the Landolt ‘C’s are both presented in four positions: up, down, left, and right.



The Children’s Shape Symbols are four shapes. As these symbols begin to blur, they are each perceived as circles. Available in the ClearChart 4 only.



A second set of shapes for children consists of the following five shapes. These symbols may be more easily recognized and verbalized by some children than the Children’s Shape Symbols. Available in the ClearChart 4 only.



The Allen Symbols are only available up to size 100.

Size Progressions

When multiple lines of descending size are in use, the line size display is that of the smallest line. The standard progression has the following visual acuity sizes expressed as Snellen fractions:

Snellen	Snellen(metric)	Snellen (decimal)
20/10	6/3.0	2.00
20/15	6/4.5	1.33
20/20	6/6.0	1.00
20/25	6/7.5	0.800
20/30	6/9.0	0.667
20/40	6/12.0	0.500
20/50	6/15.0	0.400
20/60	6/18.0	0.333
20/70	6/21.0	0.286
20/80	6/24.0	0.250
20/100	6/30.0	0.200
20/200	6/60.0	0.100
20/400	6/120	0.050

Another line size progression available in ClearChart 4 is the LogMAR progression. This progression has proved useful in prescribing low vision magnification aids and permits a more precise method of scoring visual acuity.

Snellen	Snellen(metric)	LogMAR
20/10	6/3.0	-0.3
20/12.5	6/3.8	-0.2
20/16	6/4.8	-0.1
20/20	6/6.0	0.0
20/25	6/7.5	0.1
20/32	6/9.5	0.2
20/40	6/12	0.3
20/50	6/15	0.4
20/63	6/19	0.5
20/80	6/24	0.6
20/100	6/30	0.7
20/125	6/38	0.8
20/160	6/48	0.9
20/200	6/60	1.0
20/250	6/76	1.1
20/320	6/96	1.2
20/400	6/120	1.3

When the LogMAR progression is being used, the line size display shows the Snellen value in the lower right-hand corner with the LogMAR line size next to it.

Installation, Features, & Functions

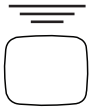
Remote Control Functions



This button will present lines of the same size of optotypes. Multiple presses of this button will change the number of lines presented on the screen from 1 to 4.

Note: At larger optotype sizes, there will be a limit of how many lines can be displayed.

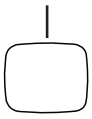




This button will present lines of optotypes descending in size. Multiple presses of this button will change the number of lines presented on the screen from 1 to 4.

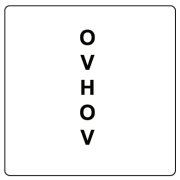
Note: At larger optotype sizes, there will be a limit of how many lines can be displayed.





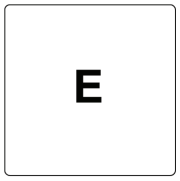
This button will present a single line of optotypes. The second time you press this button, a single line of optotypes of descending size will be displayed. A third press of this button will return you to normal lines of optotypes.

Note: At larger optotype sizes, there will be a limit of how many lines can be displayed.





This button will present a single optotype. A second press of this button will return you to normal lines of optotypes.



RED/GREEN



This button will initialize RED/GREEN mode. In this mode, you will be able to change optotypes, sizes, lines, and line presentation by pressing other buttons on the remote. To exit the RED/GREEN mode, simply press this button again.

Note: At larger optotype sizes, there will be a limit of how many lines can be displayed.



RANDOM



Press the RANDOM button to randomize the current optotypes at its current size. Pressing the RANDOM button repeatedly will continue to present random characters of the current optotype at its current size.

Note: Use the RIGHT arrow button to randomize single optotypes.



Installation, Features, & Functions

Remote Control Functions



This button will momentarily display the current size of the smallest optotypes displayed on the screen on the bottom right hand corner of the screen.



Note: This button only works if you have the DISPLAY OPTOTYPE SIZE option on the menu turned off.



This is the LEFT arrow button. Pressing the LEFT arrow button will randomize the optotypes on the screen. The LEFT arrow button is also used to select options during the initial setup of the ClearChart 4, as well as making selections in the menu screen.



This is the UP arrow button. Pressing the UP arrow button will increase the size of the optotypes on the screen. The UP arrow button is also used to select options during the initial setup of the ClearChart 4, as well as making selections in the menu screen.

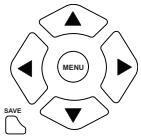


This is the RIGHT arrow button. Pressing the RIGHT arrow button will randomize the optotypes on the screen. The RIGHT arrow button is also used to select options during the initial setup of the ClearChart 4, as well as making selections in the menu screen.

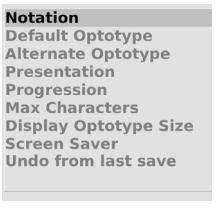
Note: It is recommended that the RIGHT arrow button be used to randomize single optotypes.



This is the DOWN arrow button. Pressing the DOWN arrow button will decrease the size of the optotypes on the screen. The DOWN arrow button is also used to select options during the initial setup of the ClearChart 4, as well as making selections in the menu screen.



The MENU button presents the main menu to select default preferences for the ClearChart 4.



Once in the menu screen, use the UP and DOWN arrow buttons to select a menu item, and the RIGHT and LEFT arrow buttons to toggle through options.

When you are ready to save your selection, press the SAVE button on the remote.

Remote Control Functions

Menu Item	Options
1. NOTATION	Snellen, Metric, Decimal
2. DEFAULT OPTOTYPE	17 Letter Set, 8 Letter Set, Sloan, Tumbling E, Landolt C, O Landolt C, HOTV, Numbers, Kolt, Children's Shapes, Allen Symbols
3. ALTERNATE OPTOTYPE	17 Letter Set, 8 Letter Set, Sloan, Tumbling E, Landolt C, O Landolt C, HOTV, Numbers, Kolt, Children's Shapes, Allen Symbols
4. PRESENTATION	Single Line, Double/Same, Double/Decreasing, Triple/Same, Triple/Decreasing, Quadruple/Same, Quadruple/Decreasing, Single Letter, Column, Column/Uneven
5. PROGRESSION	Standard, Logmar
6. MAX CHARACTERS	1, 2, 3, 4, 5, 6
7. DISPLAY OPTOTYPE SIZE	No Display, Display
8. SCREEN SAVER	1 TO 60 minutes
9. UNDO FROM LAST SAVE	Restore previously saved settings.



The SAVE button is used in the Menu Mode to save your selections.



Press the Contrast MAX button to increase the contrast of the opto character or the sine gratings in the contrast sensitivity mode.

Note: RED/GREEN tests will only display maximum contrast letters even if less than maximum contrast is selected.

Installation, Features, & Functions

Remote Control Functions

MIN

Press the Contrast MIN button to decreases the contrast of the opto character or the sine gratings in the contrast sensitivity mode.

Note: RED/GREEN tests will only display maximum contrast letters even if less than maximum contrast is selected.

LIGHT

Pressing the LIGHT button changes the illumination of the screen. There are three light levels available for testing: full illumination (220 cd/m^2), photopic (contrast sensitivity standard, 85 cd/m^2), mesopic (contrast sensitivity low light test 3 cd/m^2).

Note: Unit should be illuminated for 10 minutes prior to photopic and mesopic testing.

SIZE BUTTONS

100

Each button is labeled with a line size and when pressed, will display the current optotype at that size. Pressing the same button again will randomize the optotype at that current size.

OPTO

Pressing the OPTO button will toggle through the different optotypes.

Note: Toggling through optotypes at large line sizes might prevent the viewing of the Allen Symbols.

ALT OPTO

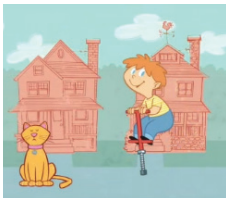
Pressing the ALT OPTO button will display the alternate optotype selected during the initial setup or in the Menu screen.

ANIM

Pressing the ANIM button will animate the current optotype. Press the ANIM button a second time to stop the animation.

MOVIE

Pressing the MOVIE button will run an animated movie for pediatric focusing. Use the UP/DOWN arrows to adjust the volume. Press the MOVIE button a second time to exit the movie.



XCYL

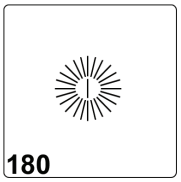
Pressing the XCYL button will present a Cross Cylinder test. Pressing the XCYL button a second time will exit the Cross Cylinder Test mode.

Installation, Features, & Functions

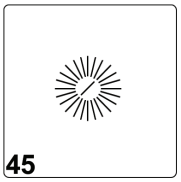
Remote Control Functions

ASTIG

Pressing the ASTIG button will present an Astigmatic dial. Pressing the ASTIG button a second time will exit the Astigmatic Dial.

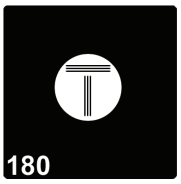


Use the UP and DOWN arrow buttons to rotate the dial and adjust the angle.



T

Pressing the T button will present an Astigmatic T. Pressing the T button a second time will leave the Astigmatic T mode.

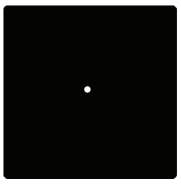


Use the UP and DOWN arrow buttons to rotate the dial and adjust the angle.



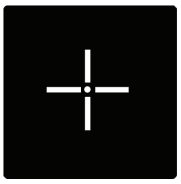
FIX

Pressing the FIX button will present a fixation target.



FIX

Pressing the FIX button a second time will present a second fixation target. Pressing the FIX button a third time exits the Fixation mode.

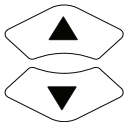


SUPP

Pressing the SUPP button will initiate Color Suppression mode.

Installation, Features, & Functions

Remote Control Functions



Use the UP and DOWN arrow buttons to change the size of the optotype. You can also use the individual optotype size buttons to change the size of the optotype.



SUPP



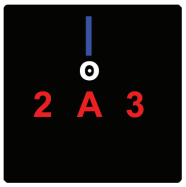
Pressing the SUPP button a second time will present the second screen of the Color Suppression mode. Press the SUPP button a third time to exit the Color Suppression mode.

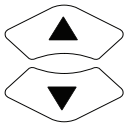


HDISP

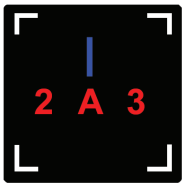


Pressing the HDISP button will present a horizontal disparity test.





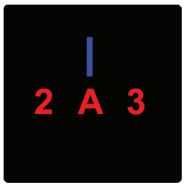
Press the HDISP button a second time for a second type of horizontal disparity test. Use the UP and DOWN arrow buttons to move the fixation line.



HDISP



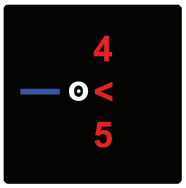
Press the HDISP button a third time for a third type of horizontal disparity test. Pressing the HDISP button a fourth time will exit Horizontal Disparity testing mode.

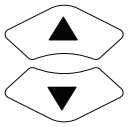


VDISP

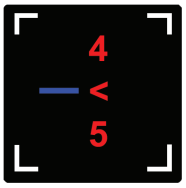


Pressing the VDISP button will present a vertical disparity test.





Press the VDISP button a second time for a second type of vertical disparity test. Use the UP and DOWN arrow buttons to move the fixation line.

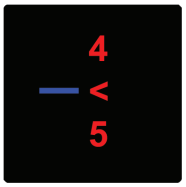


Installation, Features, & Functions

Remote Control Functions

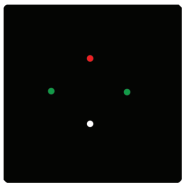
VDISP

Press the VDISP button a third time for a third type of vertical disparity test. Pressing the VDISP button a fourth time will exit the Vertical Disparity testing mode.



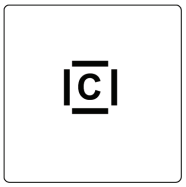
WORTH

Pressing the WORTH button will present a Worth Four Dot test.



CBAR

Pressing the CBAR button will present a single character with crowding bars. Press the CBAR button a second time to present closer bars. A third press of the CBAR button will remove the bars.



OPTO

You can change the optotype within the CBAR mode by pressing the OPTO button.

Use the UP/DOWN arrows to change the optotype size. Individual optotype size buttons also change the optotype size. The RIGHT/LEFT arrows will change the character displayed.

DARK

Pressing the DARK button will darken the screen and present columns of the ClearChart 4 logo. Press any button to leave dark mode.



Cleaning & Maintenance

Cleaning ClearChart 4

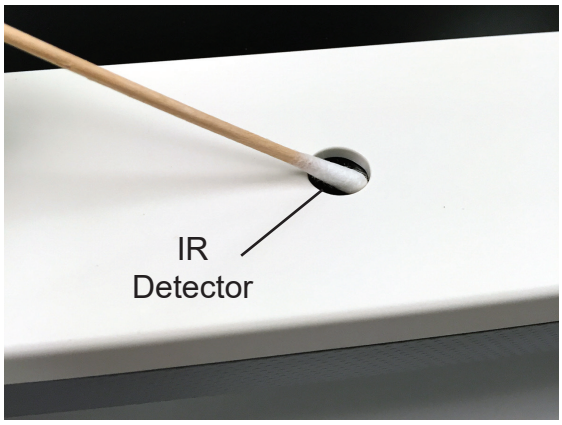
Use a lint-free, soft cloth lightly damped with 90% Isopropyl Alcohol to clean the ClearChart 4 screen and the unit. Cleaning of the ClearChart should be performed when the screen has contaminants on it or when visually, there is dust accumulation on the instrument.

CAUTION: DO NOT USE AMMONIA-BASED WINDOW CLEANERS. USE OF AMMONIA BASED CLEANERS ON THE LIQUID CRYSTAL DISPLAY (LCD) MAY CAUSE DAMAGE TO THE DISPLAY.

CAUTION: DO NOT USE PAPER TOWELS.

Cleaning the IR Detector

Use a lint-free cotton swab, clean the IR detector with a lens cleaner that is safe for plastic lenses. Refer to Figure MM-01.



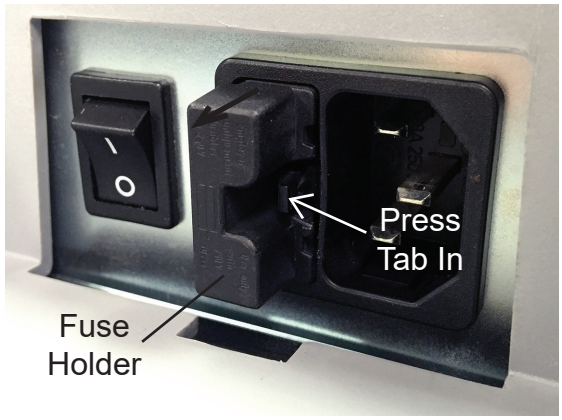
MM-01 Clean IR Detector

Fuse Replacement

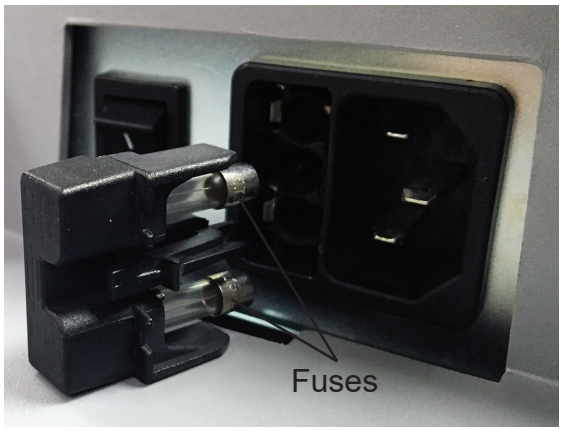
WARNING: DISCONNECT POWER BEFORE ATTEMPTING TO REMOVE THE FUSES OR SERIOUS INJURY OR DEATH MAY OCCUR.

Replace the fuses in the Power Input Module with the fuses indicated in the Specifications section of this manual.

1. Turn the power to the unit off, and unplug the device.
2. Press down on the tab in the middle of the Fuse Holder to release the Fuse Holder and pull the Fuse Holder out. Refer to figure MM-02.
3. Install new fuses that are indicated in the Specification section of this manual into the Fuse Holder. Refer to Figure MM-03.
4. Push the Fuse Holder into the Power Input Module until it snaps into place.



MM-02 Fuse Holder



MM-03 Fuse Removal

Troubleshooting

Troubleshooting

The following is a chart of errors with the ClearChart 4 and how to resolve them. If the following does not solve an issue with the ClearChart 4, the unit may require servicing.

Problem	Probable Cause	Possible Solution
Unit will not turn on.	Not plugged into an outlet with power.	Plug unit into a properly volted outlet.
	Power cord not fully pushed into the power input receptacle.	Fully install power cord.
	Fuse(s) is blown.	Replace the fuse(s).
Unit will not respond to remote control.	IR Detector is dirty.	Clean the IR detector. Refer to the Cleaning & Maintenance section of this manual.
	Batteries in remote are low.	Replace the batteries in the remote.
	Unit needs to power cycle.	Turn the unit off and on.

Specifications

Catalog Numbers: 13795 (ClearChart 4)

Physical Dimensions

Size:

Height: 15.60 in. (39.62 cm)
Width: 23.20 in. (58.92 cm)
Depth: 3.00 in. (7.62 cm)

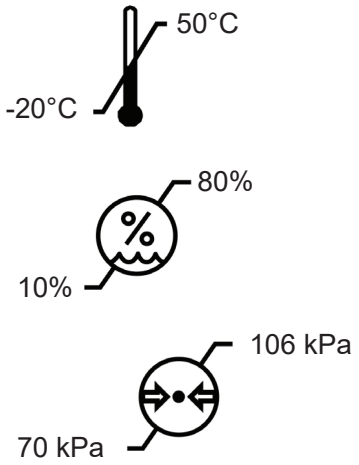
Weight, unpacked: 13.1 lbs. (5.9 Kg)

Electrical

Voltage: 100 - 240 volts AC 50/60 Hz
Input Power: 50-75 VA
Fuses: Time-Lag (2.5A, 250V), 5 x 20mm, RoHS

Operational Conditions

Environmental:
The environmental conditions are as follows:
Operating:
Temperature 10° C (50° F) to 35° C (95° F)
Relative Humidity: 30% to 75%
Atmospheric Pressure: 80 (23.6 in. Hg) to 106 kPa (31.3 in. Hg)
Transportation & Storage:
Temperature -20° C (-4° F) to +50° C (122° F).
Relative Humidity: 10% to 80% (non-condensing)
Atmospheric Pressure: 70 (20.7 in. Hg) to 106 kPa (31.3 in. Hg)



Exposure to extreme temperature conditions indicated above must not exceed 15 weeks.

Expected Service Life
The expected service life for this instrument is 7 years.

Disposal
This product does not generate any environmentally hazardous residues. At the end of its product service life, follow your local laws and ordinances regarding the proper disposal of this equipment.

Software Revision
The software revision is shown on the splash screen at start up. Users can also contact Reichert for the software revision. The serial number identifies the manufacture date and will be used to identify the software version.

Incident Reporting
EU customers should report any serious incident related to this product to Reichert and to the competent authority of their Member State.

Specifications

Classifications

The ClearChart 4 is classified as Class I equipment. Class I equipment provides additional protection against electrical shock beyond basic insulation.

Type B equipment provides an adequate degree of protection against electrical shock, particularly regarding allowable leakage currents and reliability of the protective earth connection. (No applied parts per the noted standards.)

The ClearChart 4 is classified as IPX0 Equipment. IPX0 equipment is equipment enclosed without protection against ingress of water.

According to the mode of operation, the ClearChart 4 is a continuous operation instrument.

The ClearChart 4 does not have any essential performance functions. There is no risk to patient or operator due to a failure.

Guidance & Manufacturer's Declarations

Table 201 – Guidance and Manufacturer's Declaration

Electromagnetic Emissions

All Equipment and Systems

Guidance and Manufacturer's Declaration – Electromagnetic Emissions

The ClearChart 4 is intended for use in the electromagnetic environment specified below. The customer or user of the ClearChart 4 should ensure that it is used in such an environment.

Emissions Test	Compliance	Electromagnetic Environment - Guidance -
RF Emissions CISPR 11	Group 1 Class A	The ClearChart 4 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.
Harmonics IEC 61000-3-2	Class A	The ClearChart 4 is suitable for use in all establishments, including domestic establishments and those directly connected to the public low-voltage power supply network that supplies building for domestic power.
Flicker IEC 61000-3-3	Complies	

Note: The emissions characteristics of this equipment make it suitable for use in industrial areas and hospitals (CISPR 11 class A). If it is used in a residential environment (for which CISPR 11 class B is normally required) this equipment might not offer adequate protection to radio-frequency communication services. The user might need to take mitigation measures, such as relocating or re-orienting the equipment.

Table 202 – Guidance and Manufacturer's Declaration

Electromagnetic Immunity

All Equipment and Systems

Guidance and Manufacturer's Declaration – Electromagnetic Immunity			
The ClearChart 4 is suitable for use in all establishments and is intended for use in the electromagnetic environment specified below. The customer or user of the ClearChart 4 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	±2kV, ±4kV, ±8kV Contact ±2kV, ±4kV, ±8kV, ±15kV Air	±2kV, ±4kV, ±8kV Contact ±2kV, ±4kV, ±8kV, ±15kV 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	±0.5kV, ±1kV, ±2kV Mains ±0.5kV, ±1kV I/Os	±0.5kV, ±1kV, ±2kV Mains ±0.5kV, ±1kV I/Os	Mains power quality should be that of a typical residential, commercial or hospital environment.
Surge IEC 61000-4-5	±0.5kV, ±1kV Differential ±0.5kV, ±1kV, ±2kV Common	±0.5kV, ±1kV Differential ±0.5kV, ±1kV, ±2kV Common	Mains power quality should be that of a typical residential, 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 100% Dip for 0.5 Cycle at 0°, 45°, 90°, 135°, 180°, 225°, 270°, and 315° 100% Dip for 1 Cycle at 0°	>95% Dip for 0.5 Cycle 60% Dip for 5 Cycles 30% Dip for 25 Cycles >95% Dip for 5 Seconds 100% Dip for 0.5 Cycle at 0°, 45°, 90°, 135°, 180°, 225°, 270°, and 315° 100% Dip for 1 Cycle at 0°	Mains power quality should be that of a typical residential, commercial or hospital environment. If the user of the ClearChart 4 requires continued operation during power mains interruptions, it is recommended that the ClearChart 4 be powered from an uninterruptible power supply or battery.
Power Frequency 50/60Hz Magnetic Field IEC 61000-4-8	30 A/m	30 A/m	Power frequency magnetic fields should be that of a typical residential, commercial or hospital environment.

Table 204 – Guidance and Manufacturer's Declaration

Electromagnetic Immunity

Equipment and Systems that are NOT Life-supporting

Guidance and Manufacturer's Declaration – Electromagnetic Immunity

The ClearChart 4 is intended for use in the electromagnetic environment specified below. The customer or user of the ClearChart 4 should ensure that it is used in such an environment.

Immunity Test	IEC 60601 Test Level	Compliance Level	Electromagnetic Environment - Guidance
Conducted RF IEC 61000-4-6	3 Vrms 150 kHz to 80 MHz 6 Vrms 150 kHz to 80 MHz in ISM bands	(V1) = 3 Vrms (V1) = 6 Vrms in ISM bands	Portable and mobile RF communications equipment should be no closer to any part of the ClearChart 4, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended Separation Distance: d=(3.5/V1)(Sqrt P) d=(3.5/E1)(Sqrt P) 80 to 800 MHz d=(7/E1)(Sqrt P) 800 MHz to 2.7 GHz Where P is the max output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in meters (m). Field strengths from fixed transmitters, as determined by an electromagnetic site survey, should be less than the compliance levels in each frequency range. Interference may occur in the vicinity of equipment marked with the following symbol. 
Radiated RF IEC 61000-4-3	80 MHz to 2.7 GHz @ 3V/m 80 MHz to 2.7 GHz @ 10V/m	(E1) = 3 V/m (E1) = 10 V/m	

Note 1: At 80 MHz and 800 MHz, the higher frequency range applies.

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

* Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. The measured field strength in the location in which the ME Equipment or ME System should be observed to verify normal operation. If abnormal performance is observed, additional measures many be necessary, such as re-orienting or relocating the ME Equipment or ME System.

* Over the frequency range 150 kHz to 80 MHz, field strengths should be less then [V1] V/m.

* The ISM (industrial, scientific and medical) bands between 0,15 MHz and 80 MHz are 6,765 MHz to 6,795 MHz; 13,553 MHz to 13,567 MHz; 26,957 MHz to 27,283 MHz; and 40,66 MHz to 40,70 MHz. The amateur radio bands between 0,15 MHz and 80 MHz are 1,8 MHz to 2,0 MHz, 3,5 MHz to 4,0 MHz, 5,3 MHz to 5,4 MHz, 7 MHz to 7,3 MHz, 10,1 MHz to 10,15 MHz, 14 MHz to 14,2 MHz, 18,07 MHz to 18,17 MHz, 21,0 MHz to 21,4 MHz, 24,89 MHz to 24,99 MHz, 28,0 MHz to 29,7 MHz and 50,0 MHz to 54,0 MHz.

Table 206 – Recommended Separation Distances between Portable and Mobile RF Communications Equipment and the ClearChart 4 for ME Equipment and ME Systems that are NOT Life-supporting.

Guidance and Manufacturer's Declaration - Electromagnetic Immunity

Recommended Separation Distances for between

Portable and Mobile RF Communications Equipment and the ClearChart 4

The ClearChart 4 is intended for use in the electromagnetic environment in which radiated RF disturbances are controlled. The customer or user of the ClearChart 4 can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF Communications Equipment and the ClearChart 4 as recommended below, according to the maximum output power of the communications equipment.

Max Output Power of Transmitter (W)	Separation (m) 150kHz to 80 MHz d=(3.5/V1)(Sqrt P)	Separation (m) 80 to 800 MHz d=(3.5/E1)(Sqrt P)	Separation (m) 800MHz to 2.7GHz d=(7/E1)(Sqrt P)
0.01	0.1166	0.1166	0.2333
0.1	0.3689	0.3689	0.7378
1	1.1666	1.1666	2.3333
10	3.6893	3.6893	7.3786
100	11.6666	11.6666	23.3333

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

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

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

Table 9 – Guidance and Manufacturer's Declaration

Electromagnetic Immunity

Immunity to Proximity Fields from RF Wireless Communications Equipment

Guidance and Manufacturer's Declaration – Electromagnetic Immunity

The ClearChart 4 is intended for use in the electromagnetic environment as specified below related to proximity fields from RF wireless communications equipment.

Immunity Test	IEC 60601 Test Level							Compliance Level	Electromagnetic Environment - Guidance
	Test Frequency (MHz)	Band (MHz)	Service (MHz)	Modulation	Maximum Power (W)	Distance (m)	Immunity Test Level (V/m)	Compliance Level	
Radiated RF IEC 61000-4-3	385	380-390	TETRA 400	Pulse Modulation 18 Hz	1,8	0,3	27	27 V/m at 0,3 m	RF wireless communications equipment should be no closer to any part of the ClearChart 4, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended Separation Distance: **d=(6/E)*(Sqrt[P])** Where **P** is the maximum power in watts, **d** is the minimum separation distance in meters, and **E** is the immunity level.
	450	430-470	GMRS 460, FRS 460	FM ±5 kHz deviation 1 kHs sine	2	0,3	28	28 V/m at 0,3 m	
	710	704-787	LTE Band 13, 17	Pulse Modulation 217 Hx	0,2	0,3	9	9 V/m at 0,3 m	
	745								
	780								
	810	800-960	GSM 800/900, TETRA 800, iDEN 820, CDMA 850, LTE Band 1, 3, 4, 25; UMTS	Pulse Modulation 18 Hz	2	0,3	28	28 V/m at 0,3 m	
	870								
	930								
	1 720	1 700 - 1 990	GSM 1800; CDMA 1900; GSM 1900; DECT; LTE Band 1, 3, 4, 25; UMTS	Pulse Modulation 217 Hz	2	0,3	28	28 V/m at 0,3 m	
	1 845								
	1 970								
	2 450	2 400 - 2 570	Bluetooth WLAN, 802.11 b/g/n, RFID 2450, LTE Band 7	Pulse Modulation 217 Hz	2	0,3	28	28 V/m at 0,3 m	
	5 240	5 100 - 5 800	WLAN 802.11 a/n	Pulse Modulation 217 Hz	0,2	0,3	9	9 V/m at 0,3 m	
	5 500								
	5 785								

Wireless Communication Integration

The ClearChart 4 has the ability to work with two types of RF transmitters with the following specifications and characteristic:

Configuration	USB Module
Protocol	Bluetooth
Frequency Band	2.4 - 2.4835 GHz ISM Band
Modulation Method	GFSK for 1Mbps, π/4-DQPSK for 2Mpbs, 8-DPSK (EDR Mode)
Channel Access Protocol	FHSS (Frequency Hopping Spread Spectrum)
RF Output Power	Class 1 (+8 dBm typical) up to +20dBm

Configuration	RS-232 Module
Protocol	Bluetooth
Frequency Band	2.4020 - 2.4800 GHz
Modulation Method	GFSK (Basic Mode), π/4-DQPSK, 8-DPSK (EDR Mode)
Channel Access Protocol	FHSS (Frequency Hopping Spread Spectrum)
RF Output Power	Class 1 (+18 dBm typical) up to +20dBm

Care must be taken when using other equipment operating under the same frequency band above or any other RF band. The ClearChart 4 may affect or be affected by other equipment while operating in wireless mode. Therefore, if the ClearChart 4 affects or is affected by other equipment, proper separation may be required by relocating or re-orienting the equipment.



Generates non-ionizing radiation.
May be affected by non-ionizing radiation.

Appendix A

Instrument Cables

WARNING: ANY NON-MEDICAL ELECTRICAL EQUIPMENT USED WITH THE CLEARCHART 4 MUST BE COMPLIANT WITH AN APPLICABLE IEC OR ISO SAFETY STANDARD.

Cable Reference	Length	Description
16200-440	11m / 35ft	DB9 M/F Null Modem Cable (shielded)
Any	<15m / 49 ft (2500 pF MAX Capacitance)	DB9 M/F Null Modem Cable (shielded)

Warranty

This product is warranted by Reichert Technologies (herein after referred to as Reichert) against defective material and workmanship under normal use for a period of three years from the date of invoice to the original purchaser. (An authorized dealer shall not be considered an original purchaser.) Under this warranty, Reichert's sole obligation is to repair or replace the defective part or product at Reichert's discretion.

This warranty applies to new products and does not apply to a product that has been tampered with, altered in any way, misused, damaged by accident or negligence, or which has had the serial number removed, altered or effaced. Nor shall this warranty be extended to a product installed or operated in a manner not in accordance with the applicable Reichert instruction manual, nor to a product which has been sold, serviced, installed or repaired other than by a Reichert factory, Technical Service Center, or authorized Reichert Dealer.

Lamps, bulbs, charts, cards and other expendable items are not covered by this warranty.

All claims under this warranty must be in writing and directed to the Reichert factory, Technical Service Center, or authorized instrument dealer making the original sale and must be accompanied by a copy of the purchaser's invoice.

This warranty is in lieu of all other warranties implied or expressed. All implied warranties of merchantability or fitness for a particular use are hereby disclaimed. No representative or other person is authorized to make any other obligations for Reichert. Reichert shall not be liable for any special, incidental, or consequent damages for any negligence, breach of warranty, strict liability or any other damages resulting from or relating to design, manufacture, sale, use or handling of the product.

Patent Warranty

If notified promptly in writing of any action brought against the purchaser based on a claim that the instrument infringes a U.S. Patent, Reichert will defend such action at its expense and will pay costs and damages awarded in any such action, provided that Reichert shall have sole control of the defense of any such action with information and assistance (at Reichert's expense) for such defense, and of all negotiation for the settlement and compromise thereof.

Product Changes

Reichert reserves the right to make changes in design or to make additions to or improvements in its products without obligation to add such to products previously manufactured.

Claims for Shortages

We use extreme care in selection, checking, rechecking and packing to eliminate the possibility of error. If any shipping errors are discovered:

1. Carefully go through the packing materials to be sure nothing was inadvertently overlooked when the unit was unpacked.
2. Call the dealer you purchased the product from and report the shortage. The materials are packed at the factory and none should be missing if the box has never been opened.
3. Claims must be filed within 30 days of purchase.

Claims for Damages in Transit

Our shipping responsibility ceases with the safe delivery in good condition to the transportation company. Claims for loss or damage in transit should be made promptly and directly to the transportation company.

If, upon delivery, the outside of the packing case shows evidence of rough handling or damage, the transportation company's agent should be requested to make a "Received in Bad Order" notation on the delivery receipt. If within 48 hours of delivery, concealed damage is noted upon unpacking the shipment and no exterior evidence of rough handling is apparent, the transportation company should be requested to make out a "Bad Order" report. This procedure is necessary in order for the dealer to maintain the right of recovery from the carrier.

Notes

Manufactured By
Reichert, Inc.
3362 Walden Ave
Suite 100
Depew, NY 14043
USA

Toll Free 888-849-8955
Phone: +1 716-686-4500
Fax: +1 716-686-4555
Email: reichert.information@ametek.com
www.reichert.com

Authorized European Service Center
AMETEK GmbH
Business Unit Reichert
Email: info.reichert-de@ametek.com
Tel: +49 (89) 315 89 110

EC REP

Emergo Europe
Westervoortsedijk 60
6827 AT Arnhem
The Netherlands

CH REP

MedEnvoy Switzerland
Gotthardstrasse 28
6302 Zug
Switzerland

ISO-13485 Certified

CE

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