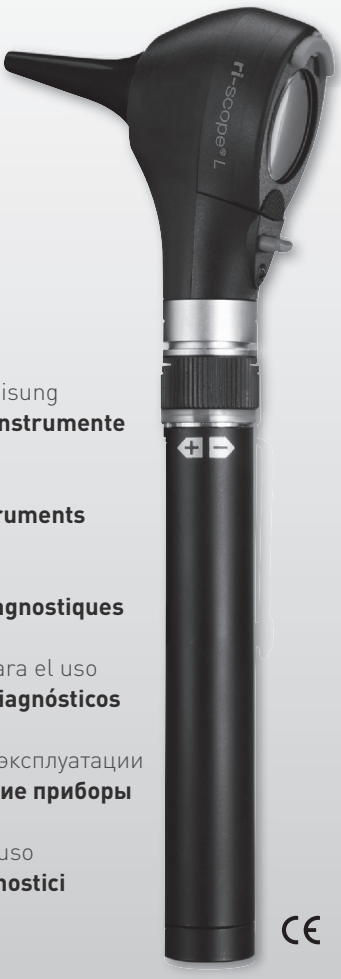
ri-scope®
ri-scope® L
ri-derma®



Gebrauchsanweisung
Diagnostische Instrumente

Instructions
Diagnostic Instruments

Mode d' emploi
Instruments diagnostiques

Instrucciones para el uso
Instrumentos diagnósticos

Инструкция по эксплуатации
Диагностические приборы

Istruzioni per l' uso
Strumenti diagnostici

CE

Riester

ENGLISH

1.Important information to observe prior to initial use
You have purchased a high quality **Riester** diagnostic instrument set manufactured in compliance with Directive 93/42/EEC for medical devices and subject to stringent quality control procedures at all stages. The excellent quality guarantees you reliable diagnoses. The use of the **Riester** battery handle for the **ri-**scope® and **ri-**derma® instrument heads and their accessories is described in our Operating Instructions. Please read the Operating Instructions carefully before initial use and retain them for future reference. Should you have any questions, we or the representative responsible for **Riester** products are available for you at all times. Please find our address on the last page of these Operating Instructions. We would be pleased to provide you with the address of our representative on request. Please note that at the instruments described in these Operating Instructions are exclusively suitable for use by properly trained persons. The operation otoscope in the Vet-I instrument set is an instrument exclusively produced for veterinary medicine and therefore bears no CE mark. Please also note that the faultless and safe function of our instruments can only be ensured if the instruments as well as their accessories used are exclusively from **Riester**.

Safety precautions:

⚠ Caution: Observe the Operating Instructions!

⧈ Device double-earthed

Classification
Type-B applied part - otoscope head with speculum

2. Battery handles and initial use
2.1. Purpose
The **Riester** battery handles described in these Operating Instructions serve to supply the instrument heads with power (the lamps are contained in the respective instrument heads). They also serve as holders.

2.2. Battery handle range
All the instrument heads described in these Operating Instructions fit on the following battery handles and can therefore be individually combined. Furthermore, all instrument heads fit the handles of the **ri-**former® wall model.
CAUTION: LED instrument heads are only compatible with the **ri-**former® diagnostic station above a certain serial number. You may obtain specifications on the compatibility of your diagnostic station on request.

For ri-scope®L otoscopes, ri-scope®L **ophthalmoscopes, perfect, E.N.T., praktikant,** de luxe®**, Vet, slit and spot retinoscopes, ri-**vision®

a) Type C battery handle with 2.5 V rheotronic®. To operate these battery handles, you require 2 commercial Type C Baby alkaline batteries (IEC standard designation LR14) or a 2.5 V **ri-**accu®. The handle with the **Riester ri-**accu® can only be charged in the **Riester ri-**charger®.

b) Type C battery handle with 3.5 V rheotronic® To operate this battery handle you require two CR 123A type commercial lithium batteries (Please note: only with reducing sleeve and LDO controller) or a **ri-**accu®L 3.5 V. The handle with the **Riester ri-**accu®L can only be charged in the **Riester ri-**charger®L.

c) Type C chargeable battery handle with or without sensomatic® 2.5 V or 3.5 V function with rheotronic® to charge from the mains 230 V or 120 V. The handle is available as a 2.5 V or 3.5 V model and can be ordered for 230 V or 120 V operation. Please note that the handle can only be used with the **Riester ri-**accu® or **ri-**accu®L.

d) Type AA battery handle with 2.5 V rheotronic®. To operate these battery handles, you require two commercial Type AA Baby alkaline batteries (IEC standard designation LR6) or a **ri-**accu® 2.5 V. The handle with the **Riester ri-**accu® can only be charged in the **Riester ri-**charger®.

e) Type AA battery handle with 3.5 V rheotronic® To operate this battery handle you require two CR 123A type commercial lithium batteries (Please note: only with an LDO controller)or a **ri-**accu®L 3.5 V. The handle with the **Riester ri-**accu®L can only be charged in the **Riester ri-**charger®L.

2.3. Inserting and removing batteries and rechargeable batteries
Handle types (2.2 a, b, d and e)
Screw off the handle cover on the lower part of the handle. Depending on which handle you have purchased and for what voltage (see 2.2), insert the respective batteries or rechargeable battery into the casing such that the positive end point towards the top of the handle. There is also an arrow next to the plus symbol on the rechargeable battery, which shows you the direction to insert into the handle. Screw the handle cover onto the handle again.

CAUTION: For lithium batteries (only for type-C battery handles) you need a reducing sleeve (item no.: 12652) + LDO controller (item no.: 12653)

Handle C
For refitting:
Twist off the cap of the handle on the lower part of the handle.
For lithium batteries, the reducing sleeve is inserted into the handle shell with the end where the spring tensioning ring is seated facing forward, and the LDO controller is inserted in the direction indicated by the printed arrow. The lithium batteries are inserted with the positive poles facing toward the upper part of the handle. Screw the cap of the handle firmly back onto the handle.
Handle AA
For refitting:
Twist off the cap of the handle on the lower part of the handle.
For lithium batteries, the LDO controller is inserted in the direction indicated by the printed arrow. The lithium batteries are inserted with the positive poles facing toward the upper part of the handle. Screw the cap of the handle firmly back onto the handle.
Remove the batteries by firstly screwing off the battery handle cover and then shaking the handle a little.

Prior to initial use, the rechargeable batteries (in the Riester battery handle) must be charged in the Riester ri-charger®. Separate operating instructions are included with every charger and must be observed.

Handle types (2.2. c)
Prior to initial use of the plug-in handle, it should be charged for up to 24 hours in the mains socket.

CAUTION: The plug-in handle (only for NiMH rechargeable batteries) must not be charged for longer than 24 hours.
Screw off the handle cover on the lower part of the handle. Depending on which handle you have purchased and for what voltage (see 2.2), insert the respective rechargeable batteries into the handle casing. For 2.5 V rechargeable batteries take care that the battery is inserted into the handle with the plus end towards the top of the handle; you will also find an arrow next to plus symbol which shows you the direction to insert into the handle. It is irrelevant in which direction 3.5 V rechargeable batteries are inserted. Screw the handle cover tightly onto the handle again. Unscrew the lower part of the handle counter clockwise. The mains socket pins become visible. Round pins are for 230 V mains operation, flat pins are for 120 V mains operation Plug the lower part of the handle into the mains socket for charging. Caution: The handle must never be in the mains socket when the rechargeable batteries are replaced! If you wish to replace the **ri-**accu® battery, unscrew the battery handle cover on the lower part of the handle counter clockwise. Remove the **ri-**accu® battery from the battery handle by shaking down the handle downwards a little. Insert the **ri-**accu® battery into the battery handle. For 2.5 V rechargeable batteries, take care that the battery is inserted into the handle with the plus end towards the top of the handle; you will also find an arrow next to plus symbol which shows you the direction to insert into the handle. It is irrelevant in which direction 3.5 V rechargeable batteries are inserted. Screw the battery cover clockwise onto the handle. Technical data: Either 230 V or 120 V
CAUTION:
- If you do not plan to use the device for a long time or if you take it on a journey, remove the batteries and rechargeable batteries from the handle.
- New batteries should be inserted once the light intensity of the instrument becomes weaker.
- To obtain the best possible light output we recommend always fitting high quality batteries (as described in 2.2).
- If you suspect that liquid or moisture could have entered the handle, it must not be charged under any circumstances. This could lead to a life-threatening electric shock, especially in the case of plug-in handles.
- To extend the service life of the **ri-**accu® battery, the **ri-**accu® battery should only be charged once the light intensity of the instruments has become weaker.

Waste disposal: Please note that batteries and rechargeable batteries must be disposed of as special waste. You can obtain the relevant information from your local authority or from your local environmental advisor.

2.4. Fitting instrument heads
Fit the required instrument head on the receptacle on the upper part of the handle such that the two recesses of the lower part of the instrument head fit on the two protruding guide studs on the battery handle. Press the instrument head lightly on to the battery handle and screw the handle clockwise as far as it goes. The head is removed by screwing counter clockwise.

2.5 Switching Type C and AA battery handles on and off
Activate the instrument by turning the switching ring on the top of the handle clockwise direction. To switch off the instrument turn the ring anti-clockwise direction until the device is swithced-off.

2.6. rheotronic® **for adjusting the light intensity**
With the rheotronic it is possible to modulate the light intensity for the C and AA handles. Depending on how often you turn the switching ring clockwise or anti-clockwise direction, the light intensity is stronger or weaker.

ATTENTION: At every switch-on of the battery handle the light intensity is at 100% Automatic safety switch-off after 180 seconds.

Explanation of the symbol on the plug-in handle:
⚠ Caution: Observe the Operating Instructions!

3. ri-scope®L **otoscope**
3.1. Purpose
The **Riester** otoscope described in these Operating Instructions is produced for illumination and examination of the auditory canal in combination with **Riester** ear specula.

3.2 Fitting and removing ear specula
Either **Riester** disposable ear specula (blue colour) or reusable **Riester** ear specula (black colour) can be fitted to the otoscope head. The size of the ear specula is marked at the back of the speculum.

L1 and L2 otoscopes
Screw the speculum clockwise until noticeable resistance is felt. To remove the speculum, screw the speculum counter clockwise.

L3 otoscope
Fit the chosen speculum on the chrome-plated metal fixture of the otoscope until it locks into place. To remove the speculum, press the blue ejection button. The speculum is automatically ejected.

3.3. Swivel lens for magnification
The swivel lens is fixed to the device and can be swivelled 360°.

3.4. Insertion of external instruments into the ear
If you wish to insert external instruments into the ear (e.g. tweezers), you have to rotate the swivel lens (approx. 3-fold magnification) located on the otoscope head by 180°. Now you can use the operation lens.

3.5. Pneumatic test
To perform the pneumatic test (= examination of the eardrum), you require a ball, which is not included in the normal delivery package, but can be ordered separately. The tube for the ball is attached to the connector. Now you can carefully insert the necessary volume of air into the ear canal.

3.6 Technical data of the lamp

Otoscope XL 2.5 V	2.5 V 750 mA	mean life span 15h
Otoscope XL 3.5 V	3.5 V 720 mA	mean life span 15h
Otoscope LED 3.5 V	3.5 V 28 mA	mean life span 10000h

4. ri-scope®L **ophthalmoscope**
4.1. Purpose
The **Riester** ophthalmoscope described in these Operating Instructions is produced for the examination of the eye and the eyeground.

4.2. Lens wheel with correction lens
The correction lens can be adjusted on the lens wheel. The following correction lenses are available:
L1 and L2 ophthalmoscopes
Plus: 1-10, 12, 15, 20, 40.
Minus: 1-10, 15, 20, 25, 30, 35.
L3 ophthalmoscope
Plus: 1-45 in single steps
Minus: 1-44 in single steps

The values can be read off in the illuminated field of view. Plus values are displayed in green numbers, minus values with red numbers.

4.3. Apertures
The following apertures can be selected with the aperture hand-wheel:
L1 ophthalmoscope
Semi-circle, small/medium/large circular aperture, fixation star, slit.
L2 ophthalmoscope
Semi-circle, small/medium/large circular aperture, fixation star and slit.
L3 ophthalmoscope
Semi-circle, small/medium/large circular aperture, fixation star, slit and grid.

Aperture	Function
Semicircle:	for examinations with turbid lenses
Small circle:	to reduce reflections for small pupils
Medium circle:	to reduce reflections for small pupils
Large circle:	for normal examination results
Grid:	for topographic determination of retina changes
Light slit:	to determine differences in level
Fixation star:	to ascertain central of eccentric fixation

4.4 Filters
Using the filter wheel, the following filters can be switched for each aperture:
L1 ophthalmoscope Red-free filter
L2 ophthalmoscope Red-free filter, blue filter and polarisation filter.
L3 ophthalmoscope Red-free filter, blue filter and polarisation filter.

Filter	Function
Red-free filter:	contrast enhancing to assess fine vascular changes, e.g. retinal bleeding
Polarisation filter:	for precise assessment of tissue colours and to avoid retinal reflections
Blue filter:	for improved recognition of vascular abnormalities or bleeding, for fluorescence ophthalmology

For L2 + L3, every filter can be switched to every aperture.

4.5. Focussing device (only with L3)
Fast fine adjustment of the examination area to be observed is achieved from various distances by turning the focussing wheel.

4.6. Magnifying glass
A magnifying glass with 5-fold magnification is supplied with the ophthalmoscope set. This can be positioned between the instrument head and the area under examination, as required. The area under examination is magnified accordingly.

4.7. Technical data on the lamp

XL 2.5 V ophthalmoscope:	750 mA	average service life 15 h
XL 3.5 V ophthalmoscope:	690 mA	average service life 15 h
LED 3.5 V ophthalmoscope:	29 mA	average service life 10000 h

5. Slit and spot retinoscopes
5.1 Purpose
The slit/spot retinoscopes (also known as skiascopes) described in these Operating Instructions are produced to determine the refraction (ametropias) of the eye

5.2. Initial use and function
Position the required instrument head on point of attachment on top section of handle with both recesses of the instrument head bottom section being congruent with the two projecting guide cams of the battery handle. Press instrument head lightly on battery handle and rotate handle in clockwise direction to the stop. Remove head by rotating in counter-clockwise direction. Rotation and focusing of the slit and/or spot image may now be effected by the knurled screw.

5.3. Rotation
The slit or spot image may be rotated by 360° by the control. Each angle may be directly read from the scale on the retinoscope.

5.4. Fixation cards
Fixation cards are suspended and fixed on the object side of the retinoscope into the bracket for the dynamic skiascope.

5.5 Technical data of the lamp

Slit retinoscope HL 2.5 V	2.5 V 440 mA	mean life span 15h
Slit retinoscope XL 3.5 V	3.5 V 690 mA	mean life span 50h
Spot retinoscope HL 2.5 V	2.5 V 450 mA	mean life span 15h
Spot retinoscope XL 3.5 V	3.5 V 640 mA	mean life span 40h

6. Dermatoscope
6.1. Purpose
The **ri-**derma® dermascope described in these Operating Instructions is produced for early identification of changes of skin pigmentation (malignant melanomas).

6.2. Initial use and function
Position the required instrument head on point of attachment on top section of handle with both recesses of the instrument head bottom section being congruent with the two projecting guide cams of the battery handle. Press instrument head lightly on battery handle and rotate handle in clockwise direction to the stop. Remove head by rotating in counter-clockwise direction.

6.3. Focusing
Focus the magnifying glass by rotating the eyepiece ring.

6.4. Skin adapters
Two skin adapters are supplied:

1) Including a scale of 0 - 10 mm for measuring melanotic skin changes, such as malign melanoma.

2) Without a scale Both skin adapters are suitable for multiple removal and replacement.

6.5 Technical data of the lamp

ri-derma® XL 2.5 V	2.5 V 750 mA	mean life span 15h
ri-derma® XL 3.5 V	3.5 V 690 mA	mean life span 15h
ri-derma® LED 3.5 V	3.5 V 28 mA	mean life span 10000h

7. Bent-arm illuminator

7.1. Purpose

The bent-arm illuminator described in these Operating Instructions is produced for illuminating the oral cavity and the pharynx.

7.2. Initial use and function

Position the required instrument head on point of attachment on top section of handle with both recesses of the instrument head bottom section being congruent with the two projecting guide cams of the battery handle. Press instrument head lightly on battery handle and rotate handle in clockwise direction to the stop. Remove head by rotating in counter-clockwise direction.

7.3 Technical data of the lamp

bent-arm illuminator XL 2.5 V	2.5 V 750 mA	mean life span 15h
bent-arm illuminator XL 3.5 V	3.5 V 690 mA	mean life span 15h
bent-arm illuminator LED 3.5 V	3.5 V 28 mA	mean life span 10000h

8. Nasal speculum

8.1. Purpose

The nasal speculum described in these Operating Instructions is produced for illumination and therefore examination of the inside of the nose.

8.2. Initial use and function

Position the required instrument head on point of attachment on top section of handle with both recesses of the instrument head bottom section being congruent with the two projecting guide cams of the battery handle. Press instrument head lightly on battery handle and rotate handle in clockwise direction to the stop. Remove head by rotating in counter-clockwise direction. For two modes of operation:

a) Fast expansion Push set screw on instrument head down with your thumb. This setting does not allow changes in the position of the speculum legs.

b) Individual expansion Rotate set screw in clockwise direction until the required expansion width is obtained. Close legs again by turning screw in clockwise direction.

8.3. Swivel lens

The nasal speculum is equipped with a swivel lens of approx. 2.5X enlargement which may be simply pulled out and/or replaced in the opening provided on the nasal speculum.

8.4 Technical data of the lamp

nasal speculum XL 2.5 V	2.5 V 750 mA	mean life span 15h
nasal speculum XL 3.5 V	3.5 V 720 mA	mean life span 15h
nasal speculum LED 3.5 V	3.5 V 20 mA	mean life span 10000h

9. Blade holder

9.1. Purpose

The blade holder described in these Operating Instructions is produced for examination of the oral cavity and pharynx in combination with commercial wooden and plastic blades.

9.2. Initial use and function

Position the required instrument head on point of attachment on top section of handle with both recesses of the instrument head bottom section being congruent with the two projecting guide cams of the battery handle. Press instrument head lightly on battery handle and rotate handle in clockwise direction to the stop. Remove head by rotating in counter-clockwise direction. Insert a commercial wooden or plastic tongue blade into the aperture below the light opening up to the stop. The tongue blade is easy to remove after examination by actuating the ejector.

9.3 Technical data of the lamp

blade holder XL 2.5 V	2.5 V 750 mA	mean life span 15h
blade holder XL 3.5 V	3.5 V 720 mA	mean life span 15h
blade holder LED 3.5 V	3.5 V 20 mA	mean life span 10000h

10. Laryngeal mirrors

10.1. Purpose

The laryngeal mirrors described in these Operating Instructions are produced for mirroring or examination of the oral cavity and pharynx in combination with the **Riester** bent-arm illuminator.

10.2. Initial use

Laryngeal mirrors may only be used in combination with the bent arm illuminator, thus ensuring maximum lighting conditions. Take two laryngeal mirrors and fix them in the required direction on the bent-arm illuminator.

11. Operation otoscope for veterinary medicine

11.1. Purpose

The **Riester** operation otoscope described in these Operating Instructions is produced exclusively for use on animals and for veterinary medicine and there-

fore bears no CE mark. It can be used for illumination and examination of the auditory canal, as well as for minor operations in the auditory canal.

11.2. Attachment and removal of ear specula in veterinary medicine
Position the required speculum on the black bracket of the operating otoscope, with the recess of the speculum fitting into the guide of the bracket. Attach speculum by rotating in anti-clockwise direction.

11.3. Swivel lens for enlargement
The operating otoscope comprises a small magnifying lens to be swivelled at an angle of 360° for a maximum enlargement of approx. 2.5X.

11.4. Insertion of external instruments into the ear
The operation otoscope is designed to be open so that external instruments can be inserted into the animal ear.

11.5 Technical data of the lamp

Operating otoscope HL 2.5 V	2.5 V 680 mA	mean life span 20h
Operating otoscope XL 3.5 V	3.5 V 700 mA	mean life span 20h

12. Operation otoscope for human medicine
12.1. Purpose
The **Riester** operation otoscope described in these Operating Instructions is produced for illumination and examination of the auditory canal and for insertion of external instruments into the auditory canal.

12.2 Attachment and removal of ear specula for human medicine
Place the desired speculum onto the black holder of the operation otoscope so that the recess on the speculum fits into the guide of the holder. Fix the speculum by turning it in a counter-clockwise direction.

12.3 Swivel lens for magnification
There is a small magnification lens which can be swivelled 360° on the operation otoscope with approx. 2.5-fold magnification.

12.4. Insertion of external instruments into the ear
The operation otoscope is designed so that external instruments can be inserted into the ear.

12.5 Technical data of the lamp

Operating otoscope HL 2.5 V	2.5 V 680 mA	mean life span 20h
Operating otoscope XL 3.5 V	3.5 V 700 mA	mean life span 20h

13. Replacing the lamp
L1 otoscope
Remove the specula fitting from the otoscope. Screw out the lamp counter clockwise. Screw in the new lamp clockwise and replace the specula fitting.

L2, L3 otoscopes, ri-derma®, bent-arm illuminator, nasal speculum and blade holder
Screw the instrument head off the battery holder. The lamp is located at the base of the instrument head. Pull the lamp out of the instrument head with thumb and forefinger or a suitable tool. Insert a new lamp.

Ophthalmoscopes
Remove the instrument head from the battery holder. The lamp is located at the base of the instrument head. Remove the lamp from the instrument head with thumb and forefinger or a suitable tool. Insert a new lamp.

CAUTION: The pin on the lamp must be inserted into the guide groove on the instrument head.

Veterinary/human operation otoscope
Screw the lamp out of the fixture in the operation otoscope and screw in a new lamp.

14. Instructions for care
General information
Cleaning and disinfection of the medical devices serves to protect the patient, the user and third parties and to preserve the value of the medical devices.
Due to the product design and the materials used, no defined limit can be specified for the maximum number of reprocessing cycles that can be carried out. The life span of the medical devices is determined by their function and by gentle handling of the devices.
Defective products must undergo the reprocessing procedure described before being returned for repair.

Cleaning and disinfection
The instrument heads and handles can be cleaned externally with a moist cloth until visually clean. Wipe-disinfection as specified by the disinfectant manufacturer. Only disinfectants with proven efficacy should be used, taking into account the national requirements.
After disinfection, wipe the instrument down with a moist cloth to remove possible disinfectant residues.

The components that come into contact with the skin (**ri-**derma®) can be rub-

bed down with alcohol or a suitable disinfectant.

PLEASE NOTE!

- Never immerse the instrument heads and handles in liquids! Take care to ensure that no liquids get inside the casing!
- This item is not approved for automated reprocessing and sterilization. These procedures cause irreparable damage!

Sterilization

a) Reusable ear specula

The ear specula can be sterilized in the steam sterilizer at 134°C with 10 minutes hold time.

b) Single-use ear specula

For single use only

WARNING: Repeated use can cause infections.

15. Spare parts and accessories

You can find a detailed list in our Instruments for E.N.T. and Ophthalmologic Instruments brochure, which you can download at www.**riester**.de.

16. Maintenance

These instruments and their accessories do not require any specific maintenance.Should an instrument have to be examined for any specific reason whatsoever, please return it to the Company or an authorised **Riester** dealer in your area. Addresses to be supplied on request.

17. Notices

Ambient temperature:	0°C to +40°C
Relative humidity:	30% to 70% non-condensing
Transport and storage temperature:	-10°C to +55°C
Relative humidity:	10% to 95% non-condensing

18 Electromagnetic compatibility

Medical electrical equipment is subject to special precautionary measures with regard to electromagnetic compatibility (EMC).

Portable and mobile high-frequency communication equipment can influence medical electrical equipment. This ME device is intended for operation in an electromagnetic environment as specified below. The user of the device should ensure that it is operated in such an environment.

The ME device must not be used directly next to or arranged in a stack with other devices. If the device has to be operated near to or in a stacked arrangement with other devices, then the ME device should be monitored in order to verify that it operates as intended in this arrangement. This ME device is intended exclusively for use by professional medical staff. This device can cause radio interference and can disrupt the operation of equipment nearby. Suitable remedial measures, such as for instance re-alignment, re-arrangement of the ME device or shielding, can become necessary.

Guidelines and manufacturer's declaration - electromagnetic emissions

The ri-scope® L is intended for operation in an electromagnetic environment as specified below. The customer or the user of the ri-scope® L should ensure that it is used in such an environment.

Emission measurements	Compliance	Electromagnetic environment - guidelines
HF emissions according to CISPR 11	Group 1	The ri-scope® L employs HF energy solely for an internal function. Its HF emission is therefore very low and it is unlikely that neighboring electronic devices will be affected by interference.
HF emissions according to CISPR 11	Class B	The ri-scope® L is intended for use in all facilities, including living quarters and such as are directly connected to a public power supply that also supplies buildings that are used for residential purposes.
Harmonics emissions according to EC61000-3-2	Not applicable	
Voltage fluctuation / flicker emissions according to IEC61000-3-3	Not applicable	

The ri-scope® L is intended for operation in an electromagnetic environment as specified below. The customer or the user of the ri-scope® L should ensure that it is used in such an environment.

Immunity tests	IEC 60601 test level	Compliance level	Electromagnetic environment - guidelines
Electrostatic discharge (ESD) according to IEC61000-4-2	± 6 kV contact discharge ± 8 kV air discharge	± 6 kV contact discharge ± 8 kV air discharge	Floors should be made of wood or concrete or be covered with ceramic tiles. If the floor is covered with a synthetic material, the relative air humidity must be at least 30%.
Fast transient electrical interference/bursts according to IEC61000-4-4	± 2 kV for power lines ± 1 kV for input and output lines	Not applicable	The quality of the supply voltage should correspond to that of a typical business or hospital environment.
Surges IEC61000-4-5	± 1 kV voltage phase-to-phase ± 2 kV voltage phase-to-earth	Not applicable	The quality of the supply voltage should correspond to that of a typical business or hospital environment.
Voltage dips, short-time interruptions and fluctuations in the supply voltage according to IEC61000-4-11	<5% U_T (>95 % drop in U_T) for 0.5 cycles 40% U_T (60 % drop in U_T) for 5 cycles 70 % U_T (30 % drop in U_T) for 25 cycles	Not applicable	The quality of the supply voltage should correspond to that of a typical business or hospital environment

	<5% U_T (>95 % drop in U_T) for 5 s		
Magnetic field at the mains frequency (50Hz) according to IEC61000-4-8	3 A/m	3 A/m	If image disturbances occur, the ri-scope® L may have to be placed further away from the sources of mains-frequency magnetic fields, or magnetic shielding may have to be installed: the mains-frequency magnetic field should be measured at the intended set-up site in order to ensure that it is small enough.

Note - U_T is the alternating supply voltage prior to application of the test level.

Guidelines and manufacturer's declaration - electromagnetic immunity

The ri-scope® L model is intended for operation in the electromagnetic environment specified below. The customer or the user of the ri-scope® L should ensure that it is used in such an environment.

Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment - guidelines
			Portable and mobile radio equipment should not be used within a distance from the ri-scope® L, including cables, that is less than the recommended safety distance as calculated by the equation that is appropriate for the transmission frequency. **Recommended safety distance:**
Conducted HF interference according to IEC61000-4-6	3 Vrms 150 kHz to 80MHz	Not applicable	$d = 1.2\sqrt{P}$
Radiated HF interference according to IEC61000-4-3	3 V/m 80 MHz to 2.5GHz	10 V/m	$d = 1.2\sqrt{P}$ 80 MHz to 1000 MHz
		3 V/m	$d = 2.3\sqrt{P}$ 1400 MHz to 2.5 GHz
			where P is the nominal power of the transmitter in Watts (W) as specified by the manufacturer of the transmitter, and d is the recommended safety distance in meters (m). The field strength of stationary radio transmitters should be less than the compliance level[b] at all frequencies as verified by an on-site test[a]
			Interference is possible in the vicinity of equipment marked with the following symbol 

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

Note 2: These guidelines may not apply in all situations. The propagation of electromagnetic waves is influenced by reflection and absorption by buildings, objects and people.

[a] The field strength of stationary transmitters, such as base stations of wireless telephones and mobile field radio services, amateur radio stations, AM and FM radio and television transmitters cannot be precisely determined theoretically in advance. In order to determine the electromagnetic environment due to stationary HF transmitters, an investigation of the location is advisable. If the field strength determined at the location of the ri-scope® L exceeds the compliance level indicated above, then the ri-scope® L must be monitored with regard to its normal operation at each place where it is used. If unusual performance characteristics are observed, additional measures such as re-alignment of the ri-scope® L or its removal to another place may be necessary.

[b] In the frequency range of 150 kHz to 80 MHz, the field strength should be smaller than 3 V/m.

Recommended safety distances between portable and mobile HF communication devices and the ri-scope® L

The ri-scope® L is intended for operation in an electromagnetic environment in which the radiated HF interference is monitored. The customer or user of the ri-scope® L can help prevent electromagnetic interference by observing minimum distances between portable and mobile HF communication equipment (transmitters) and the ri-scope® L as recommended below, depending on the maximum output power of the communication equipment.

Nominal power of the transmitter W	Safety distance that applies to the transmitter frequency m		
	150 kHz to 80 MHz Not applicable	80 MHz to 1000 MHz $d = 1.2\sqrt{P}$	1400 MHz to 2.5GHz $d = 2.3\sqrt{P}$
0.01		0.12	0.23
0.1		0.38	0.73
1		1.2	2.3
10		3.8	7.3
100		12	23

For transmitters whose nominal power is not indicated in the table above, the distance can be determined using the equation belonging to the respective column, where P is the nominal power of the transmitter in Watts (W) as specified by the manufacturer of the transmitter.

Note 1: At 80 MHz and 1400 MHz, the distance for the higher frequency range applies.

Note 2: These guidelines may not apply in all situations. The propagation of electromagnetic waves is influenced by reflection and absorption by buildings, objects and people.

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99220 Rev.D 2013-08 • Änderungen vorbehalten • Subject to alterations • Sous réserve de modifications • Sujeto a modificaciones • Возможны изменения • Con riserva di apportare modifiche