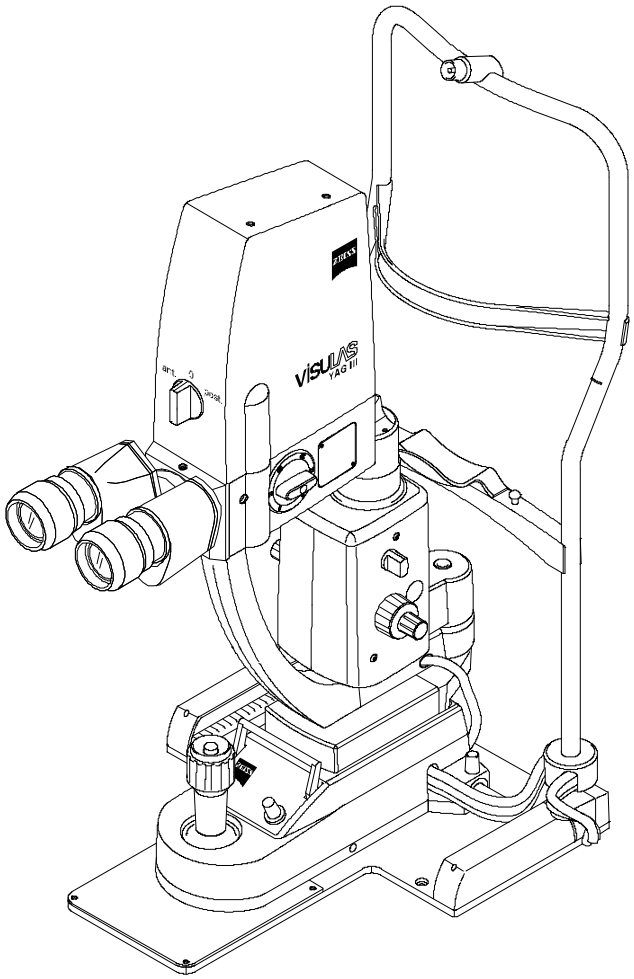
VISULAS YAG III

Documentation set



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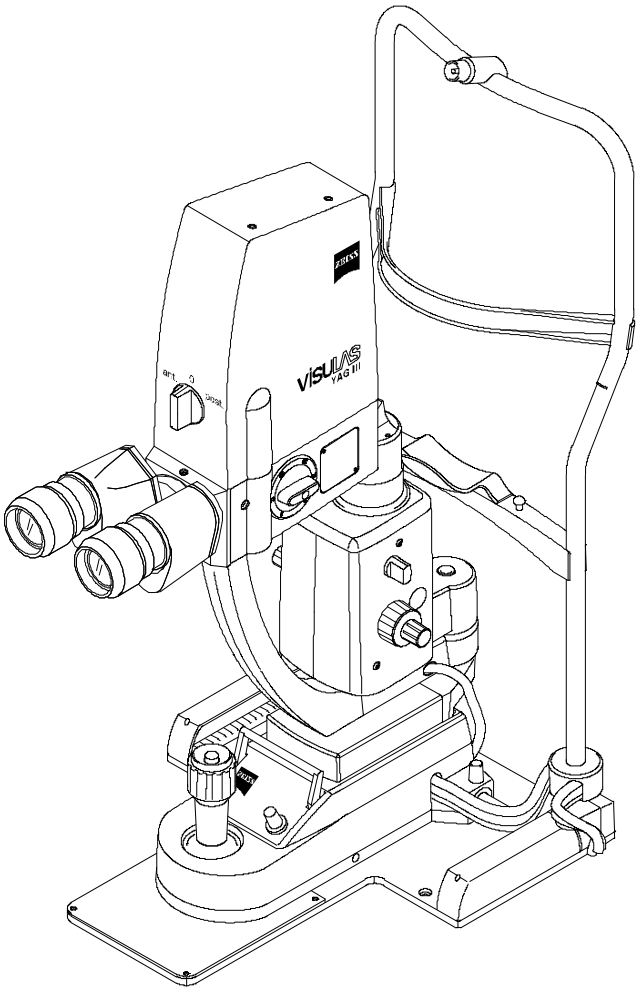
Contents

Appendix

VISULAS YAG III

User manual



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Contents

Notes on the user manual

Purpose and availability of documentation

This user manual explains the safety precautions, functions, usage, performance parameters and measures for care and maintenance of the VISULAS YAG III.

Correct operation of the system is imperative for its safe and successful function. You should therefore ensure that you are thoroughly familiar with this user manual before setting up and using the VISULAS YAG III the first time.

The user manuals and other documentation enclosed with the VISULAS YAG III should be kept accessible to users at all times to ensure that the information required for use of the VISULAS YAG III is readily available.

Questions and comments

If you have any questions or comments concerning this user manual or the VISULAS YAG III, please contact Carl Zeiss Meditec customer service or your local dealer (Contact details see reverse.).

Explanation of symbols used

The symbols used in this user manual refer to important safety information which warn against possible health risks or fatal injuries and contain useful notes. Whenever you see these symbols, read the accompanying information carefully and observe all safety notes and information in this user manual and on instrument labels.

WARNING

Indicates a hazardous situation which may result in fatal or serious bodily injury if the appropriate safety precautions are not heeded.

CAUTION

Indicates a hazardous situation which may result in minor injury if the appropriate safety precautions are not heeded.

CAUTION - PROPERTY DAMAGE

Indicates possible device damage if the appropriate safety precautions are not heeded.

☞ Information, hints and advice for a better understanding of the instructions to be observed in the operation of the instrument.

Package check list

The delivery package contains the following components:

- VISULAS YAG III laser console
- LSL YAG III laser slit lamp
- Straight binocular tube f = 140 mm
- 2 eyepieces 10x
- Head restrainer for VISULAS laser
- Armrest (height-adjustable)
- Dust cover
- Fixation lamp
- Cover plate for fixation lamp
- Flashing diode, red, for fixation lamp
- Power supply cable 2.5 m
- Documentation set

Country-specific information and labels

Classification/Manufacturer's declaration

WARNING - GENERAL HAZARDS

This device may only be set up, operated and used for the specified purpose and according to national regulations, consistent with the applicable industry standards and occupational safety and accident prevention regulations. Further notes on classification are to be found in section *Technical data*, page 104.

The device VISULAS YAG III complies with EU Medical Device Directive 93/42/EEC and its national implementation in the form of the German Medical Products Act (MPG).

CE 0297

Device class:	2 pursuant to ISO 15004-2:2007
Device class according to the Medical Products Act:	IIb
Laser class in accordance with DIN EN 60825-1-2003:	4 (VISULAS YAG III)
EMC:	See section *Electromagnetic compatibility*, page 107 and following.
UMDNS No.:	16-947 (VISULAS YAG III)
UMDNS No.:	12-281 (laser slit lamp)

This declaration shall be rendered invalid if changes are made to the product without the manufacturer’s authorization.

Indication for use

The VISULAS YAG III is designed for ophthalmologic use including posterior capsulotomy and peripheral iridotomy.

☞ **Note for VISULAS YAG III Combi:**
The VISULAS YAG III Combi instrument system consists of the VISULAS 532s laser system, the VISULAS YAG III laser system and the LSL YAG III Combi laser slit lamp as a general applicator for the two laser systems.

For correct operation of the VISULAS 532s, the VISULAS 532s user manual must be observed.

☞ **Note for VISULAS Trion Combi:**
The VISULAS Trion Combi instrument system consists of the VISULAS Trion laser system, the VISULAS YAG III laser system and the LSL Trion Combi laser slit lamp as a common applicator for the two laser systems.
For correct operation of the VISULAS Trion, the VISULAS Trion user manual must be observed.

The user is liable for any use of the device other than intended.

Side effects/contraindications

The VISULAS YAG III should not be used in cases of retinal detachment or cystoid macular edema, or with patients with intraocular glass lenses. Glass lenses can be destroyed by the effect of the optical breakdown.
The following complications have been reported after Nd:YAG laser treatment:

Complication	**Incidence**	
Cystoid macular edema	Estimated:	< 1 %
Retinal detachment*	Total population: After capsulotomy:	1.4 % 2.8 %
Endophthalmitis	Estimated:	< 1 %
Increased intraocular pressure	Estimated:	< 1 %
Rubeosis iridis (associated with diabetes)	Estimated:	< 1 %

* Christian Ohrloff "Die Bedeutung der intakten Hinterkapsel für den Glaskörper"
Klin. Monatsbl. Augenheilkd. 1994; 205:181-186 © 1994 F. Enke Verlag Stuttgart

The frequency and severity of complications depends on the energy applied. The lower the energy used, the lower the degree of postoperative inflammation and increase in intraocular pressure.

Intended user profile

CAUTION - RISK ARISING FROM OPERATING ERRORS

This device may only be installed, operated, used and maintained by persons who have been properly trained or who have the required knowledge and experience to do so. Please adhere to the national qualification guidelines applicable in your country.

The VISULAS YAG III may only be operated by physicians who have adequate knowledge of the medical application of the instrument, the effect of the laser beam on tissues and possible side effects.

People working in the laser hazard area must be given instruction concerning safety regulations, safety precautions and operation of the instrument at least once a year. Keep a written record of these instructions listing the participants.

Disposal of the product

CAUTION - RISK OF ENVIRONMENTAL POLLUTION

Packaging materials should be retained for future relocation or repair.

If you wish to dispose of the packaging material, hand it over to a recognized collection system for recycling.

The instrument contains electronic components. At the end of its lifetime, the device and its integrated batteries should be disposed of in accordance with the relevant national regulations.

Disposal of the product within the EU

In accordance with applicable EU guidelines and national regulations at the time at which the product was brought onto the market, the product specified on the consignment note is not to be disposed of via the domestic waste disposal system or communal waste disposal facilities.

For further information on disposal of this product please contact your local dealer or the manufacturer or its legal successor company. Please read the latest internet information provided by the manufacturer.

Where the product or its components are resold, the seller must inform the buyer that the product must be disposed of in accordance with the currently applicable national regulations.

Labels

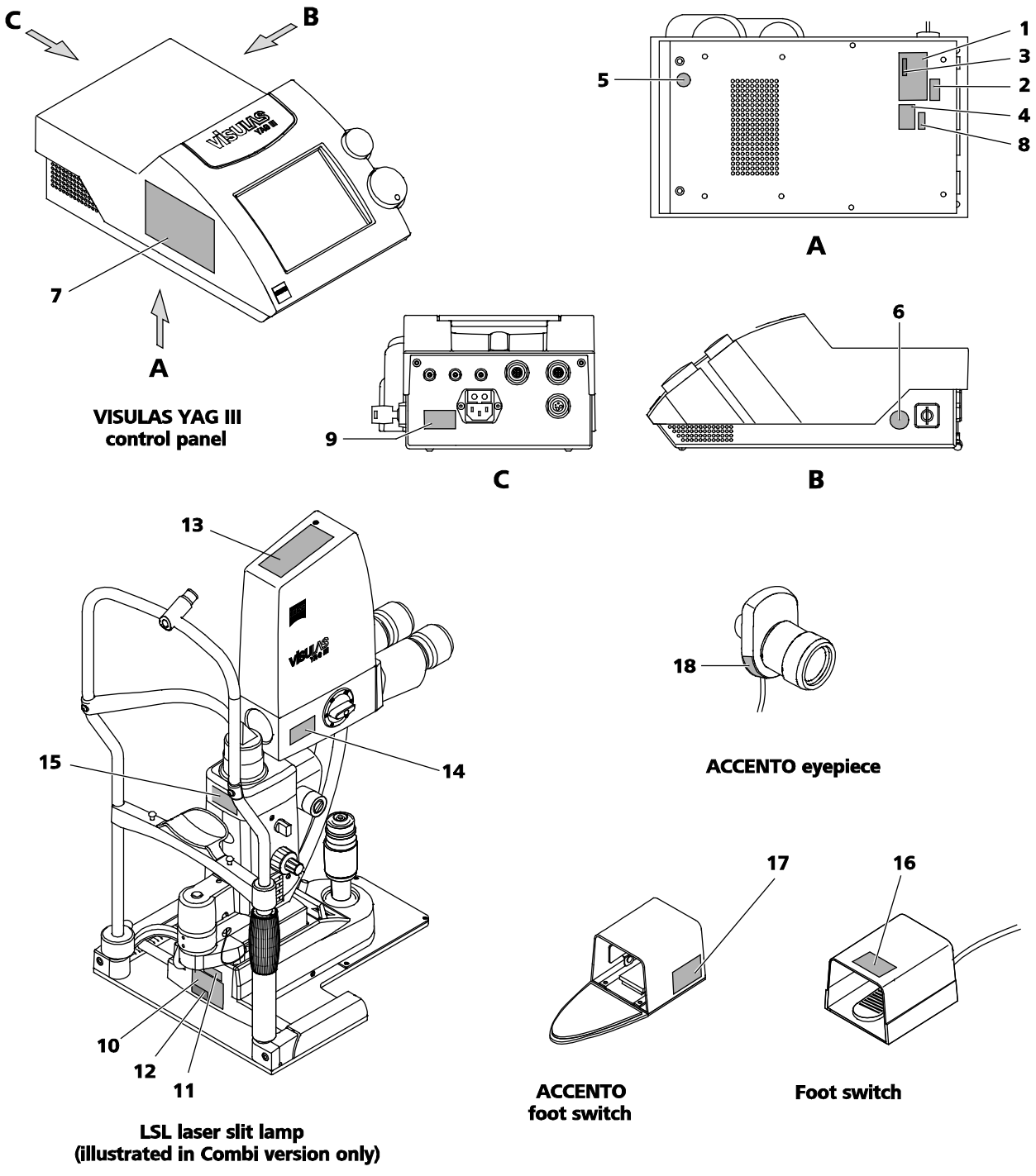
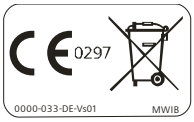
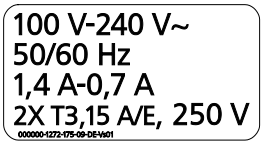
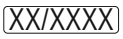
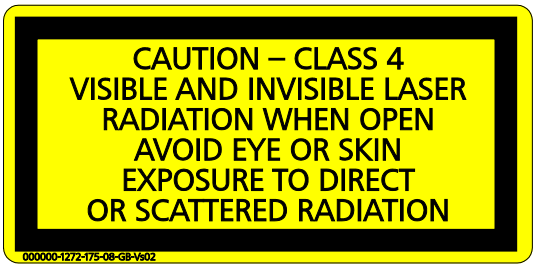
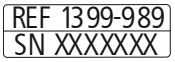


Fig. 1 Warning and information labels on the VISULAS YAG III

Item	Label	Explanation
1		VISULAS YAG III type label Manufacturer Date of manufacture Application part type B IP20 Housing protection class (protected against solid foreign bodies of 12.5mm in diameter and larger, no protection against penetration of water)
2		Identification label VISULAS YAG III **REF** Catalogue number/ part number **SN** Serial number
3		Date of manufacture label
4		CE marking label and disposal advise for EU
5		"Disconnect device from the power supply before opening" sign
6		"Observe user manual" sign

Item	Label	Explanation
7		Laser class 4 1064/660-680 nm warning label
8	Not applicable	Not applicable
9		Label with fuse specifications VISULAS YAG III
10	  	LSL YAG III type label LSL YAG III Combi type label LSL Trion Combi type label  Manufacturer  Date of manufacture  Application parts type B conforming to IEC 60601-1  CE marking label and disposal advise for EU IP20 Housing protection class (protected against solid foreign bodies of 12.5 mm in diameter and larger, no protection against penetration of water)

Item	Label	Explanation
11		Identification label LSL YAG III
		Identification label LSL YAG III Combi
		Identification label LSL Trion Combi
12		Date of manufacture
13		Laser class 4 warning label
14		"Laser exit aperture" warning label LSL YAG III LSL YAG III Combi LSL Trion Combi
15		"Laser exit aperture" warning label LSL YAG III Combi LSL Trion Combi

16	 	Type label Foot switch, complete, cable 5m/ Foot switch, complete Manufacturer Date of manufacture Application parts type B conforming to IEC 60601-1 **REF** Catalogue number/ part number **SN** Serial number **CE** CE label 0297 Identification number of notified body IPX8 Housing protection class (protected against continuous immersion in water)
17	 	ACCENTO foot switch (1.2 m)/ ACCENTO foot switch (5 m) Manufacturer Date of manufacture **REF** Catalogue number/part number **SN** Serial number **CE** CE label 0297 Identification number of notified body IPX8 Housing protection class (protected against continuous immersion in water)
18		Identification label ACCENTO eyepiece

General warning and safety instructions

In this section you can find general warning and safety instructions. Also observe the special warning and safety instructions for the individual work steps in the respective chapters of this user manual.

General notes

WARNING - RISK OF LASER RADIATION

This instrument is a class 4 laser device. For this reason, the operator must take precautions to prevent injuries or damage. Applicable national and international regulations must be observed.

Use the lowest possible power necessary to achieve the desired effect.

Focus the aiming beam as carefully as possible on the tissue to be treated.

Never trigger the laser if the aiming beam is not clearly visible in the target area.

Deactivate the treatment beam and always switch the aiming beam off before changing the applicator or releasing the applicator fibers from the laser module for any other reason (Please note that incorrect release of the fibers when the laser is in operation may result in a brief discharge of scattered radiation to the surroundings.).

Switch the aiming beam off when the instrument is not in use.

Because the aiming beam follows the same optical path through the beam delivery system as the therapy beam, it represents a good method for checking that the beam delivery system is undamaged. If the aiming beam spot at the distal end of the beam delivery system is not visible, is weak or appears diffuse, it may indicate damage to or improper function of the beam delivery system.

Safety officer

The operator and safety officer are responsible for carrying out all safety measures to prevent injury to the patient, physician in attendance and other persons present during laser operation. Observe the national regulations in your country.

The responsibilities of the safety officer, who is appointed in writing by the customer or the institution operating the laser, include:

- Implementation of safety measures
- Instruction of all persons working with the laser in safety precautions and correct operation of the instrument
- Marking of the laser hazard area
- Checking the warning signs and equipment
- Correct therapeutic application of the instrument
- Safekeeping of the key for the key switch
- Safekeeping of the laser instrument
- Proper reconnection of the device after relocation

Laser safety goggles

WARNING - RISK OF LASER RADIATION

All persons present in the laser hazard area during laser operation must wear laser safety goggles. The patient's eye which is not being treated must also be properly protected.

Exception:
The physician does not require laser safety goggles when observing the target area through

- a surgical microscope equipped with a 532 nm physician's safety filter
- a laser slit lamp supplied by Carl Zeiss Meditec
- a diagnostic slit lamp as described in the user manual in conjunction with VISULINK 532/U or
- the LIO Trion/532s laser indirect ophthalmoscope

.
The institution operating the device is responsible for providing proper laser safety goggles. The safety goggles must be approved for the wavelength of the laser and for the type and intensity of the laser radiation (in Europe, in compliance with DIN EN 207).

- VISULAS YAG III: YAG laser safety goggles
- VISULAS 532s: Laser safety goggles Argon/532
- VISULAS Trion: Laser safety goggles 532/561, laser safety goggles 659

☞ The laser hazard area is the area in which the maximum permissible exposure (MPE) may be exceeded. This includes areas into which the laser beam may unintentionally be deflected by a reflecting surface.

Patient safety

The key parameter in laser treatment is the energy density at the target, i.e. applied laser energy divided by the area of the laser spot.

On the VISULAS YAG III Combi, the energy of the laser pulse can be pre-set.

The most important parameter in laser treatment when operated in combination mode (VISULAS YAG III Combi and VISULAS Trion Combi) is the energy flux density at the target area, i.e. the applied laser power divided by the area of the laser spot. In order to achieve a consistent physiological effect, the power should therefore be adjusted when the spot diameter is changed.

In combination mode, the power output (VISULAS 532s, VISULAS Trion mode) or the energy (VISULAS YAG III mode) can be pre-set.

WARNING - RISK OF LASER RADIATION

If, after using an applicator (e.g. indirect ophthalmoscope), you change to a different applicator (e.g. slit lamp), the correct applicator must be selected from the main menu.

Never start treatment if a different applicator is shown in the display to the one required, or if no physician's safety filter is fitted.

Do not fire the laser beam if the tip of the laser endoprobe is touching the tissue.

Explosion and fire hazards

WARNING - FIRE HAZARD

Do not use the laser in conjunction with flammable anesthetics.

Keep potentially explosive materials away from the laser hazard zone. Easily flammable materials may start fires.

A laser beam can set fire to many explosive or flammable gases or liquids, including some of the solutions used in the preparation of surgical procedures.

Flammable drapes, surgical gowns, gauze and other ignitable materials must be kept out of the beam path. We recommend using non-flammable materials and instruments and wearing gowns and clothing which do not easily catch fire.

A fire extinguisher should be kept in the vicinity of the laser device.

Check the integrity of all lenses and glass surfaces before each use.

Significant contamination or detached coatings can lead to exposure to hazardous radiation.

Dangers caused by direct irradiation and reflection

WARNING - RISK OF LASER RADIATION

The instrument and its applicators emit visible laser radiation which is dangerous to the human eye and skin.

The LIO Trion/532s indirect ophthalmoscope may only be used as an applicator in combination with the Carl Zeiss Meditec VISULAS 532s laser console.

The VISULINK 532/U may only be used as an applicator in combination with the Carl Zeiss Meditec VISULAS 532s laser console.

Strictly avoid irradiation of the eye or skin by direct or scattered radiation. Metallic and similar surfaces reflect laser beams!

All persons present in the laser hazard area must therefore wear laser safety goggles as a precaution against unintentional direct or reflected laser radiation.

Remove or cover any shiny, reflecting objects within the laser hazard area.

Also cover windows and reflecting walls with non-combustible cloths.

Take safety precautions if there is a risk of noxious gases, dust and vapours, secondary radiation or explosive gas mixtures from materials exposed to laser radiation within the laser hazard area.

Only use medical instruments in the laser beam path which are shaped or surface-finished to prevent hazardous reflection.

WARNING - RISK OF OPTICAL RADIATION

Because prolonged intense light exposure can damage the retina, the use of LSL 532 or LIO Trion/532s for ocular examination should not be unnecessarily prolonged, and the brightness settings should not exceed what is needed to provide clear visualization of the target structures.

The light emitted from this instrument is potentially hazardous. The longer the duration of exposure and the greater the number of pulses, the greater the risk of ocular damage. Exposure to light from these instruments when operated at maximum output will exceed the safety guideline after 3.8 min.

If you have any questions concerning the permissible prolonged exposure time with other filter positions, please contact Carl Zeiss Meditec customer service.

A 90 D contact glass may not be used.

Avoid looking directly into the light emitting prism.

Take particular care, when examining infants and aphakic patients.

Never look into the sun through the binocular tube and eyepieces.

Performance specifications

Functional description

Principle of Nd:YAG laser treatment

The VISULAS YAG III is an ophthalmic therapy laser system for non-contact incision of ocular tissue.
The radiation is generated by a Q-switched Nd:YAG laser, which emits pulses of typically < 4 ns duration and a maximum energy of approximately 10 mJ at a wavelength of 1,064 nm. At the focus of the laser beam, a plasma is created which is at a high pressure and temperature, but is spatially confined. This phenomenon is termed optical breakdown or photodisruption. The plasma expands, thereby cooling rapidly, such that there is no thermal effect on the tissue.
However, the mechanical stress due to the shock wave accompanying the expansion of the plasma results in an incisional effect.

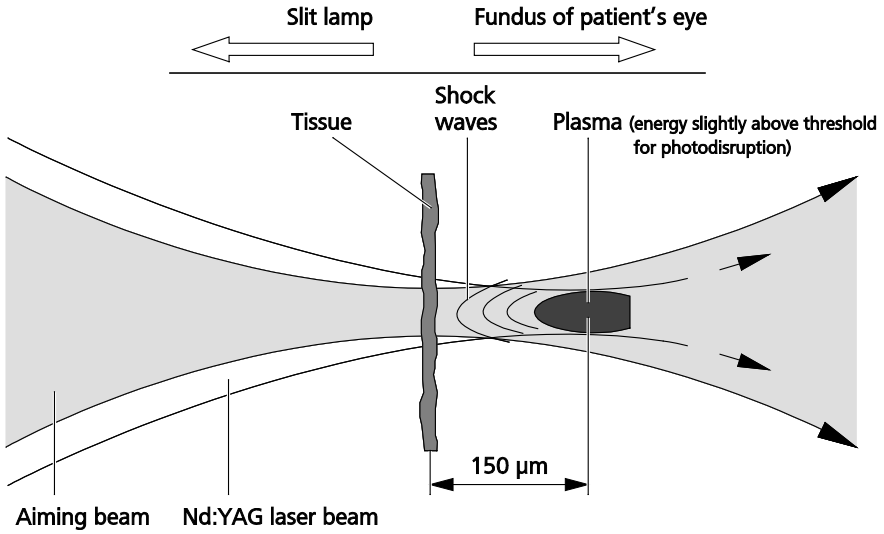


Fig. 2 Principle of photodisruption using the Nd:YAG laser

Useful life

WARNING - GENERAL HAZARDS

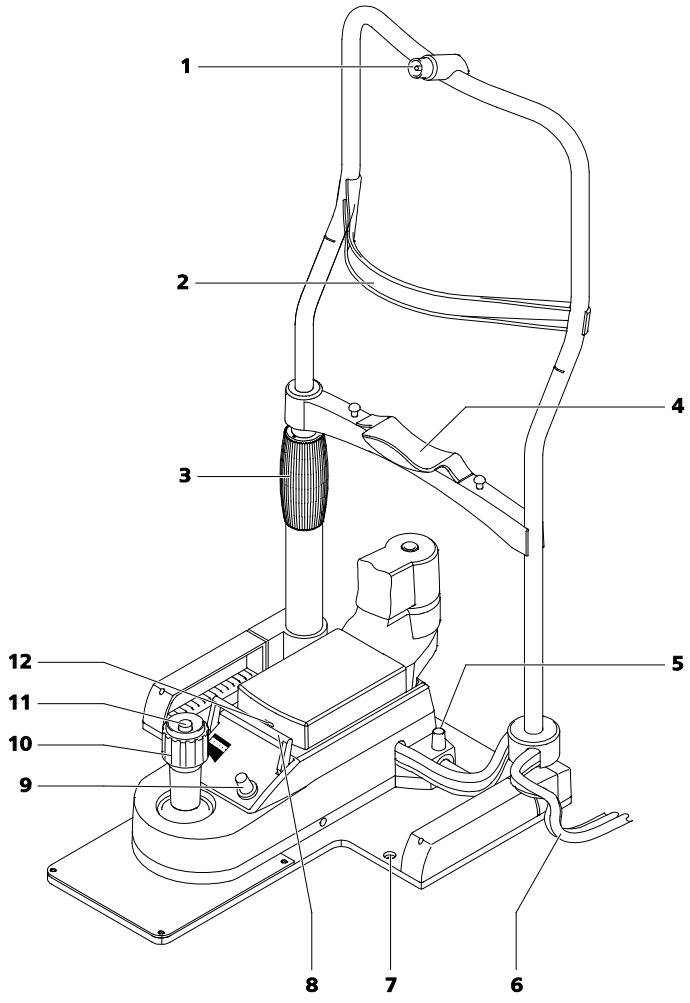
The development, production and maintenance of this device, together with associated risks, are based on an expected service life of eight years, assuming that the device is serviced at the specified intervals.

Modifications to the product or failure to follow the manufacturer's instructions may substantially reduce the expected service life and significantly increase the risk associated with use of the device.

It is the responsibility of the institution operating this product to follow the manufacturer's instructions and to decide on the risk/benefit ratio upon expiration of the expected service life or maintenance and inspection intervals specified by the manufacturer.

Description of the device

Instrument base with head rest for VISULAS YAG III/ VISULAS YAG III Combi/VISULAS Trion Combi



1 Fixation lamp mounting
2 Forehead support (application part)
3 Height adjustment for chin rest
4 Chin rest (application part)
5 Clamp screw for fastening the instrument base
6 Connection cable for laser console
7 Mounting holes
8 Fast-action base lock
9 Brightness control for slit illumination
10 Joystick
11 Hand switch
12 Index mark for mid-position

Fig. 3 Instrument base with head rest

The instrument base is mounted to the support using the mounting holes (**7**, Fig. 3) and the appropriate screws.

The clamp screw (**5,** Fig. 3) is for adjusting the tightness of the X-Y movement of the instrument base.

Fine adjustment of the instrument base in X-Y direction is achieved by tilting the joystick (**10**, Fig. 3) accordingly; coarse adjustment by shifting the complete instrument base.

The fast-action base lock (**8**, Fig. 3) is for locking the instrument base in position.

Lever tilted to the front (towards the patient): The base is locked.

Lever tilted to the rear (towards the physician): The base can be moved freely.

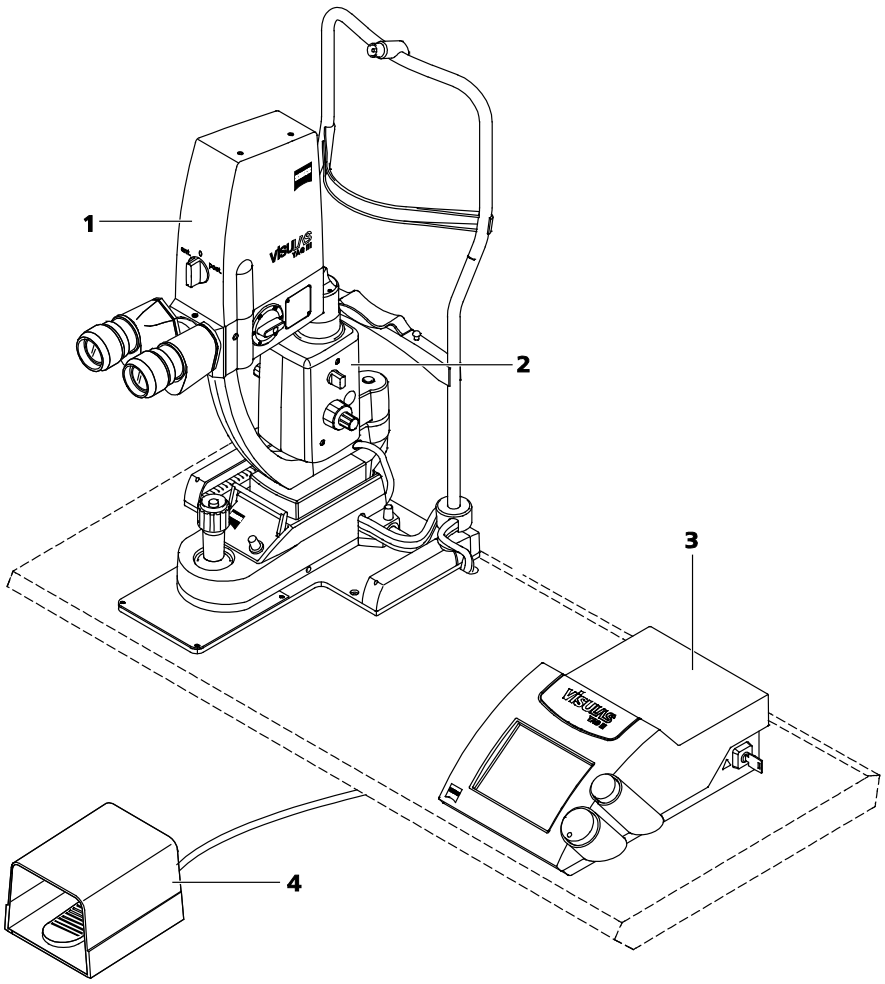
The index mark for mid-position (**12**, Fig. 3) indicates the center point of the height adjustment range. The height is adjusted by turning the joystick.

The laser can be triggered using either the hand switch (**11**, Fig. 3) or the foot switch (special accessory). The laser console menu is used to switch between the hand and foot switches. The VISULAS YAG III Combi/ VISULAS Trion Combi has an additional micromanipulator on the hand switch (see VISULAS 532s, VISULAS Trion user manual).

The plugs of the connection cable (**6**, Fig. 3) are inserted into the sockets (**5, 6**, Fig. 8) on the laser console.

Design of the VISULAS YAG III

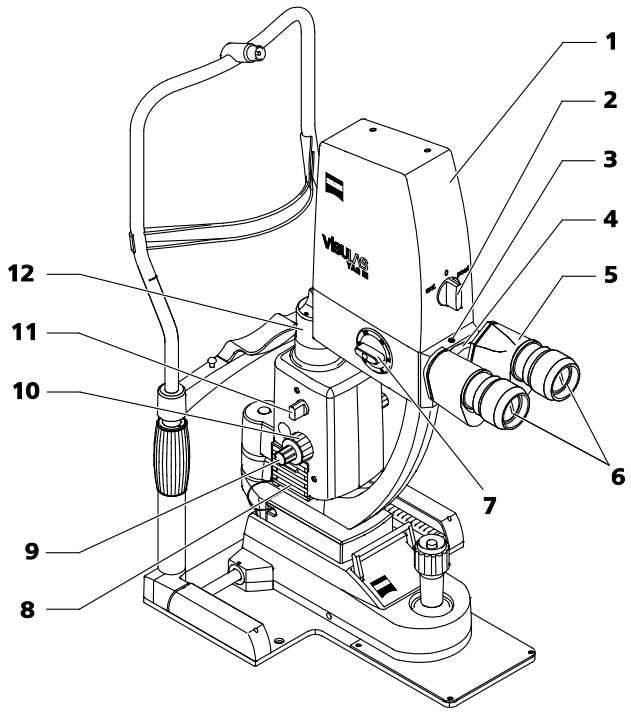
The instrument consists of a laser head (**1**, Fig. 4) mounted to a laser slit lamp (**2**, Fig. 4) and a laser console (**3**, Fig. 4).
An optional foot switch (**4**, Fig. 4) is available. The laser console menu is used to switch between the hand and foot switches.
The VISULAS YAG III can be mounted to any table with an even table-top.



1 VISULAS YAG III laser head
2 LSL YAG III laser slit lamp
3 VISULAS YAG III laser console
4 Foot switch (optional)

Fig. 4 VISULAS YAG III instrument components

Design of the LSL YAG III laser slit lamp



1 Laser head
2 Focus shift control
3 Fastening screw
4 Interpupillary distance scale
5 Binocular tube
6 Eyepieces
7 Magnification changer
8 Halogen lamp cover (see page 95 for replacing the lamp)
9 Slit length control
10 Slit width control
11 Filter selector
12 Prism head

Fig. 5 LSL YAG III laser slit lamp

The fastening screw (**3**, Fig. 5) fastens the binocular tube or other component to the microscope body.

The standard equipment includes eyepieces (**6**, Fig. 5) with a magnification of 10x. An eyepiece with a reticle can be used for taking measurements and to aid focusing.

Settings of filter selector

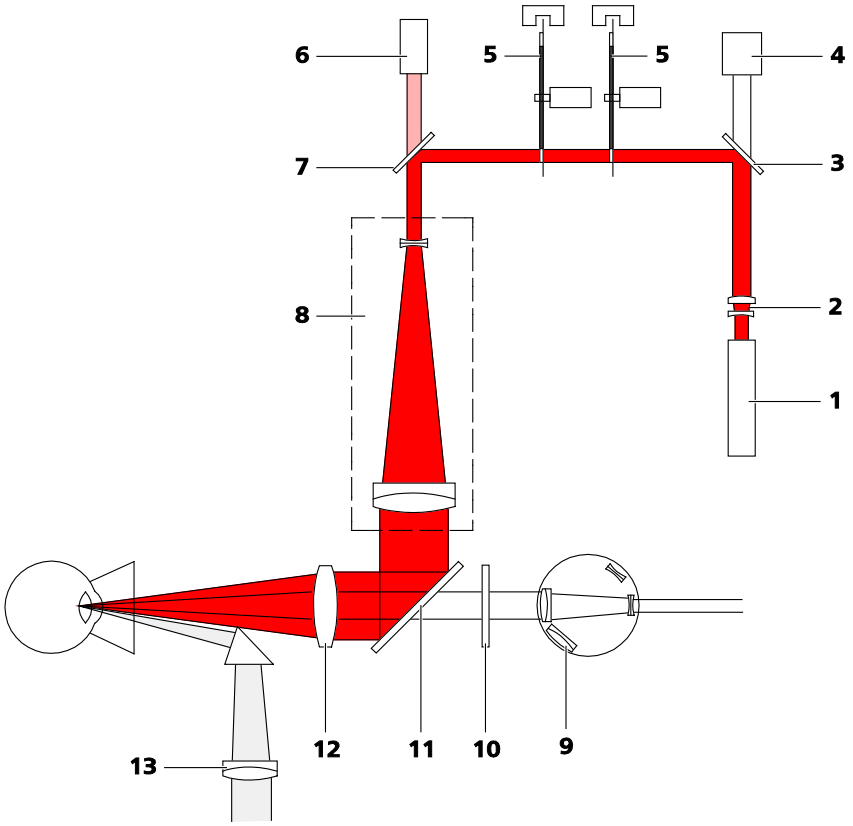
White line pointing up:	Full aperture combined with a heat-absorbing filter.
White line to the patient:	Blue filter for tonometry and fluorescence observations.
White line to the physician:	Red-free filter for contrast enhancement during fundus observation

☞ A tonometer can be mounted to the slit lamp.
The tonometer support is mounted on the joint on the carrier arm.
The tonometer itself is attached by a magnet and fitted only when required.

Beam delivery in the LSL YAG III laser slit lamp

An Nd:YAG laser (**1**, Fig. 6) (mini-laser module) generates the therapy beam. The beam passes through the energy attenuator (**5**, Fig. 6), is then combined with the aiming beam (**6**, Fig. 6) and coupled into the viewing path of the corneal microscope by means of a coupling mirror (**11**, Fig. 6).
The prism head of the slit illumination system (**13**, Fig. 6) is lowered by 10°.
The lens system (**2**, Fig. 6) can be used to adjust the focus shift.

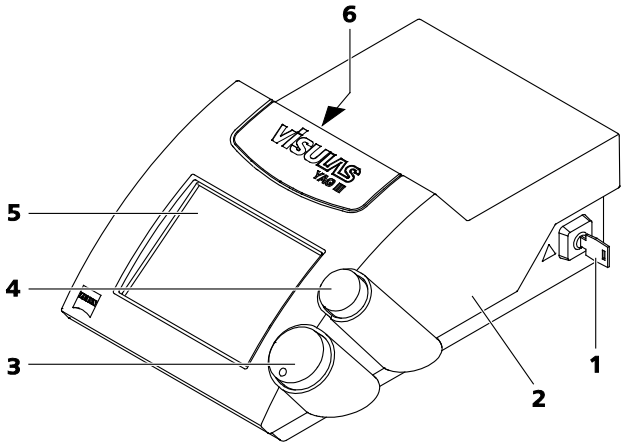
☞ **Note for VISULAS YAG III:**
In the central illumination position, a small part of the therapy beam is clipped.



1 Nd:YAG laser
2 Focus shift lens system
3 Partially transmitting mirror for energy meter
4 Energy meter and pulse counter
5 Energy attenuator
6 Four-point aiming beam diode laser
7 Aiming beam coupling mirror
8 Beam expander
9 Galilean magnification changer
10 Physician's safety filter
11 Coupling mirror for coupling the laser beam into the viewing path
12 Slit lamp objective
13 Slit illumination system

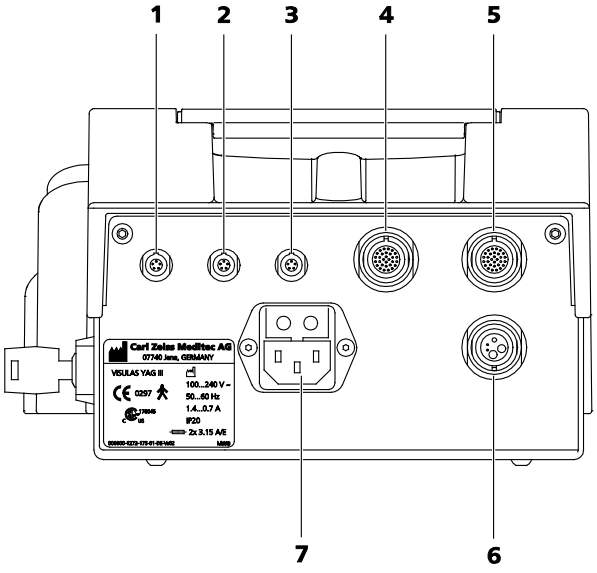
Fig. 6 LSL YAG III beam delivery

VISULAS YAG III laser console



1 Key switch
2 Laser console
3 Control knob/button
4 LASER STOP button
5 Control panel
6 Recessed grip

Fig. 7 VISULAS YAG III laser console



1 Foot switch connector
2 Door interlock connector
3 Serial port for servicing
4 Connector for combined operation with the VISULAS 532s/VISULAS Trion
5 Slit lamp connector (control cable)
6 Slit lamp connector (high-voltage cable)
7 Power inlet connector with integrated fuses

Fig. 8 Laser console, connections

The laser console (**2**, Fig. 7) is the central power supply and control unit for the VISULAS YAG III and the LSL YAG III laser slit lamp.

The control panel (**5**, Fig. 7), the LASER STOP button (**4**, Fig. 7) and the combined control knob/button (**3**, Fig. 7) are located on the front side of the control unit. The power supply and control connectors required for operation of the VISULAS YAG III are located on the rear panel of the laser console (Fig. 8).

The VISULAS YAG III is menu operated via the icons on the control panel (**5**, Fig. 7) and the combined control knob/button (**3**, Fig. 7). The control knob/button is used to adjust the system parameters in the individual operating modes by turning the knob. Pressing the button selects the **Energy** parameter in all modes.

Numerous functions and values of the system are electronically monitored. If any of these values are outside the permitted range, the system prevents the laser from being fired. Laser triggering, for example, is automatically locked, when the metered energy of the therapy beam is outside the pre-defined range.

Using the key switch (**1**, Fig. 7) you can prevent that unauthorized persons switch on the laser.
The user must remove the key after the treatment.

The LASER STOP button (**4**, Fig. 7) is intended for control of unforeseeable hazardous situations. When this button is pressed, the system goes into STANDBY mode and all functions on the control unit are locked. To resume operation, press the LASER STOP button again.

The possibility of triggering the laser can be made dependent on whether a remote contact is open or closed, e. g. on a door. A Carl Zeiss Meditec authorized specialist will be pleased to assist, if you wish to connect the laser to a remote interlock.
If the instrument is not connected to a door interlock contact, the dummy connector which bridges the pins is inserted in the interlock socket. The instrument is delivered with the dummy plug inserted.

Design of VISULAS YAG III Combi/ VISULAS Trion Combi

VISULAS YAG III Combi

VISULAS YAG III Combi is a combination of the VISULAS YAG III and VISULAS 532s devices consisting of the following components:

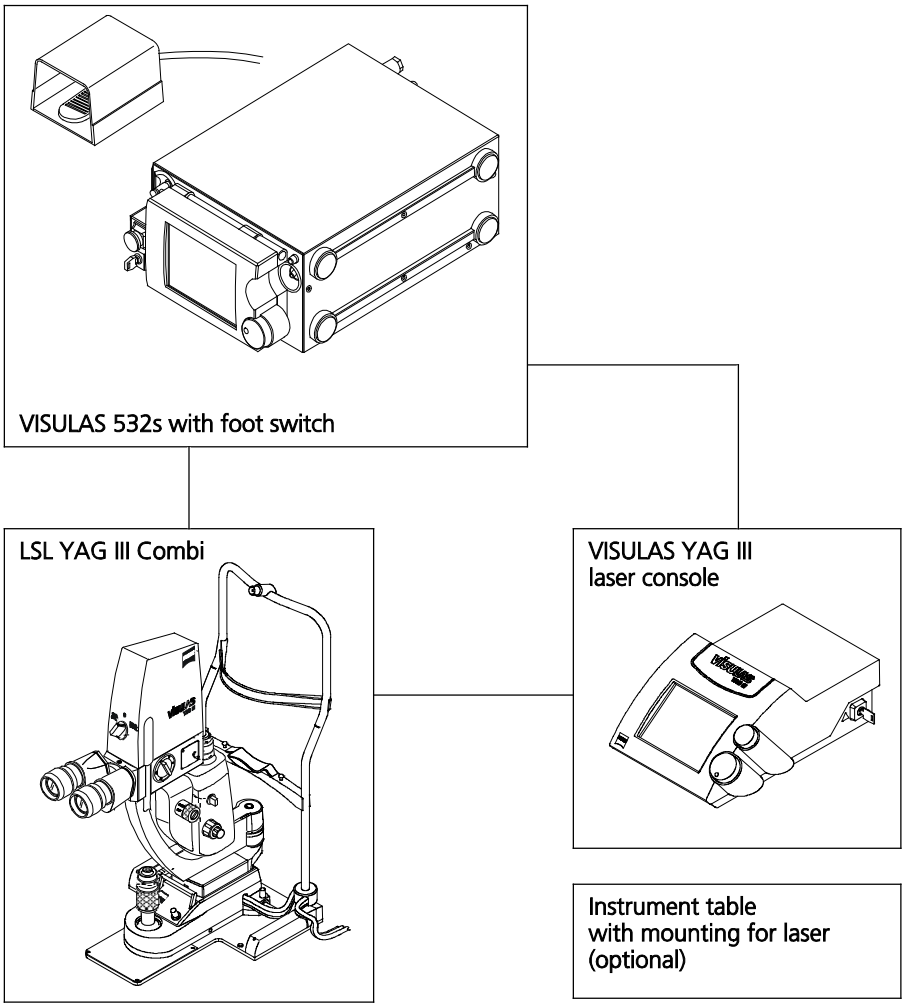
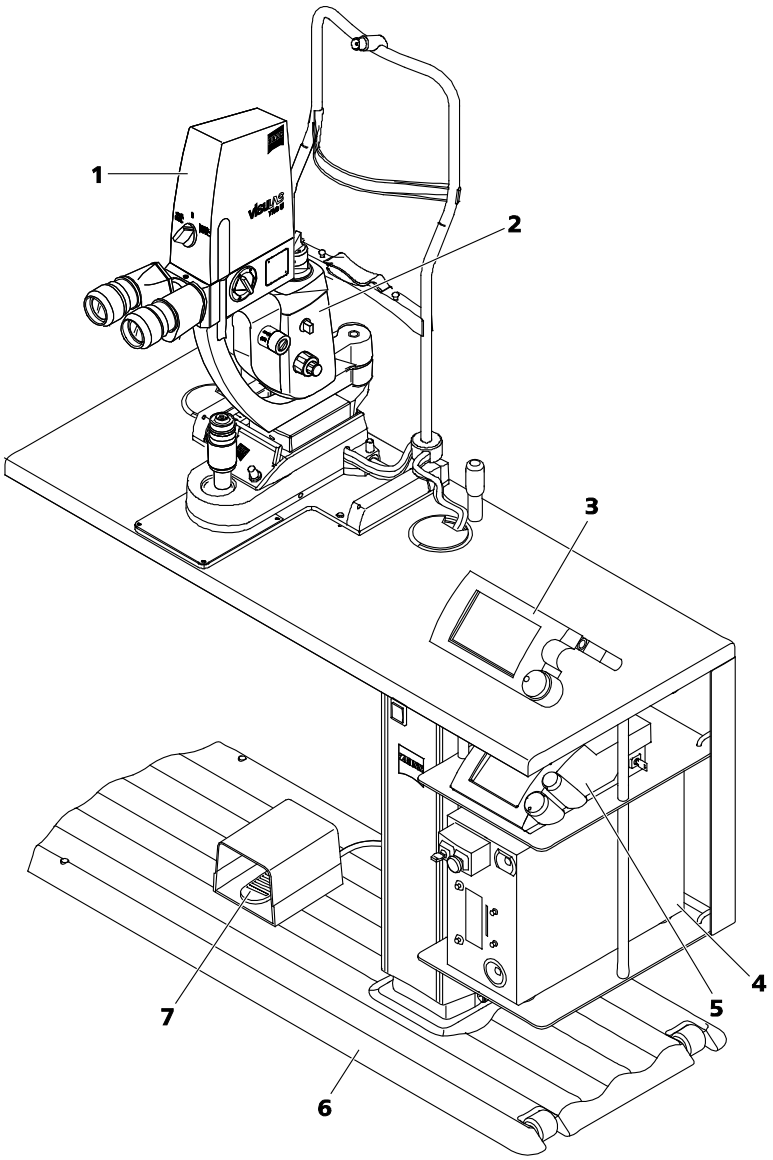


Fig. 9 Components of the VISULAS YAG III Combi



1 VISULAS YAG III laser head
2 LSL YAG III Combi laser slit lamp
3 Control panel of the VISULAS 532s laser console
4 VISULAS 532s laser console
5 VISULAS YAG III laser console (Fig. 7)
6 Instrument table (optional)
7 Foot switch

Fig. 10 VISULAS YAG III Combi

VISULAS Trion Combi

VISULAS Trion Combi is a combination of the VISULAS YAG III and VISULAS Trion devices consisting of the following components:

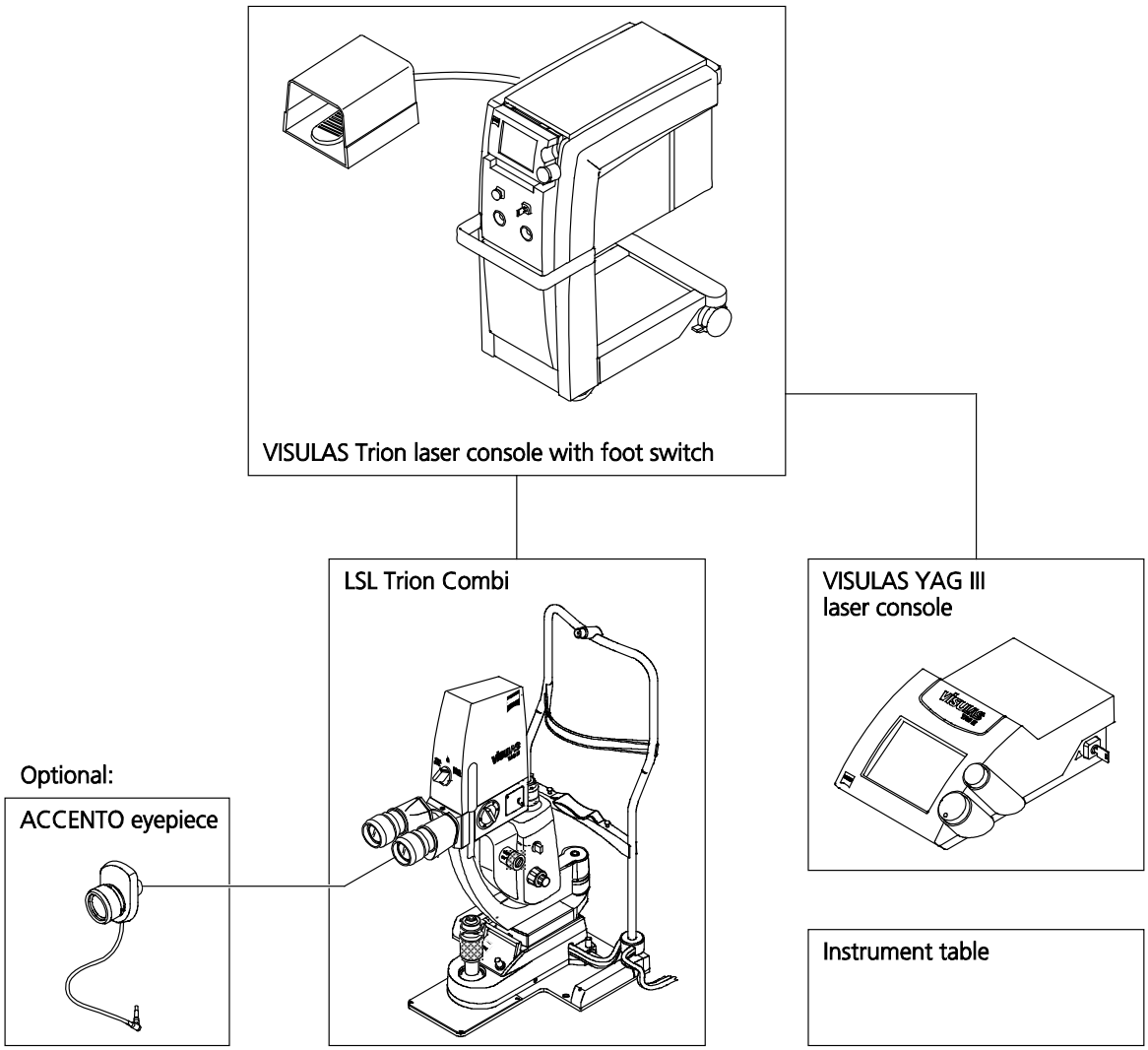
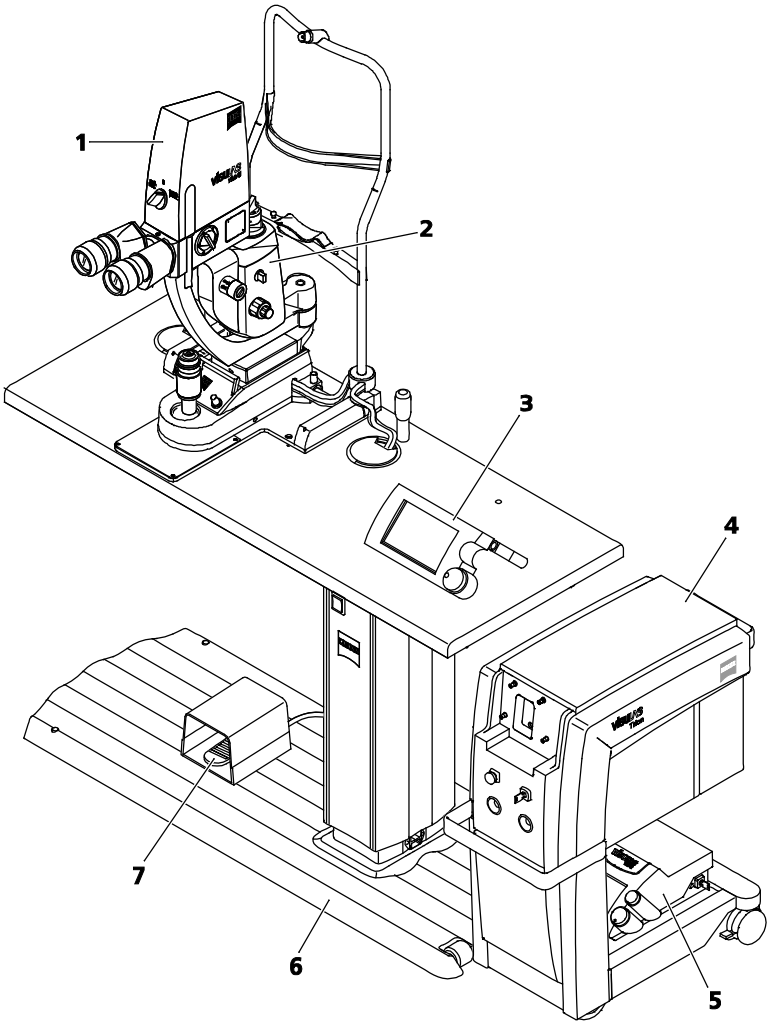


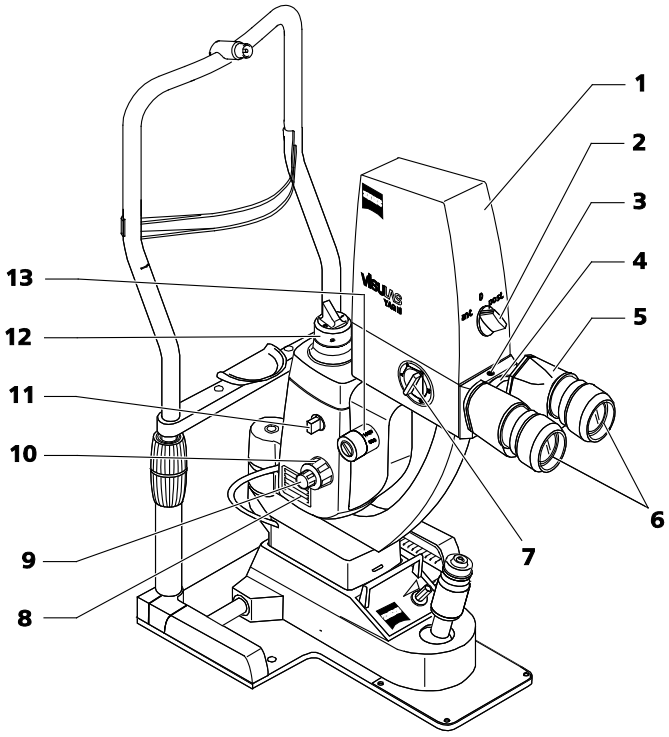
Fig. 11 VISULAS Trion Combi components



1 VISULAS YAG III laser head
2 LSL Trion Combi laser slit lamp
3 Control panel of the VISULAS Trion laser console
4 VISULAS Trion laser console
5 VISULAS YAG III laser console (Fig. 7)
6 Instrument table (optional)
7 Standard foot switch or ACCENTO foot switch (only for VISULAS Trion Combi)

Fig. 12 VISULAS Trion Combi

Design of the LSL YAG III Combi/LSL Trion Combi laser slit lamp



1 Laser head
2 Focus shift control
3 Fastening screw
4 Interpupillary distance scale
5 Binocular tube
6 Eyepieces
7 Magnification changer
8 Halogen lamp cover (see page 95 for replacing the lamp)
9 Slit length control
10 Slit width control
11 Filter selector
12 Prism head
13 VISULAS 532s/VISULAS Trion laser spot size control

Fig. 13 LSL YAG III Combi/LSL Trion Combi laser slit lamp

The fastening screw (**3**, Fig. 13) fastens the binocular tube or other component to the microscope body.

The standard equipment includes eyepieces (**6**, Fig. 13) with a magnification of 10x. An eyepiece with a reticle can be used for taking measurements and to aid focusing.

Settings of filter selector

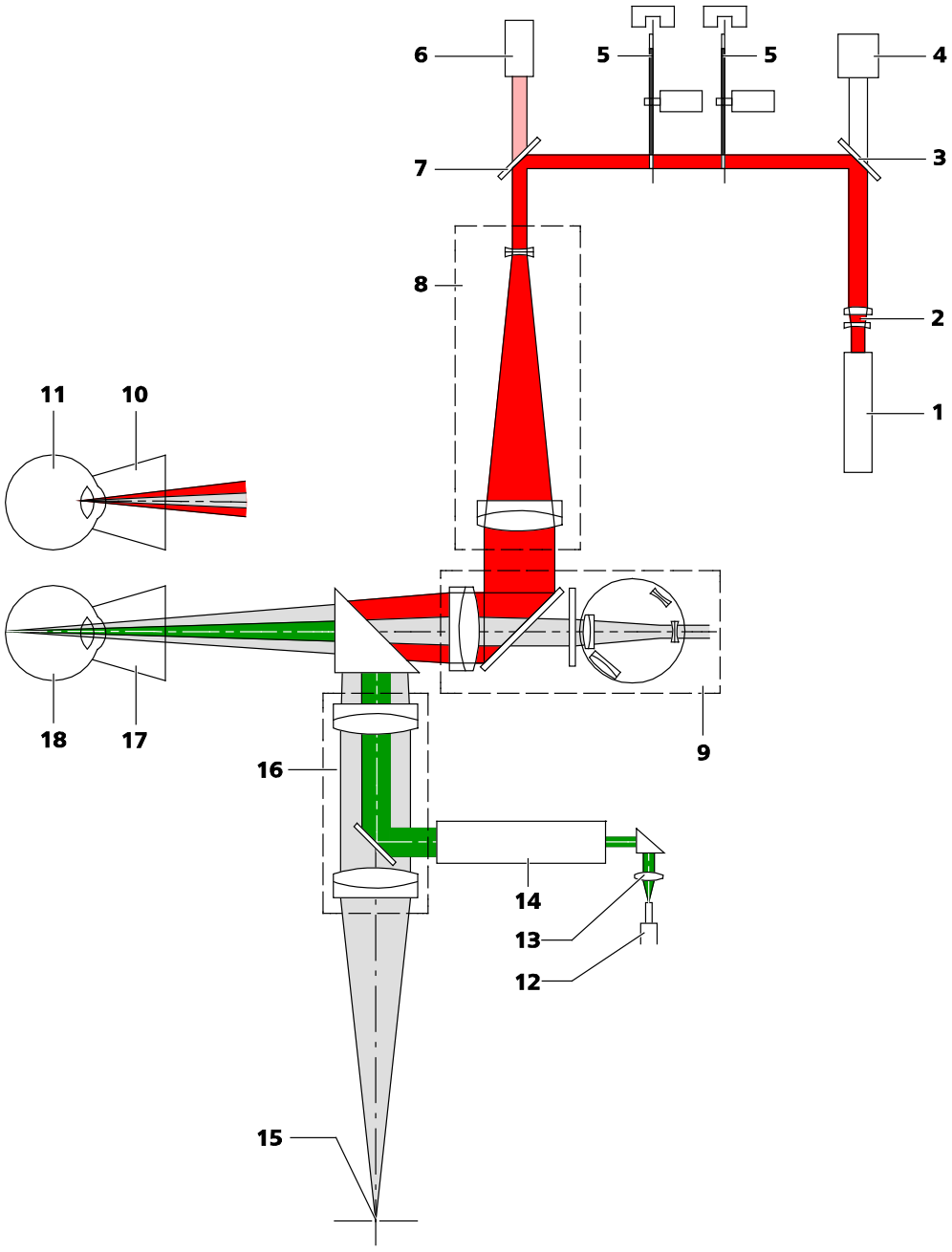
White line pointing up:	Full aperture combined with a heat-absorbing filter.
White line to the patient:	Blue filter for tonometry and fluorescence observations.
White line to the physician:	Red-free filter for contrast enhancement during fundus observation

☞ A tonometer can be mounted to the slit lamp.
The tonometer support is mounted on the joint on the carrier arm.
The tonometer itself is attached by a magnet and fitted only when required.

Beam delivery in the LSL YAG III Combi/LSL Trion Combi laser slit lamp

The laser beam is superimposed upon the slit illumination beam path so that the laser spot is coincident with the slit image on the fundus at all times.
This ensures that the area of the fundus which is to be coagulated is always illuminated, even in the peripheral fundus.
This means of combining illumination and laser beams is particularly advantageous for small illumination fields.

☞ **Note for VISULAS YAG III Combi and VISULAS Trion Combi**
The prism head of the slit illumination system must be swiveled out by about 30° before the YAG laser can be fired and the YAG laser beam can arrive at the patient's eye without obstruction.



YAG laser light path

1 Nd:YAG laser
2 Focus shift lens system
3 Partially transmitting mirror for energy meter
4 Energy meter and pulse counter
5 Energy attenuator
6 Four-point aiming beam diode laser
7 Aiming beam coupling mirror
8 Beam expander
9 Corneal microscope with physician's safety filter
10 Contact lens
11 Patient's eye

Coagulation laser light path

12 Optical fiber
13 Coupling lens
14 Laser beam expander
15 Slit illumination system
16 Optical system for slit lamp and laser spot visualization
17 Contact lens
18 Patient's eye

Fig. 14 Beam delivery in the LSL YAG III Combi/LSL Trion Combi laser slit lamp

VISULAS 532s/VISULAS Trion control panel for VISULAS YAG III Combi/VISULAS Trion Combi

The VISULAS YAG III Combi/VISULAS Trion Combi is menu-operated using the icons on the VISULAS 532s/VISULAS Trion control panel and the combined knob/button of the corresponding laser console.

The control knob/button is used to adjust the system parameters in the individual operating modes by turning the knob. Pressing the button selects the **laser power output** parameter in all modes.

The control panel can be detached from the laser console and placed on the table.

☞ For further instructions on the control panel refer to the VISULAS 532s or VISULAS Trion user manual.

Installation

Notes for installation and use

WARNING - GENERAL HAZARDS

Do not store or operate the devices in ambient conditions other than those prescribed (see section *Technical data* on page 104 and following).

Set up the devices so that the power cables can be disconnected from the power supply quickly and easily without any tools.

WARNING - RISK OF ELECTRIC SHOCK

If connecting external components to the interfaces of the device, the operator must ensure to meet the safety requirements as per IEC 60601-1-1 (medical electrical systems)!

Do not use additional extension cables or portable multiple sockets.

The electrical installation must conform to IEC 60364-7-710 or the applicable national regulations. This includes the existence of a ground fault circuit interrupter (GFCI).

To avert the risk of an electric shock this device may only be connected to a power supply with a protective ground conductor.

Ensure that the power supply plug is suitable and certified for the local connection. If the supplied power cable must be replaced, at least the following specifications must be adhered to:

- Protective earth conductor resistance maximum 0.1 Ohm
- Local certification of the power cable for connection to medical devices
- Device plug C13 conforming to IEC 60320
- Cross-section at least 0.75 mm²/AWG 18
  Hospital Grade design for specific countries (e.g. USA, Canada)
  (For cables > 2.5 m the cross-section must be increased to 1.5 mm²)

.

WARNING - FIRE HAZARD

The devices are not suitable for operation in explosion risk areas (e.g. combustible mixture of anesthetic, cleaning or disinfecting agents with air, oxygen or nitrous oxide).

The electrical installation must conform to IEC 60364-7-710.

CAUTION - RISK OF LASER RADIATION

The laser hazard area should be as small as possible and demarcated by suitable screens. Unauthorized persons should be prevented from entering the laser hazard area. The number of persons in the laser hazard area must be kept to a minimum. Where suitable screens are not in use, the entire treatment room must be considered as a laser hazard area.

A warning lamp must be installed at the entrance door indicating when the laser is in operation. Only the Carl Zeiss Meditec AG laser warning light (see *Optional accessories*, page 100) may be connected. The laser hazard area must be demarcated and marked as such during laser operation.

Preferably the Carl Zeiss Meditec AG laser warning lamp (see *Optional accessories*, page 100) should be connected. The supplied remote door interlock switches the laser off automatically when the door to the laser area is opened to gain access. The laser hazard area must be clearly demarcated and marked as such during laser operation. Other safety precautions should be clarified with local authorities or with your laser safety officer.

Only the patient and appropriately trained personnel may remain within the laser hazard area. These persons must wear suitable laser safety goggles when the laser is in operation.

Persons working in the laser hazard area must be given instruction concerning safety regulations, safety precautions and operation of the instrument at least once a year. Keep a written record of these instructions listing the participants.

All objects within the laser hazard area, including the floor, should have diffusely reflecting surfaces or be covered with diffusely reflecting material.

CAUTION - RISK OF FALLING PARTS

When selecting a suitable table, ensure that the combination of table and instrument is stable up to an angle of tilt of 10°. Furthermore, the table must be designed for 4 times the weight of the device configuration. If the table is on castors, these must have a locking device.

Read the user manual of the instrument table and follow its instructions.

CAUTION - PROPERTY DAMAGE

Never touch the end of the optical fiber with your fingers and always protect it from contamination.

Because of the laser's high power output, any dirt may result in damage to the end surface of the fibers.

Screw in the optical fiber by hand only. Do not use tools!

To avoid damage to the instrument, remove the key before carrying out the installation.

Handle with care; lift or carry the laser slit lamp by the base plate.

Connect only cables and sockets that are the same color and size. Never use force.

Do not use optical fibers and application systems from other manufacturers.

Do not store or use this device in damp rooms. Do not expose the device to water splashes, dripping water or sprayed water.

Installation and transport of the VISULAS YAG III

WARNING - GENERAL HAZARDS

This device may only be installed and operated for the first time by persons who have been authorized by Carl Zeiss Meditec.

CAUTION - PROPERTY DAMAGE

The VISULAS YAG III may only be transported in the carrying case provided (optional).

If the VISULAS YAG III is to be used as a mobile system, an optionally available carrying case will be required.

Before transporting the instrument, the following steps should be taken:

- Disconnect all cables, protective caps and interlock connectors.

☞ To release the cable, grasp the connector by the sleeve and pull it directly backwards. Pulling on the sleeve releases the lock mechanism on the connector.

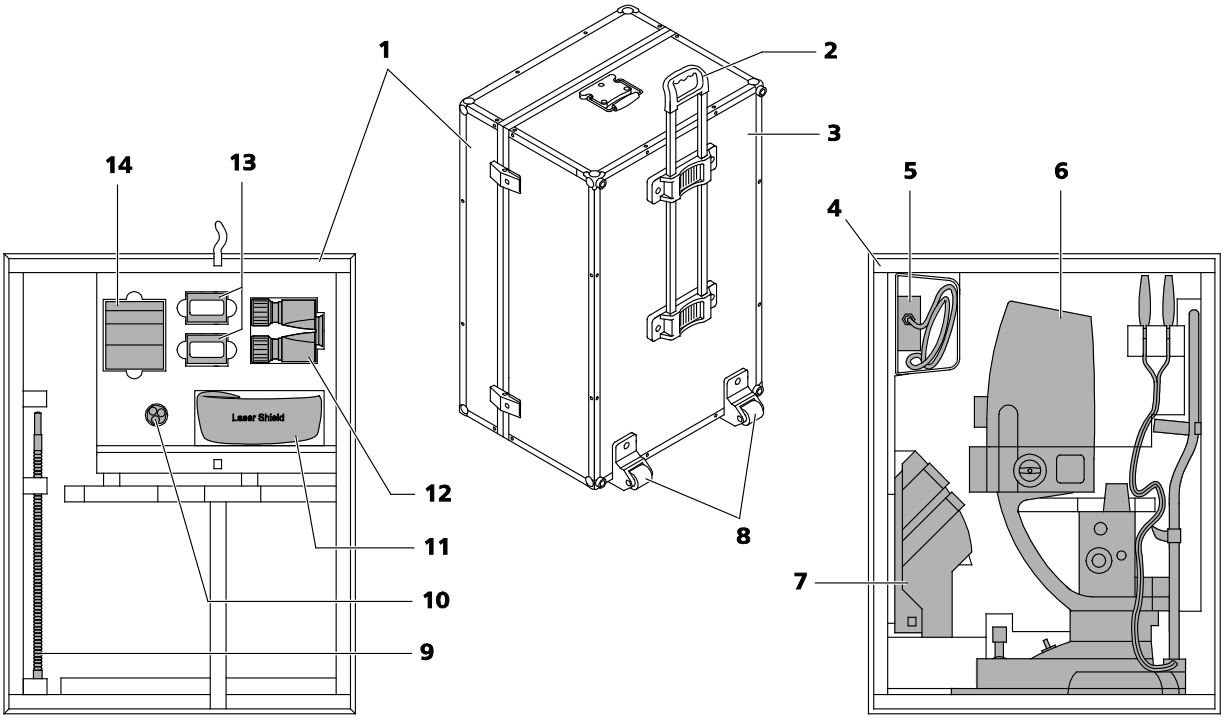
- Disconnect the binocular tube from the slit lamp.
- Unscrew the screws fixing the slit lamp base to the instrument table.
- Remove the key from the key switch on the control unit.
- Adjust the slit lamp to the lowest height using the joystick.
- Unscrew the fixation lamp.
- Put all components into the cardboard boxes as shown in Fig. 15. Reassemble the equipment in reverse order. The connections are shown in Fig. 8.

☞ Cables and the corresponding sockets and ports are color-coded for easy identification. All connectors and sockets are marked with a red dot. These dots must be vertically aligned when they are connected. All sockets are labeled.

CAUTION - PROPERTY DAMAGE

Connect only cables and sockets that are the same color and size. Never use force.

- Install the door interlock to the control panel (Fig. 8). If you do not wish to install an interlock, connect the yellow coding plug provided in place of the interlock (yellow connector, **2**, Fig. 8).



1 Transport case lid
2 Transport case handle
3 Transport case (720 mm x 550 mm x 370 mm)
4 Transport case, open
5 Foot switch (optional)
6 Laser slit lamp with head rest
7 Laser console
8 Transport castors
9 Fixation lamp
10 Accessories, packed
11 Laser safety goggles (optional)
12 Binocular tube
13 Contact lenses (optional)
14 Arm rests

Fig. 15 VISULAS YAG III Combi in transport case

Installation of VISULAS YAG III Combi

WARNING - GENERAL HAZARDS

This device may only be installed and operated for the first time by persons who have been authorized by Carl Zeiss Meditec.

CAUTION - GENERAL HAZARDS

Fiber optics may not be tightly bent, kinked or incompletely fastened. The device may otherwise be damaged, causing injury to the patient or user.

CAUTION - PROPERTY DAMAGE

Never touch the end of the optical fiber with your fingers and always protect it from contamination.

Because of the laser's high power output, any dirt may lead to damage to the end surface of the fiber.

Screw in the optical fiber by hand only. Do not use tools!

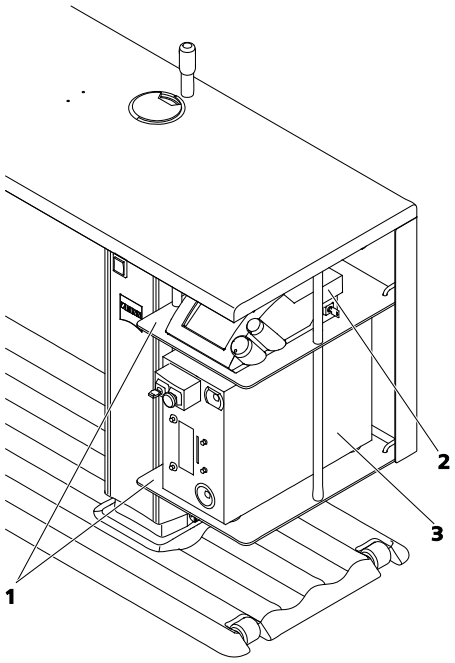
☞ Observe the user manuals of VISULAS 532s and the instrument table.

- Avoid impact and blows during shipment of the device.
- Remove the key from the key switch to prevent the unit from being inadvertently switched on during installation.
- Mount the system in a suitable location close to the physician and the slit lamp.

To install the laser console on an instrument table, the table mounting (**1**, Fig. 16) must first be fitted. Four holes are provided for this purpose under the tabletop (on the right hand side, seen from the physician's perspective).

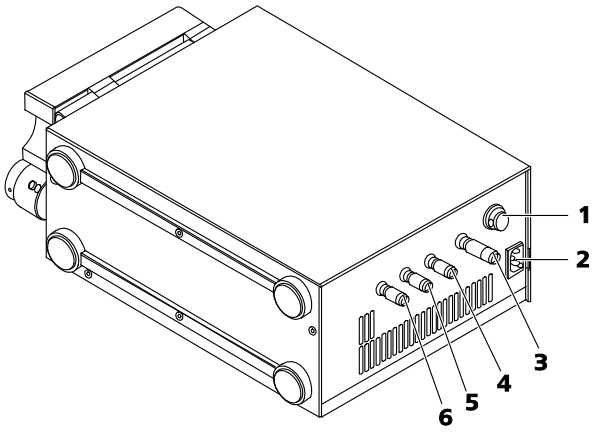
- Screw the table mounting's mounting plate firmly to the table top using the screws provided.
- Now affix the laser slit lamp to the table.
- Slide the VISULAS YAG III from the front onto the upper plate of the table mounting.
- Finally, holding it vertically, slide the VISULAS 532s, from the front, onto the lower plate of the table mounting.
- Place the foot switch in a suitable position under the table and insert the connector into the red socket marked VISULAS 532s (see VISULAS 532s user manual).

☞ In Combi mode the foot switch is always connected to the VISULAS 532s, never to VISULAS YAG III.



1 Table mounting
2 VISULAS YAG III laser console
3 VISULAS 532s laser console

Fig. 16 Instrument table with laser consoles



1 Slit lamp connector
2 Power input connector
3 Connector for combined operation with the VISULAS YAG III
4 Serial port for servicing
5 Door interlock connector
6 Connection to foot switch

Fig. 17 Connections on the rear side of the VISULAS 532s laser console

- For combined operation the VISULAS YAG III must be connected by a special combi cable to the VISULAS 532s. For this purpose insert the end of the cable with the single plug into the 532s socket on the YAG III laser console (**4**, Fig. 8). Insert the larger of the two plugs at the other end of the combi cable into the socket in the slit lamp (**1**, Fig. 17) on the VISULAS 532s, the smaller plug into the Combi socket of the VISULAS YAG III YAG (**3**, Fig. 17).
- Connect the remaining mains and instrument cables according to the user manuals for the individual instruments.

☞ Cables and the corresponding sockets and ports are color-coded for easy identification. All connectors and sockets are marked with a red dot. These dots must be vertically aligned when they are connected. All sockets are labeled.

CAUTION - PROPERTY DAMAGE

Connect only cables and sockets that are the same color and size. Never use force.

☞ To release the cable, grasp the connector by the sleeve and pull it directly backwards. Pulling on the sleeve releases the lock mechanism on the connector.

- Install the door interlock on the VISULAS 532s (**5**, Fig. 17). If you do not wish to install an interlock, connect the yellow coding plug provided in place of the interlock (yellow connector, see VISULAS 532s user manual).
- The power cable for the instrument table should be connected to a fixed power socket.
- Connect the VISULAS YAG III to one of the sockets on the instrument table (see separate user manual for the instrument table). The VISULAS 532s must be plugged into a separate fixed earthed socket.
- Remove the protective cap from the optical fiber of the applicator.
- Insert the optical fiber carefully into the socket for the optical fiber on the VISULAS 532s console (see VISULAS 532s user manual) and screw in firmly.
- Fold out the control panel foot, unwind as much of the control panel cable as required and connect it to the front of the instrument (see VISULAS 532s user manual).
- Adjust the foot of the control panel to the required angle and place the control panel in the location required.

Installation of VISULAS Trion Combi

WARNING - GENERAL HAZARDS

This device may only be installed and operated for the first time by persons who have been authorized by Carl Zeiss Meditec.

CAUTION - GENERAL HAZARDS

Fiber optics may not be tightly bent, kinked or incompletely fastened. The device may otherwise be damaged, causing injury to the patient or user.

CAUTION - PROPERTY DAMAGE

Never touch the end of the optical fiber with your fingers and always protect it from contamination.

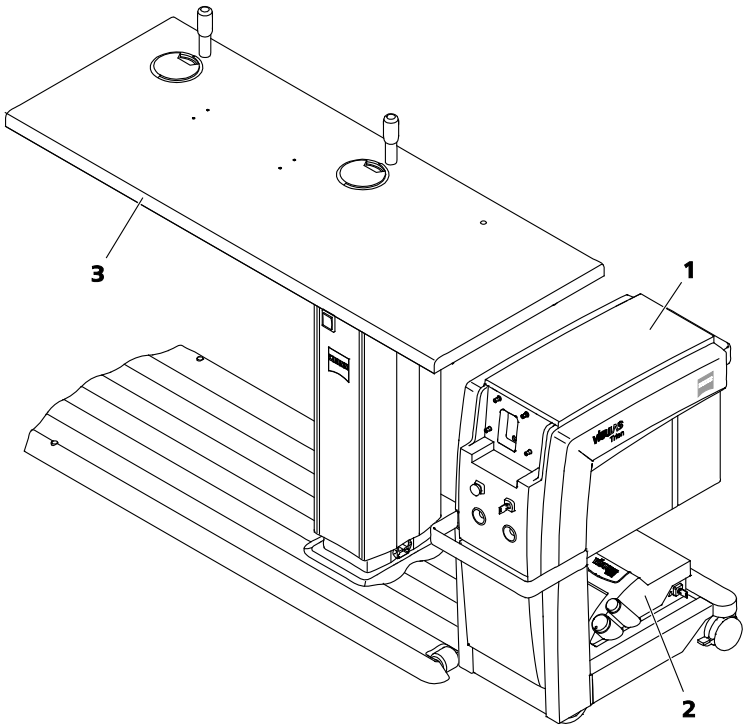
Because of the laser's high power output, any dirt may lead to damage to the end surface of the fiber.

Screw in the optical fiber by hand only. Do not use tools!

☞ Observe the user manuals of VISULAS Trion and the instrument table.

- Avoid impact and blows during shipment of the device.
- Mount the system in a suitable location close to the physician and the slit lamp.
- Ensure that the VISULAS Trion is mounted on a flat surface.
- Remove the key from the key switch to prevent the unit from being inadvertently switched on during installation.
- To install the VISULAS Trion on an instrument table with laser slit lamp, it is best to roll the VISULAS Trion to the right of the instrument table (Fig. 18).
- Now affix the laser slit lamp to the instrument table.
- Push the VISULAS YAG III (laser console) onto the foot of the VISULAS Trion from the back (Fig. 18).

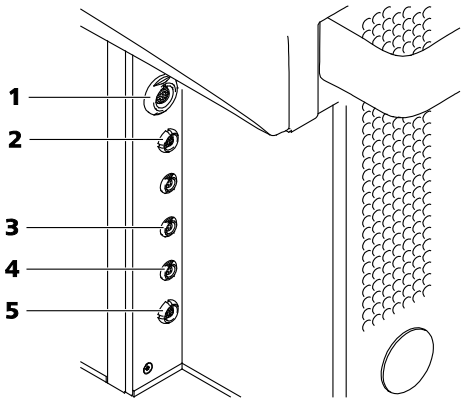
☞ For combined operation the foot switch must always be connected to the VISULAS Trion, never to the VISULAS YAG III.



1 VISULAS Trion laser console
2 VISULAS YAG III laser console
3 Instrument table

Fig. 18 Instrument table with VISULAS Trion Combi laser console

- Place the foot switch (standard or ACCENTO foot switch) in a suitable position under the table. The plug of the standard foot switch must be inserted into the socket marked "Foot 1" (**4**, Fig. 19), the ACCENTO foot switch into the socket on the VISULAS Trion marked "Foot 2" (**5**, Fig. 19).
- For combined operation the VISULAS YAG III must be connected by a special combi cable to the VISULAS Trion. For this purpose insert the end of the cable with the single plug into the 532s socket on the YAG III laser console (**4**, Fig. 8). Insert the larger of the two plugs at the other end of the combi cable into the socket in the slit lamp (**1**, Fig. 19) on the VISULAS Trion, the smaller plug into the Combi socket of the VISULAS YAG III YAG (**2**, Fig. 19).
- Connect the remaining mains and instrument cables according to the user manuals for the individual instruments.
- Close the cover of the terminal connecting strip of the VISULAS Trion.



1 Connection socket for slit lamp or physician's safety filter
2 Connector for combined operation with the VISULAS YAG III
3 Door interlock connector
4 "Foot 1" - Connection for foot switch (standard)
5 "Foot 2" - Connection for foot switch with power control (optional)

Fig. 19 Connections on the VISULAS Trion laser console

☞ Cables and the corresponding sockets and ports are color-coded for easy identification. All connectors and sockets are marked with a red dot. These dots must be vertically aligned when they are connected. All sockets are labeled.

CAUTION - PROPERTY DAMAGE

Connect only cables and sockets that are the same color and size. Never use force.

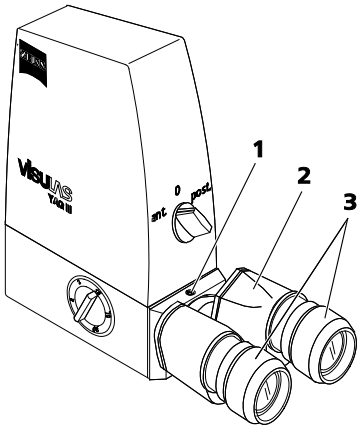
☞ To release the cable, grasp the connector by the sleeve and pull it directly backwards. Pulling on the sleeve releases the lock mechanism on the connector.

- Install the door interlock on the VISULAS Trion (**3**, Fig. 19). If you do not wish to install an interlock, connect the yellow coding plug provided in place of the interlock (yellow connector, see VISULAS Trion user manual).
- The power cable for the instrument table should be connected to a fixed power socket.
- Connect the VISULAS YAG III to one of the sockets on the instrument table (see separate user manual for the instrument table). The VISULAS Trion must be plugged into a separate earthed mains socket.
- Remove the protective cap from the optical fiber of the applicator.

- Insert the optical fiber carefully into the socket for the optical fiber on the VISULAS Trion console (see VISULAS Trion user manual) and screw in firmly.
- Fold out the control panel foot, unwind as much of the control panel cable as required and connect it to the front of the instrument (see VISULAS Trion user manual).
- Adjust the foot to the required angle and place the control panel in the location required.

Installation of additional components

☞ An additional component, e.g. an optical splitter, can be mounted between the binocular tube and the microscope body. This assembly is locked by the locking screw (**1**, Fig. 20).



1 Locking screw
2 Binocular tube
3 Eyepieces

Fig. 20 Binocular tube and eyepieces

Moving the instrument table with the instrument

☞ Secure the VISULAS Trion once it is in its final position. Lock the steering castors by applying the brakes.

Pushing the instrument table will move the entire VISULAS YAG III Combi system, as all components are installed on the table.

Before moving the VISULAS Trion Combi the cable connection to the VISULAS Trion must be pulled, as the latter stands separately next to the instrument table and is not moved together with the table.

☞ Read the user manual of the instrument table and follow its instructions.

To avoid damage when moving the complete system, proceed as follows:

- Carefully lower the table to the lowest position.
- The table can now be lifted slightly by the narrow side of the tabletop, on the slit lamp side, and placed onto the castors.
- Use both hands to lift the table.

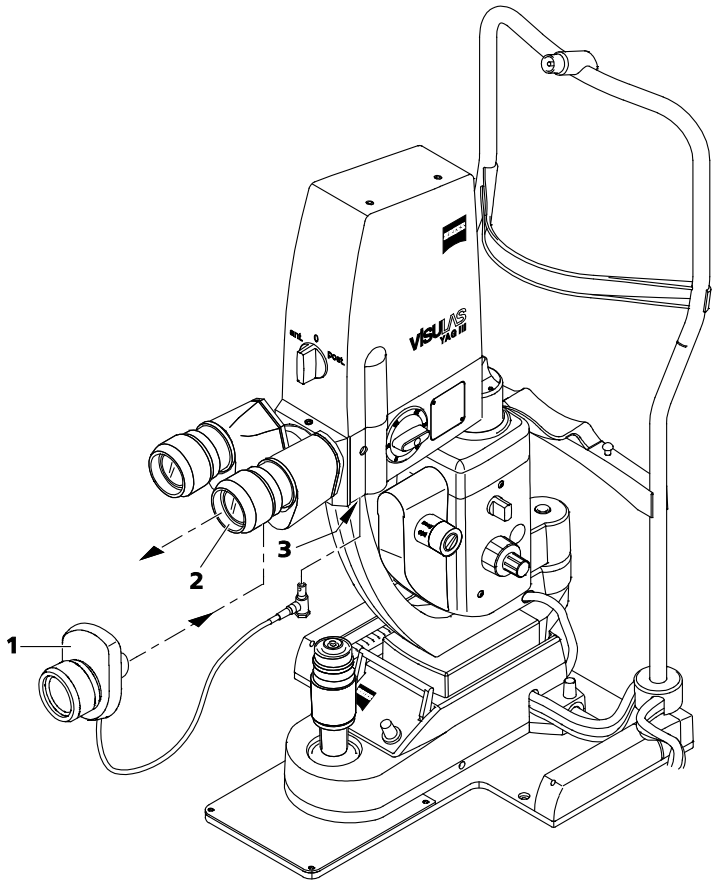
Installation of ACCENTO eyepiece to VISULAS YAG III/ VISULAS YAG III Combi and VISULAS Trion Combi

The ACCENTO eyepiece can be used alternatively for displaying the treatment parameters in the display field of the slit lamp.

To install, proceed as follows:

- Switch off the VISULAS YAG III and disconnect the power cable.
- Carefully remove the desired eyepiece (right or left; **2**, Fig. 21) from the tube of the slit lamp.
- Insert the ACCENTO eyepiece (**1**, Fig. 21) and push it in as far as it will go.

☞ The connecting cable of the ACCENTO eyepiece will point vertically downwards.



1 ACCENTO eyepiece
2 Eyepiece
3 Slit lamp

Fig. 21 LSL YAG III laser slit lamp

- Insert the plug of the ACCENTO eyepiece from below into the socket on the microscope body of the slit lamp (**3**, Fig. 21). The plug and its lead should be positioned towards the physician.

Data display in the ACCENTO eyepiece

When the ACCENTO eyepiece is used, in both treatment modes (**STANDBY** and **READY**) treatment parameters are shown in the display of the slit lamp.

The energy value currently set is also shown at the top of the image field

Example: 0.9 mJ

Either the **cumulative energy** or the **sum of the delivered pulses** is shown at the top of the image field, depending on which parameter has been activated in the **INFO** mode.

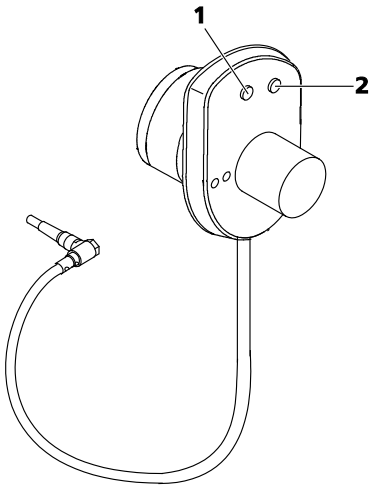
Example:	∑ 35.4 mJ	when the cumulative energy has been activated
	∑ 28	when the sum of the delivered pulses has been activated

When the focus shift display flashes (change of focus shift, change from **STANDBY treatment mode** to **READY treatment mode**, counter reset) the selected focus shift will appear briefly on the underside of the ACCENTO eyepiece.

Example: F POST

☞ In combined operation (VISULAS YAG III Combi and VISULAS Trion Combi) you can only switch between the display of the cumulative energy and the sum of delivered pulses when the coagulation laser (VISULAS 532s or VISULAS Trion) is switched off. Switch on only the VISULAS YAG III and select the display as described in section *Information mode*, page 66). The chosen setting will remain when the coagulation laser (VISULAS 532s or VISULAS Trion) has been switched on.

The display brightness can be changed stepwise by pressing the buttons (**1**, **2**, Fig. 22) on the rear casing of the ACCENTO eyepiece. Brightness is increased/decreased by pressing the right-/left-hand button as viewed from the rear.



1 Button for increasing brightness
2 Button for decreasing brightness

Fig. 22 ACCENTO eyepiece, rear view, brightness control buttons

☞ Follow the instructions for the ACCENTO eyepiece.

ACCENTO foot switch

The ACCENTO foot switch may only be used in combination with the VISULAS Trion Combi.

Only the standard foot switch may be used with the VISULAS YAG III and VISULAS YAG III Combi.

Daily use

WARNING - GENERAL HAZARDS

Prior to using the device, the user must ensure that it is in a good condition and fully functioning. Furthermore, the user must follow the instructions in the user manual.

The following inspections must be carried out each working day prior to use:

- Visual inspection of the casing, exterior markings, user manual, accessories and power cable to ensure that they are present and intact. If parts are missing or damage is visible, the device should not be used and should be taken out of service.
- The ventilation slits in the casing should not be covered or otherwise obstructed!

WARNING - RISK OF ELECTRIC SHOCK

Please take care that the following operational requirements are met before using the device and maintained throughout further operation:

- Use the power cable supplied with the device. If the instrument is mounted on an instrument table, it will be powered through this table. If using a table not approved by Carl Zeiss Meditec, the user is solely responsible for ensuring the electrical safety of the instrument.
- The power plug must be inserted into a power outlet with an intact protective ground connection.
- Cables and plugs may only be used if they are in perfect condition.

Switching on

Turn on the laser console using the key switch (**1**, Fig. 7).

Function test

When the instrument is switched on using the key switch (**1**, Fig. 7) on the VISULAS YAG III laser console, a system test will be automatically performed.

During the system test the following actions, tests and initialization routines will be executed:

- Switch-on and initialization of the system
- Start of system monitoring
- Test and subsequent activation of watch dog circuit
- Test of energy power down
- Execution of internal laser shots and determination of energy values for all pulse modes.

When the system test has been successfully completed, the program switches automatically to the treatment mode.

Operation of the device

CAUTION - GENERAL HAZARDS

The patient should not touch the instrument with his/her hands. In particular, the instrument should not be used as a support or an aid for standing up.

CAUTION - RISK OF PINCHING

Various modules of the laser slit lamp can move against one another. Take care to avoid pinching the fingers.

WARNING - RISK OF LASER RADIATION

Never trigger the laser if the aiming beam is not clearly visible in the target area.

Laser treatment using VISULAS YAG III/ VISULAS YAG III Combi/VISULAS Trion Combi

☞ **Note for VISULAS Trion Combi:**
When operting the VISULAS Trion Combi with the ACCENTO eyepiece, both devices (VISULAS Trion and VISULAS YAG III) should be switched on.

Adjusting the slit lamp and eyepieces

Before treating a patient with laser radiation you should be perfectly familiar with the use of the slit lamp. Read the user manual carefully, paying particular attention to the safety notes.

- Make sure the eyepieces are completely plugged in and the eyecups pulled out (for spectacle wearers: pushed in).
- Turn the diopter setting ring on both eyepieces fully in a **+** direction (anti-clockwise) as far as they will go.
- First of all, attach a piece of paper (business card or similar) to the object plane of the slit lamp.
- Center the slit projector and binocular tube to the slit lamp base.
- On the slit lamp, choose the highest magnification.
- Open the slit.
- Look through the eyepieces. Use the joystick to focus on the paper surface and lock the slit lamp base.
- Close the illuminating slit to a narrow line.
- On the slit lamp, choose the lowest magnification.
- Look through each eyepiece in turn, rotating the diopter setting ring for the eyepiece through which you are looking in the **–** direction (clockwise) until the surface of the paper is sharply in focus.
- Select the other magnification steps on the slit lamp.
- The image should remain sharply in focus at all magnifications. If not, the procedure should be repeated.
- Make a note of the eyepiece settings for future treatment sessions. In future you will need only to adjust the eyepieces to these values.

☞ If more than one physician uses the device, it is recommended that a table be prepared with the individual refractive powers and kept in a handy location near the device.

Start-up and laser treatment

Control of the VISULAS YAG III is menu-driven using the control panel. Functions and menus are described in detail below.

VISULAS YAG III menu description

Note for VISULAS YAG III Combi and VISULAS Trion Combi:
The menu descriptions for the VISULAS YAG III Combi are shown from page 70 and the VISULAS Trion Combi from page 78.

Menu navigation

The VISULAS YAG III is operated via a menu system with four menu screens via the VISULAS YAG III laser console.

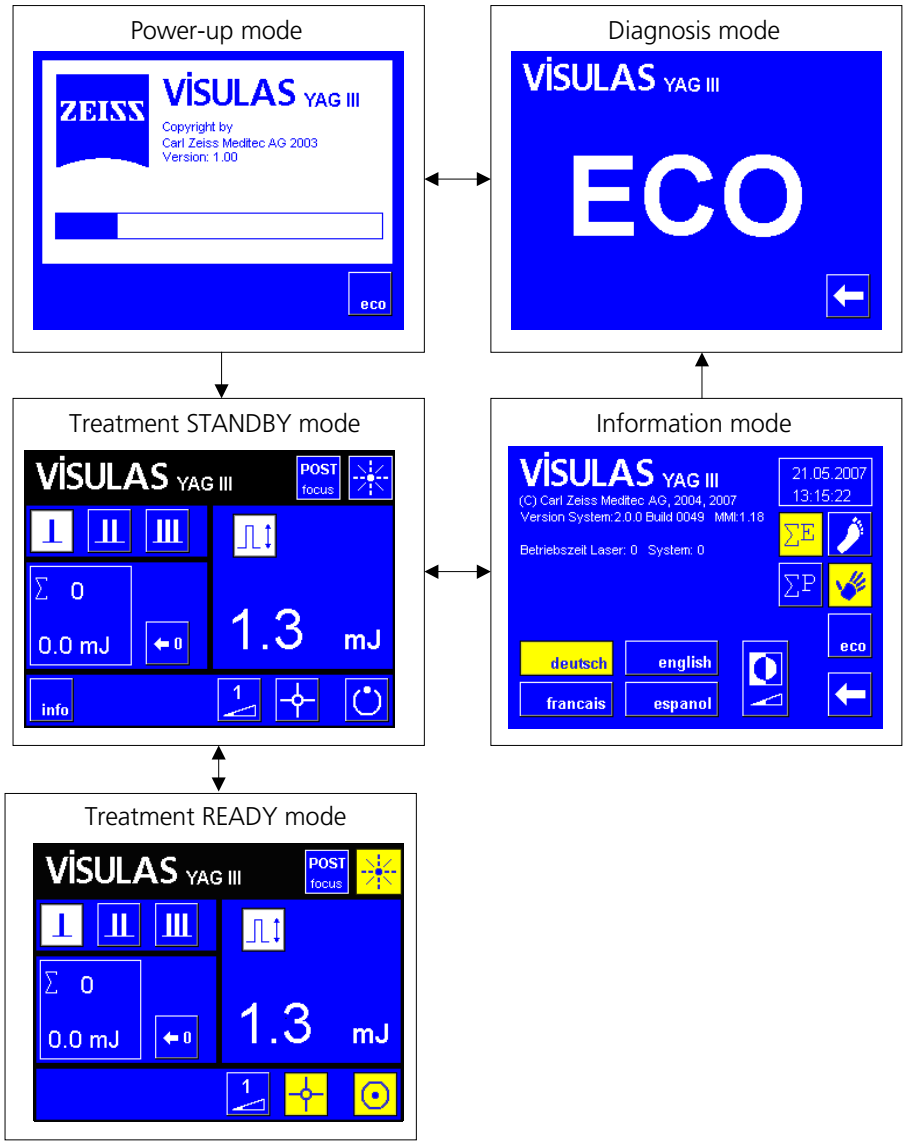


Fig. 23 VISULAS YAG III menu navigation

Power-up mode

When the system is switched on using the key switch (**1**, Fig. 7) on the VISULAS YAG III laser console, the start-up screen appears on the control panel. The instrument is now in **Power-up mode** (Fig. 24).

Fig. 24 Power-up mode

The system automatically performs a self-test. The start-up screen includes a progress bar which shows the progress of the system test.

When the system test has been successfully completed, the program switches automatically to the **STANDBY treatment mode** (Fig. 26).

You can switch directly into **Diagnosis mode** during the system test. To do so, touch the **eco** button.

Diagnosis mode

Diagnosis mode (Fig. 25) enables the user to use the laser slit lamp as a diagnostic slit lamp.
The VISULAS YAG III is used merely as a power source for the slit lamp. The laser remains switched off and the hand switch or foot switch are deactivated.

Fig. 25 Diagnosis mode

Pressing the **Arrow** button switches the program to **Power-up mode** and then automatically to **treatment STANDBY mode.**

Treatment STANDBY mode

After the system has been switched on and the internal system test has been completed, the system enters this mode automatically unless the instrument is switched to **Diagnosis mode** by the user.

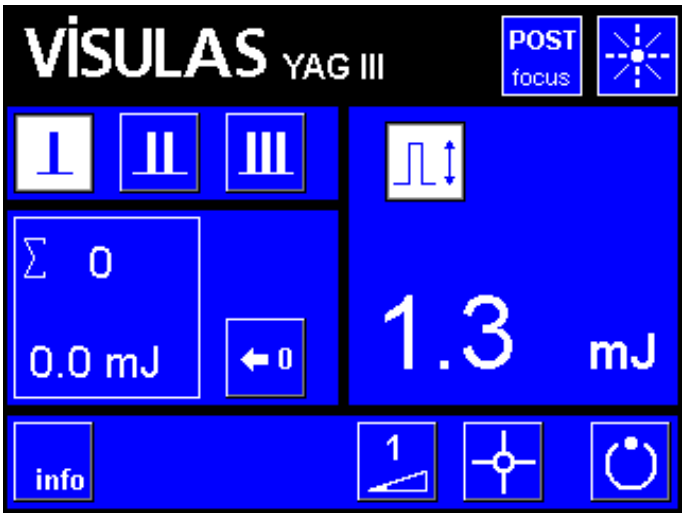


Fig. 26 Treatment **STANDBY** mode

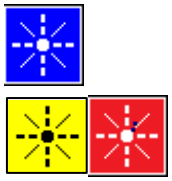
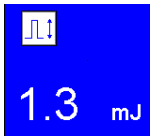
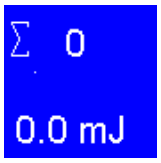
All treatment-related laser parameters are displayed on the control panel and can be changed in this mode.

The following laser parameters can be set in this mode: energy, pulse mode and aiming beam intensity.

Each time the system is restarted, the energy and the aiming beam intensity values most recently selected will be used.

- To set individual laser parameters, touch the appropriate parameter button and set the value required by turning the control knob.
- Select the desired pulse mode (single, double or triple pulse) by touching the appropriate button. The reverse-colored button (blue on a white background) is activated.
- Pressing the control knob takes you directly to the entry field for the laser energy. Rotate the knob to set the energy required.

The buttons in the **Treatment mode** have the following functions:

	**Displays the selected focus shift mode** ANT - anterior focus shift POST - posterior focus shift 0 - Zero focus shift Refer to section *Focus shift and defocusing* on page 88.
	**Laser emission display** This field lights up in yellow when the instrument is in treatment **READY** mode and the aiming beam is switched on. This display lights up in red when the laser is triggered.
Selection and display of pulse mode (burst) (shown here: single pulse mode activated)	
	**Single pulse**
	**Double pulse**
	**Triple pulse**
Selection and display of energy levels	
	**Energy levels** When this field is activated, the energy can be set using the control knob. There are 22 energy levels. In single-pulse mode, the lowest level corresponds to about 0.3 mJ, the highest to about 10 mJ. The energy display indicates the average energy of the last five shots, calculated for the currently selected energy level. The output energy of the Nd:YAG laser may vary slightly. You should therefore check the displayed energy value regularly.
Energy and pulse counter	
	**Display field** Displays the sum of the emitted pulses and the cumulative energy.
	**Reset button** Touching this button resets the sum of emitted pulses and the cumulative energy to zero.
Information mode	
	**Switch to information mode** Touching this button switches to Information mode. See page 66.

Aiming beam	
	**Switch on the aiming beam.** In Treatment **STANDBY** mode, the aiming beam is switched on and off by touching this button. If the aiming beam is on, this button appears in reverse color.
	**Aiming beam intensity** After touching this button, the intensity of the aiming beam can be adjusted by turning the rotary knob.
STANDBY/READY	
	**Display and switch between STANDBY/READY** Touching this button switches the system into Treatment **READY** mode after approximately three seconds. This transition time is visually indicated by a blinking button. Touching this button again returns the system to Treatment **STANDBY** mode. The key illustrated is the **STANDBY** key.

☞ If the system has been in **Treatment STANDBY mode** for more than 30 minutes, on switching to **Treatment READY mode** the system will release a series of internal laser shots in order to update the energy values for each pulse mode.

Information mode

Touching the **info** button in **Treatment STANDBY mode** switches the system into **Information mode** (Fig. 27).

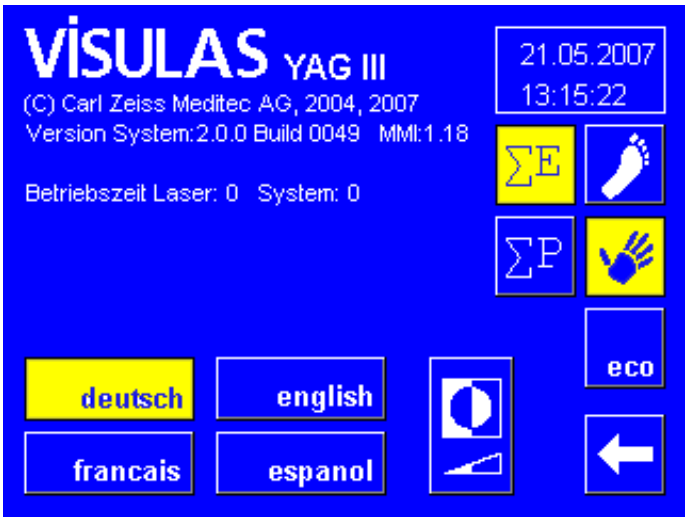


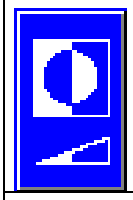
Fig. 27 Information mode

This mode allows you to view system information. You can also set the triggering mode (hand switch or foot switch), the system time (date and time), the user interface language and the control panel LC display contrast.

The following system information is displayed:

- Company name/instrument name
- Software version
- Operating time counter
- System time (date and time)
- Information on any faults which may have occurred

The following options can be set in **Information mode**:

	**Triggering mode** • Touch the appropriate button to select either hand switch or foot switch triggering. The foot switch is not included as standard, but is available as an option.
	• Touching this button switches the system into Diagnosis mode (see page 63).
	**Language** The user interface is available in the following languages: German, English, French and Spanish. • Touch the appropriate button to select the language required.
	**Contrast** Adjustment of the LC display contrast to the ambient brightness. • Touch this button and adjust display contrast by turning the control knob.
	**System time** Touching this button takes you to the system time field and allows you to set the system time (Fig. 28).
	**Display in the ACCENTO eyepiece (optional)** • Touch the respective button to display the cumulative energy (Σ E) or the sum of the delivered pulses (Σ P).

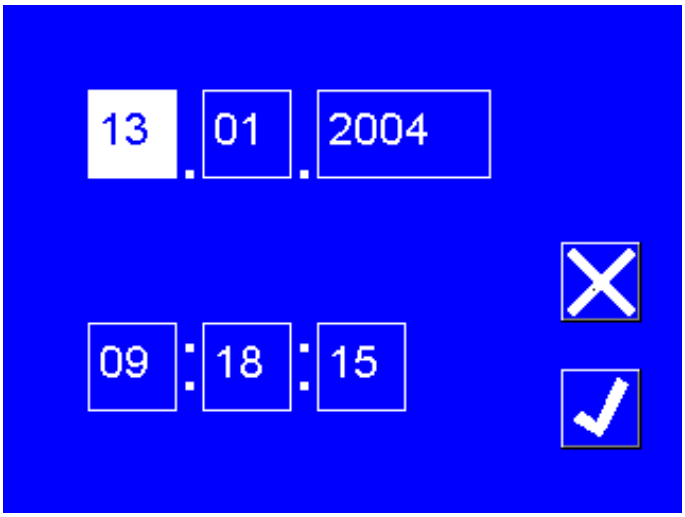


Fig. 28 Setting the system time

Setting the system time

- Activate each numerical field in turn by touching it and set the current date and time by turning the rotary knob.
- To save the settings and return to **Information mode**, touch the ✓ button.
- Touching the ✗ button also returns the system to **Information mode**, but without saving any previous changes.

Touching the **Arrow** button switches the system from the **Information mode** into **Treatment STANDBY mode**. The settings made are retained when the instrument is switched off.

Treatment READY mode

Touching the button **STANDBY/READY** in **Treatment STANDBY mode** switches the system, after about three seconds, into **Treatment READY mode** (Fig. 29).

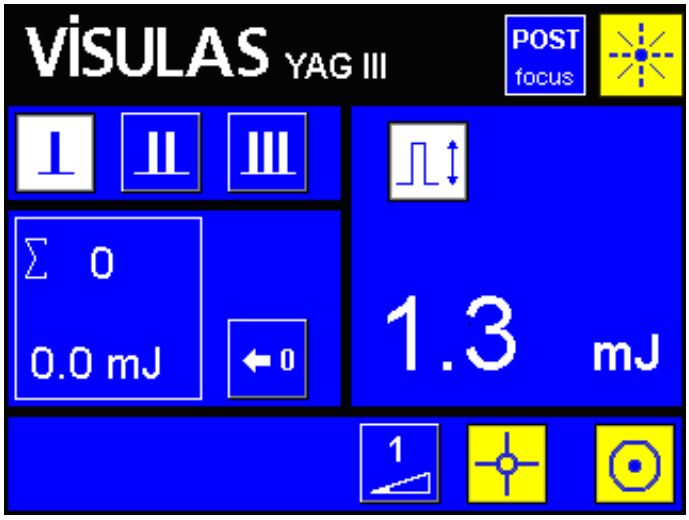


Fig. 29 Treatment **READY** mode

In **Treatment READY mode**, the aiming beam and laser warning lamp are always on.
Parameters are set in the same way as for **Treatment STANDBY** mode (see page 64).
When the trigger is activated, the laser beam will be fired according to the parameters set.

WARNING - RISK OF LASER RADIATION

Never trigger the laser if the aiming beam is not clearly visible in the target area.

- Touching the **STANDBY/READY** button returns you to **Treatment STANDBY** mode.

☞ If, in **Treatment READY mode**, more than 5 minutes elapses without the laser being triggered, the system returns to **Treatment STANDBY mode**.

Menu description for VISULAS YAG III Combi

Note for VISULAS YAG III:
The menus for the VISULAS YAG III are described on page 61.

Menu navigation

The VISULAS YAG III is operated via a menu system with eight menu screens using the VISULAS 543s laser console.

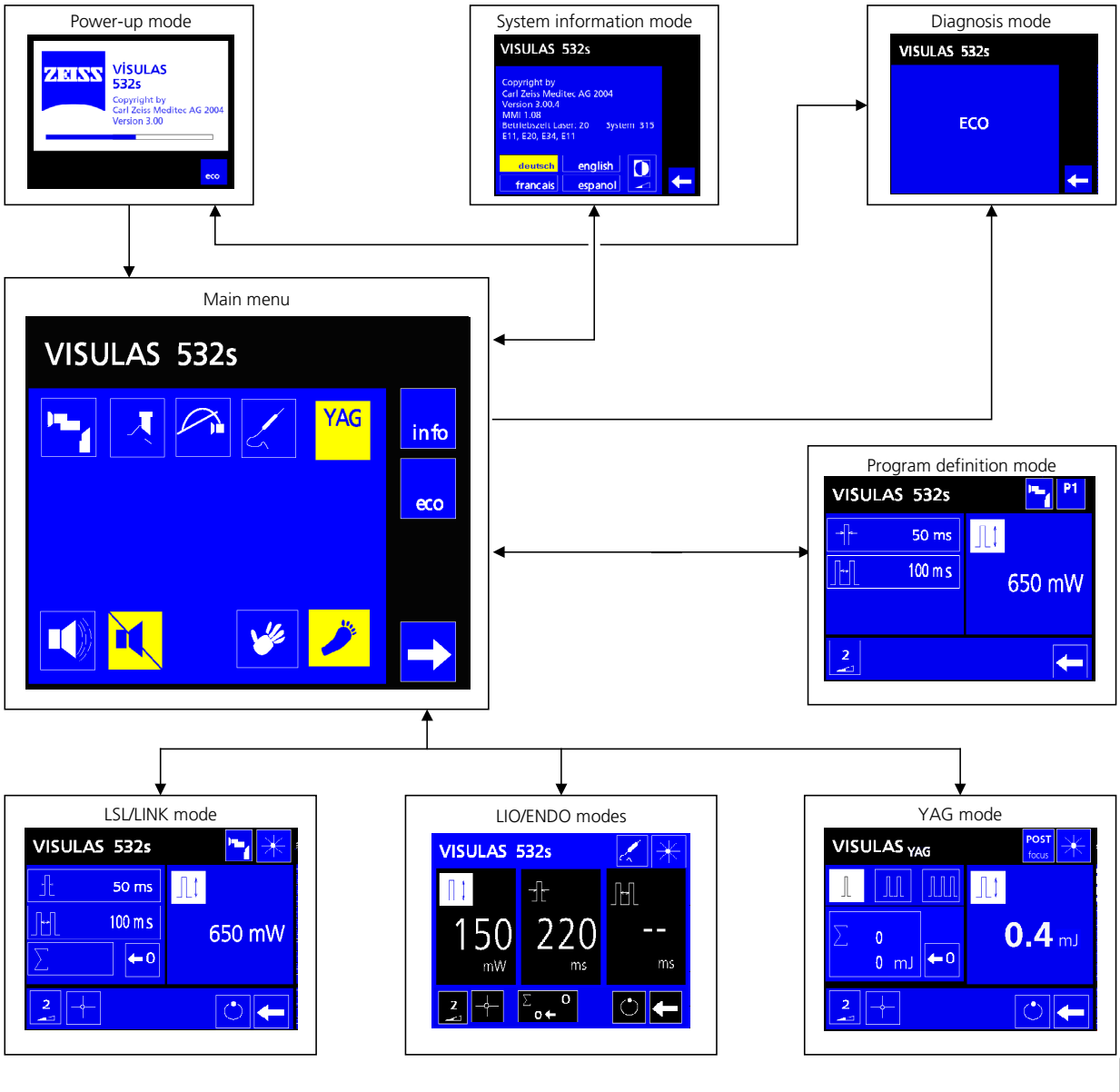


Fig. 30 VISULAS YAG III Combi general menu navigation

Correct operation of VISULAS 532s is imperative for safe functioning. Please familiarize yourself thoroughly with the contents of the user manual for VISULAS 532s before using the VISULAS 532s.

To operate the VISULAS YAG III in combination with the VISULAS 532s, the two laser consoles must be connected by a special interface cable (Combi cable).
As soon as this cable is connected, the buttons on the YAG III laser console control panel will be deactivated and combination mode will be selected.

VISULAS 532s power-up mode

- When the instrument is switched on using the key switch on the VISULAS 532s laser console (see VISULAS 532s user manual) the start-up screen is displayed on the control panel (Fig. 31).
- The system automatically performs a self-test.
- The user interface includes a progress bar, which shows the progress of the system test.
- When the system test has been successfully completed, the program switches automatically to the main menu (see VISULAS 532s user manual).
- You can switch directly into **Diagnosis mode** during the system test.
- To do so, touch the **eco** button.

Fig. 31 Power-up mode

Diagnosis mode

This mode enables the user to use the LSL YAG III Combi laser slit lamp as a diagnostic slit lamp. The VISULAS 532s is used merely as a power source for the slit lamp.

- The laser module and temperature regulator remain switched off, meaning that the ventilators are operated at minimum speed (minimal noise production).
- The shutter remains closed in diagnosis mode.

- Touching the **Arrow** button switches the system into **System test** mode.

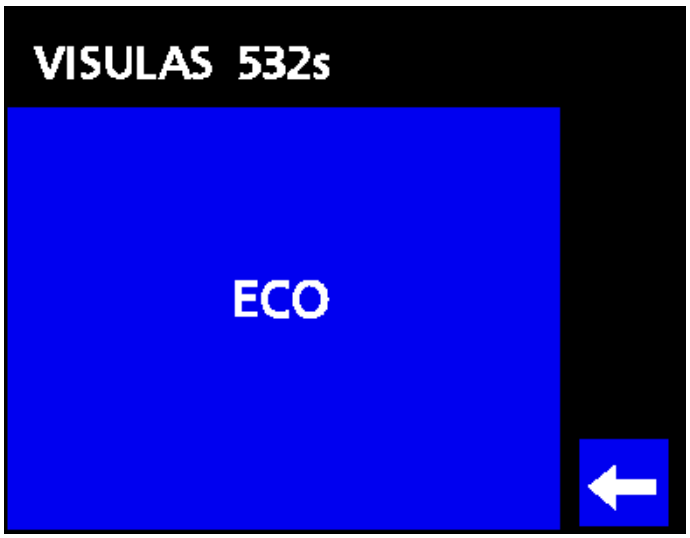


Fig. 32 Diagnosis mode

VISULAS YAG III power-up mode

- When the YAG system is switched on using the key switch (**1**, Fig. 7), the system automatically performs a self-test (Fig. 33). Then the Combi mode is active and the message shown in Fig. 34 is displayed on the YAG console. The YAG laser can now be operated using the VISULAS 532s control panel only.
- The combination message continues to be displayed on the YAG console as long as the system remains in combination mode and there are no system errors (Fig. 34).
- Should an error occur on the VISULAS YAG III whilst in combination mode, the VISULAS 532s logs off automatically. The relevant error message is displayed on the YAG console display. The YAG laser cannot be operated or logged back on until the error has been resolved and the system restarted.
- If an error occurs during the system self-test, an error message is displayed. If the error cannot be eliminated using the troubleshooting table in the VISULAS 532s user manual, please notify customer service.

Fig. 33 System test

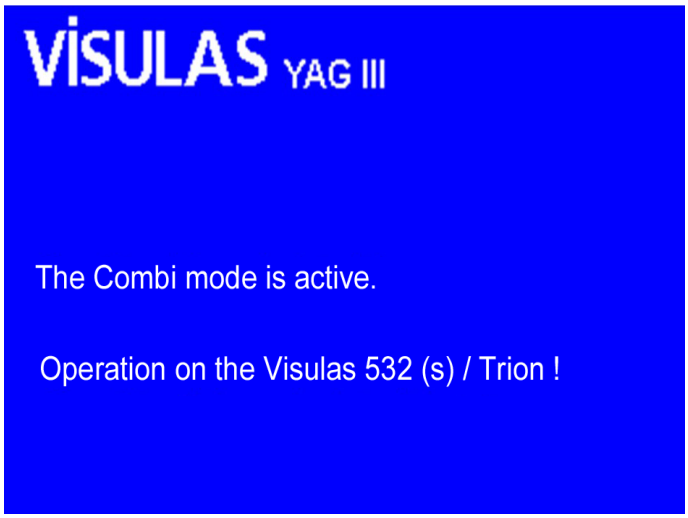


Fig. 34 Combination mode is activated

YAG III treatment mode

In the main menu, select the **YAG** laser as applicator.

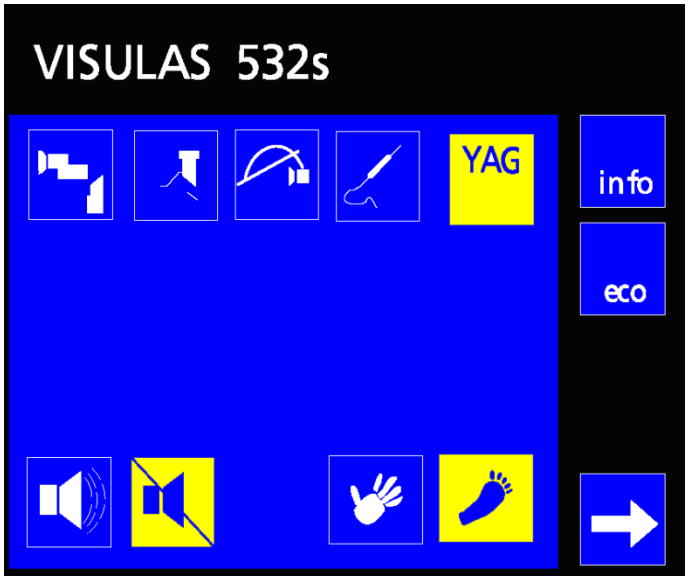
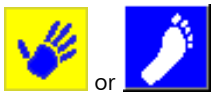


Fig. 35 Main menu after selecting the YAG laser as applicator



- Select the YAG triggering mode (hand/foot).

STANDBY

- Touching the **Arrow** button switches the system from the main menu into **Treatment STANDBY mode**.

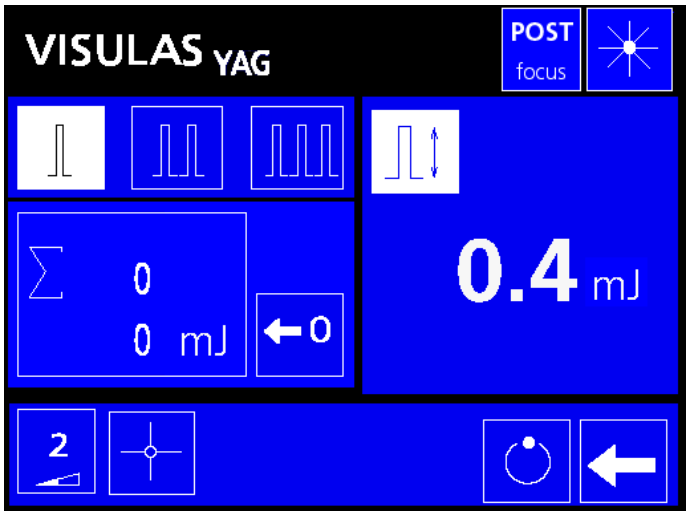


Fig. 36 Treatment **STANDBY** mode

- Selected focus shift mode display:

  ANT - anterior focus shift
  POST - posterior focus shift
  0 - Zero focus shift
  Refer to section *Focus shift and defocusing* on page 88.

- Laser emission display:

  This field lights up in yellow when the instrument is in **Treatment READY mode** and the aiming beam is switched on. This display lights up in red when the laser is triggered.

In treatment mode, the therapy beam can be applied via the LSL YAG III Combi laser slit lamp.
All treatment-related laser parameters are displayed on the control panel and can be changed in this mode.

- To set individual laser parameters, touch the appropriate parameter button and select the value required by turning the rotary knob.
- Select the pulse mode required.
- Pressing the rotary knob takes you directly to the entry field for the laser energy of the therapy beam. Rotate the knob to set the energy required.

- The aiming beam can be turned on and off using the **Aiming beam** button. When the aiming beam is on, this button is highlighted.

- Upon touching the **Brightness** button, the intensity of the aiming beam can be adjusted by turning the rotary knob.

- A pulse counter is also displayed. This can be reset to zero by touching the **Reset** button.

- Touching the **Arrow** button returns you to the main menu.


STANDBY


READY

- Touching the button for switching between treatment modes **STANDBY/READY** switches the system, after about three seconds, into **Treatment READY mode**. This transition time is visually indicated by a blinking button.

READY

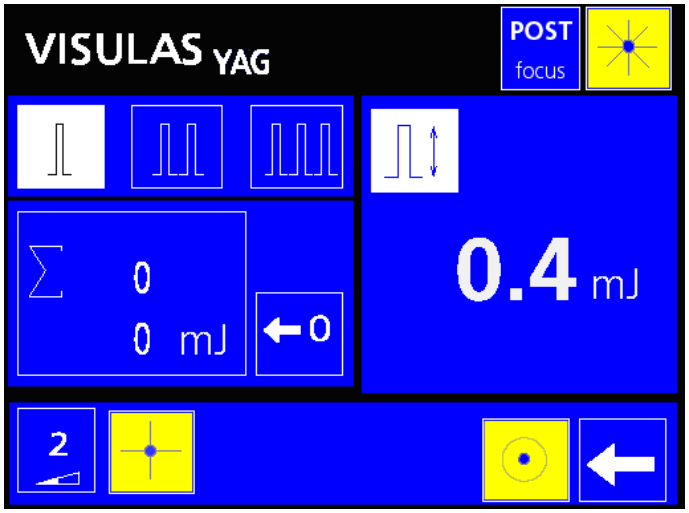


Fig. 37 Treatment **READY** mode

- In **Treatment READY mode**, the aiming beam and laser emission indicators are always on.
- Parameters are set in the same way as for **Treatment STANDBY** mode.
- When the trigger is activated, the laser beam will be triggered according to the parameters set.
- Touching the **Standby/Ready** button returns you to **Treatment STANDBY** mode.

- Touching the **Arrow** button returns you to the main menu.

☞ If, in **Treatment READY mode**, more than 5 minutes elapses without the laser being triggered, the system returns to **Treatment STANDBY mode** and emits a short audible signal.

VISULAS Trion Combi menu description

Note for VISULAS YAG III:
The menus for the VISULAS YAG III are described on page 61.

Menu navigation

The VISULAS Trion Combi is operated via a menu system with five menu screens using the VISULAS Trion laser console.

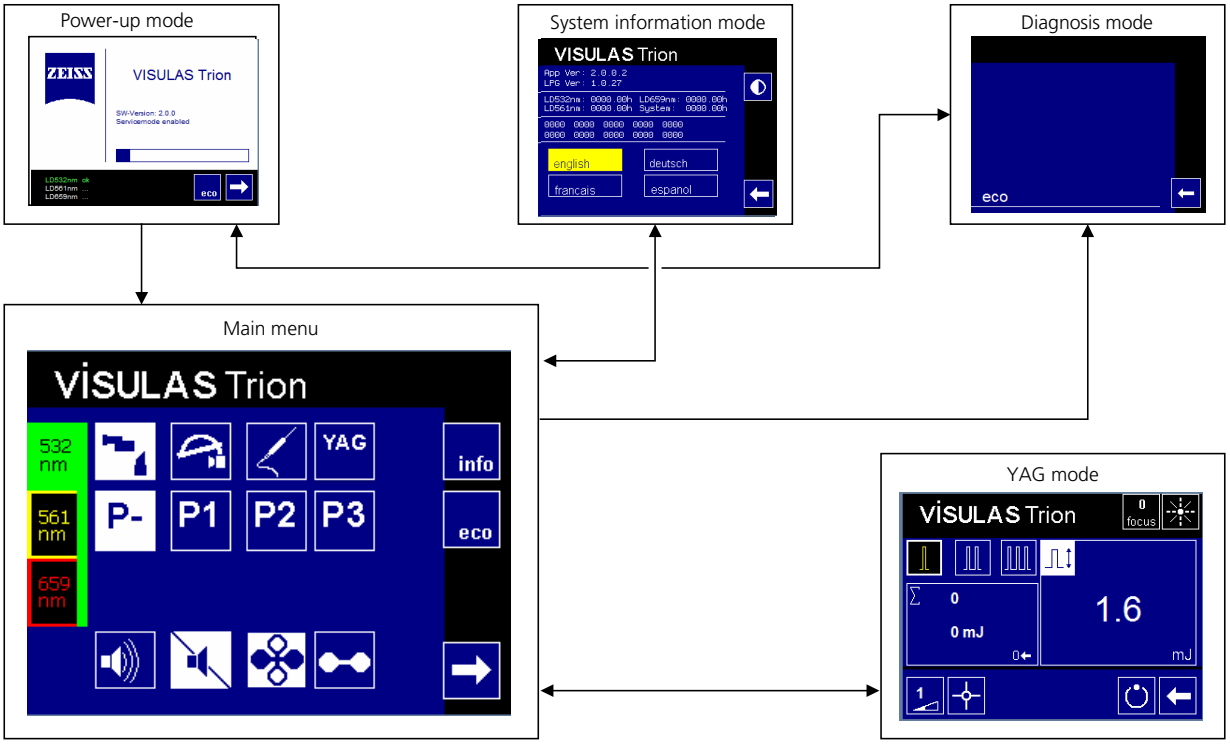


Fig. 38 VISULAS YAG III Combi general menu navigation

Correct operation of VISULAS Trion is imperative for safe functioning. Please familiarize yourself thoroughly with the contents of the user manual for VISULAS Trion before using the VISULAS Trion.

To operate the VISULAS YAG III in combination with the VISULAS Trion, the two laser consoles must be connected by a special interface cable (Combi cable).
As soon as this cable is connected, the buttons on the YAG III laser console control panel will be deactivated and combination mode will be selected.
The instruments are operated using the VISULAS Trion control panel.

VISULAS Trion power-up mode

- When the instrument is switched on using the key switch on the VISULAS Trion laser console (see VISULAS Trion user manual) the start-up screen is displayed on the control panel (Fig. 39).
- The system automatically performs a self-test.
- The user interface includes a progress bar, which shows the progress of the system test.
- When the system test has been successfully completed, the program switches automatically to the main menu (see VISULAS Trion user manual).
- You can switch directly into **Diagnosis mode** during the system test.
- To do so, touch the **eco** button.

Fig. 39 Power-up mode

Diagnosis mode

This mode enables the user to use the LSL YAG III Combi laser slit lamp as a diagnostic slit lamp. The VISULAS Trion is used merely as a power source for the slit lamp.

- The laser module and temperature regulator remain switched off, meaning that the ventilators are operated at minimum speed (minimal noise production).
- The shutter remains closed in diagnosis mode.

- Touching the **Arrow** button switches the system into **System test** mode (Fig. 41).

Fig. 40 Diagnosis mode

VISULAS YAG III power-up mode

- When the YAG system is switched on using the key switch (**1**, Fig. 7), the system automatically performs a self-test (Fig. 41). Then the Combi mode is active and the message shown in Fig. 42 is displayed on the YAG console. The YAG laser can now be operated using the VISULAS Trion control panel only.
- The combination message continues to be displayed on the YAG console as long as the system remains in combination mode and there are no system errors (Fig. 42).
- Should an error occur on the VISULAS YAG III whilst in combination mode, the VISULAS Trion logs off automatically. The relevant error message is displayed on the YAG console display. The YAG laser cannot be operated or logged back on until the error has been resolved and the system restarted.
- If an error occurs during the system self-test, an error message is displayed. If the error cannot be eliminated using the troubleshooting table in the VISULAS Trion user manual, please notify customer service.

Fig. 41 System test

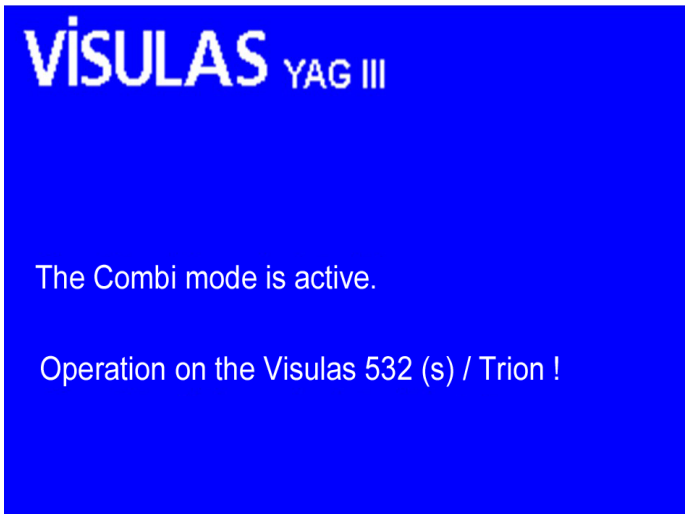


Fig. 42 Combination mode is activated

YAG III treatment mode

If you wish to change the YAG trigger (hand or foot) press the upper blue **YAG** button in the main menu.

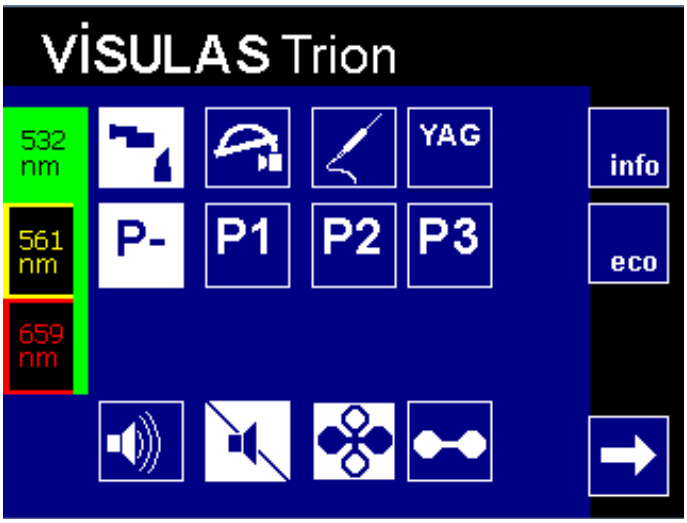


Fig. 43 VISULAS Trion main menu

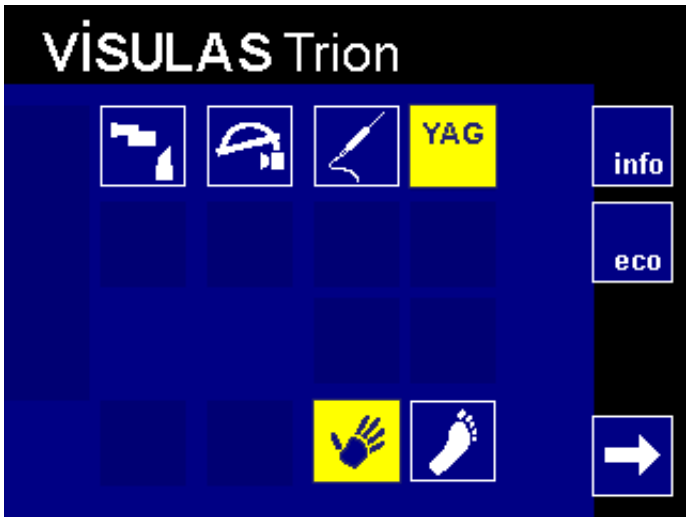


Fig. 44 YAG trigger selection menu

- Select the YAG trigger (hand/foot).

☞ The last-selected trigger will be active upon restarting.

STANDBY

- Pressing the **Arrow** button in the YAG trigger selection menu will change to the YAG **Treatment STANDBY mode**

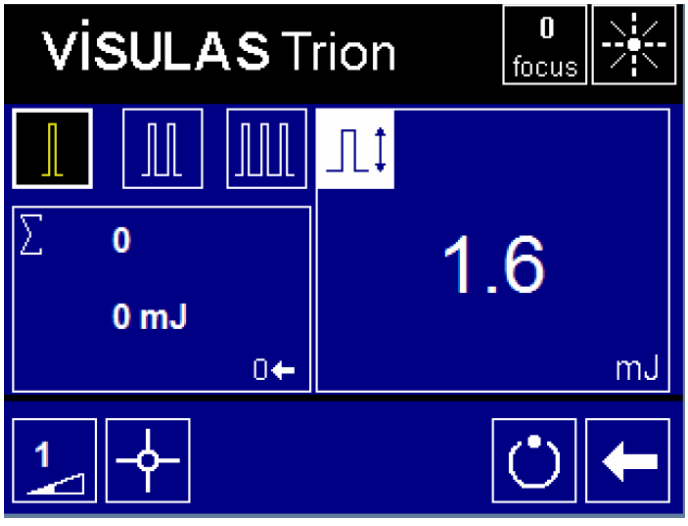


Fig. 45 Treatment **STANDBY** mode

Selected focus shift mode display:
ANT - anterior focus shift
POST - posterior focus shift
0 - Zero focus shift
Refer to section *Focus shift and defocusing* on page 88.

Laser emission display:
This field lights up in yellow when the instrument is in **Treatment READY mode** and the aiming beam is switched on. This display lights up in red when the laser is triggered.

In **Treatment mode**, the therapy beam can be applied via the LSL YAG III Combi laser slit lamp.
All treatment-related laser parameters are displayed on the control panel and can be changed in this mode.

- To set individual laser parameters, touch the appropriate parameter button and select the value required by turning the rotary knob.

- Select the pulse mode required.

- Pressing the rotary knob takes you directly to the entry field for the laser energy of the therapy beam. Rotate the knob to set the energy required.

- The aiming beam can be turned on and off using the **Aiming beam** button. When the aiming beam is on, this button is highlighted.

- Upon touching the **Brightness** button, the intensity of the aiming beam can be adjusted by turning the rotary knob.

- A pulse counter is also displayed. This can be reset to zero by pressing the **RESET** button.

- Touching the **Arrow** button returns you to the main menu.

- Touching the button for switching between treatment modes **STANDBY/READY** switches the system, after about three seconds, into **Treatment READY mode**. This transition time is visually indicated by a blinking button.

READY

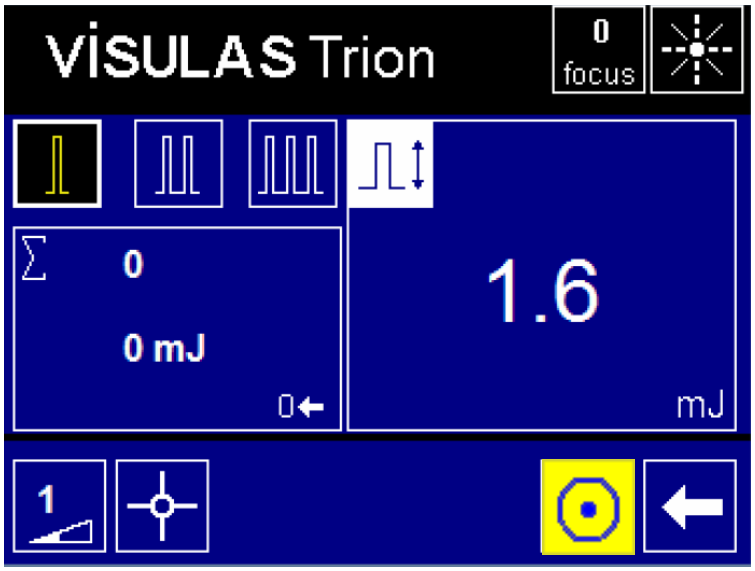


Fig. 46 Treatment **READY** mode

In **Treatment READY mode**, the aiming beam and laser warning lamp are always on.

Parameters are set in the same way as for **Treatment STANDBY** mode.

- When the trigger is activated, the laser beam will be triggered according to the parameters set.
- Touching the **STANDBY/READY** button returns you to **Treatment STANDBY** mode.

- Touching the **Arrow** button returns you to the main menu.

☞ If, in **Treatment READY mode**, more than 5 minutes elapses without the laser being triggered, the system returns to **Treatment STANDBY mode** and emits a short audible signal.

Using the aiming beam system with the VISULAS YAG III/VISULAS YAG III Combi/ VISULAS Trion Combi

The VISULAS YAG III uses a four-point aiming beam system.
If the image is free from distortion, the following aiming beam spot patterns can be seen, depending on the position of the focus:

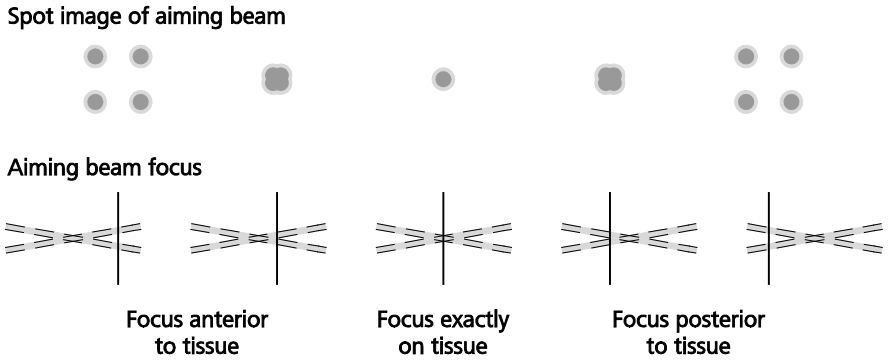


Fig. 47 Focusing the aiming beam

When working with energies of up to 1.5 mJ, you can focus directly on the target plane. The four spots then merge into a single spot. When working with higher energies, you must use anterior or posterior defocusing, depending on the individual situation (see *Focus shift and defocusing*, page 88).
Where there is astigmatic distortion, the aiming beam spot pattern will take on a different appearance, usually exhibiting rhombic distortion.
In this case, it is not always possible to merge the four aiming beam spots when focusing on the target plane. From this it should be clear, that in some circumstances it may no longer be possible to achieve the desired effect at low energy levels, as the therapy beam will be similarly distorted. It may be necessary to use a higher energy level in order to achieve the desired effect. Return to a normal energy level when a square aiming beam pattern is seen and it is possible to merge the four aiming beam spots.

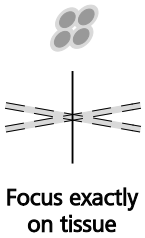


Fig. 48 Distorted aiming beam

☞ Always work with the lowest energy possible.

Intraocular lenses made of silicone are considerably more sensitive than intraocular lenses made of PMMA. For this reason, you should be particularly careful when working with silicone lenses.
The aiming beam spot pattern may also be distorted if the contact lens is held at too much of an angle. You should therefore avoid holding the contact lens at too much of an angle for the purpose of minimizing reflections.

WARNING - RISK OF LASER RADIATION

Never trigger the laser if the aiming beam is not clearly visible in the target area.

Focus shift and defocusing

The optimal mechanical effect of the optical breakdown occurs at a specific distance from the focus of the therapy beam. For this reason, the aiming beam and therapy beam of the VISULAS YAG III are not parfocal, but are shifted (focus shift). Depending on the application, you can select one of three settings:

- Posterior:

  Labeled as **post.**, switch to the right.
  The therapy beam is focused 150 µm posterior to the aiming beam focus. This setting should only be used for applications in which the area to be treated is posterior to the tissue to be protected (see also Fig. 2).

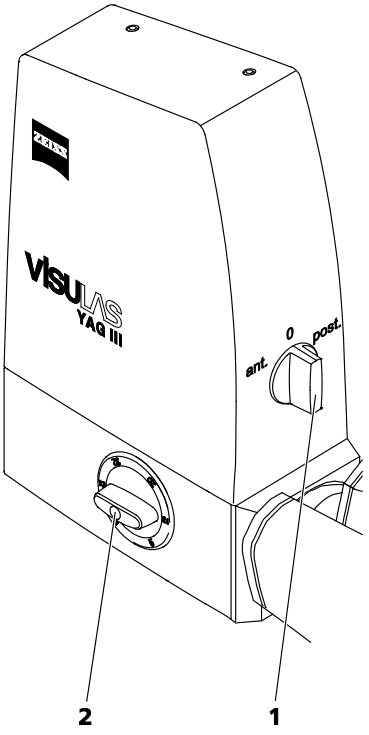
- Anterior:

  Labeled as **ant.**, switch to the left.
  The therapy beam is focused 150 µm anterior to the aiming beam focus. This setting should only be used for applications in which the area to be treated is anterior to the tissue to be protected.

- Zero:

  Labeled as **0**, switch in mid-position.
  The therapy beam and aiming beam are focused in the same plane (parfocal). This setting should only be used for applications in which there is no tissue which needs to be protected either directly anterior or posterior to the treatment region.

The laser is intended for use with the focus in these three positions only.



1 Focus shift control
2 Magnification changer

Fig. 49 Focus shift control

☞ Always turn the focus shift control until it clicks into position (an audible click should be heard).

The focus shift of the VISULAS YAG III is designed for pulse energies of up to about 1.5 mJ.

- If you wish to work with higher energy levels (e.g. for fibrotic secondary cataracts), you must increase the focus shift distance by defocusing:
  – In switch position **ant.**, you must defocus in the anterior direction.
  – In switch position **post.**, you must defocus in the posterior direction.

☞ The degree of defocusing required depends on factors such as the application and the specific conditions of the eye to be treated. It is therefore not possible to give a general recommendation.

Shutting down

WARNING - GENERAL HAZARDS

If one of the following events should occur, switch the instrument off immediately at the key switch and disconnect the cable from the power supply.

- Electric shocks
- Penetration of substances
- Smoke, sparks or unusual sounds
- Faults that cannot by remedied according to the descriptions in this user manual.

Label the instrument clearly as being out of service and report the problem to the Carl Zeiss Meditec service.

Switching off the instrument

WARNING - RISK OF ELECTRIC SHOCK

Internal components remain under voltage after the instrument has been switched off with the key switch.

To completely disconnect from the power supply, the instrument must be unplugged.

CAUTION - RISK OF OPTICAL RADIATION

Unauthorized persons must be prevented from firing the laser. The user must remove the key from the key switch after the treatment.

Turn on all devices using the key switch.

Maintenance and care

WARNING - GENERAL HAZARDS

Further maintenance procedures above and beyond those specified in this section (maintenance, safety inspections and repairs) may only be carried out by persons authorized by Carl Zeiss Meditec and solely according to the service instructions issued by Carl Zeiss Meditec. For planning and implementing these maintenance and care procedures please contact Carl Zeiss Meditec service or your local dealer.

The manufacturer accepts no liability for damages resulting from unauthorized tampering with the device or from the use of unapproved accessories. Such actions will also render any warranty claims invalid.

Fault remedy

Troubleshooting tables

Faults are indicated as system information on the laser console display. The user is also alerted by short audible signals. Remedy the fault according to the troubleshooting tables below.

If a malfunction occurs which cannot be corrected using the following tables or the troubleshooting table in the VISULAS 532s or VISULAS Trion user manuals, please notify a specialist authorised by Carl Zeiss Meditec stating the error displayed.
Label the instrument as being out of order and remove the key from the key switch.

Error messages on YAG III

Message	Remedy
LASER STOP is activated; please unlock.	Unlock the LASER STOP button.
Please release actuator!	Release foot or hand switch.
Door interlock is active, please close door.	Shut the door or check that the shorting plug is correctly plugged into the yellow socket.
Excess temperature, please wait!	The internal monitoring systems have detected an excess temperature. Please wait a moment. If this fault occurs frequently, ensure that the instrument's ventilation slots are not covered and that the ambient temperature falls below 35 °C.
Slit lamp not connected!	Check that the slit lamp is properly connected.
No foot switch connected!	Connect the foot switch or operate the instrument using the hand switch. Select the required triggering mode (see *Information mode*, page 66 and following).
In the STANDBY and READY modes, **demo** is displayed beside the **info** button. The laser cannot be triggered.	Switch the instrument off and then on again. While the progress bar is active during the system test (see *Power-up mode*, page 62), touch the ZEISS logo on the screen, then press the rotary knob/button.

Error messages on VISULAS YAG III Combi/VISULAS Trion Combi

Message	Remedy
In the STANDBY and READY modes, **demo** is displayed beside the **aiming beam** button. The laser cannot be triggered.	Switch the VISULAS YAG III off and then on again. While the progress bar is active during the system test on YAG III (see *Power-up mode*, page 62), touch the ZEISS logo on the screen, then press the rotary knob/button.
Swivel lamp casing out of position.	Swivel the lamp casing out of position. Check that all the connectors on the rear of both consoles are inserted properly.

If, in YAG mode, an error occurs on the VISULAS YAG III, an error message will be displayed on the control panel.
At the same time, an error message with a specific error code will be displayed on the YAG console.

Correct the malfunction as instructed in the VISULAS 532s or VISULAS Trion user manual. Then switch the VISULAS 532s or VISULAS Trion off and on again.

Faults on the VISULAS 532s/VISULAS Trion are indicated as system information on the control unit display. The user is also alerted by short audible signals.

Note: Follow the instructions given.

Warning message: Correct the malfunction as instructed in the troubleshooting tables in the VISULAS 532s or VISULAS Trion user manual.

If a fault occurs, which cannot be remedied by using the troubleshooting tables, please contact a Carl Zeiss Meditec authorized specialist, citing the error number displayed.
Label the instrument as being out of order and remove the key from the key switch.

Laser slit lamp faults

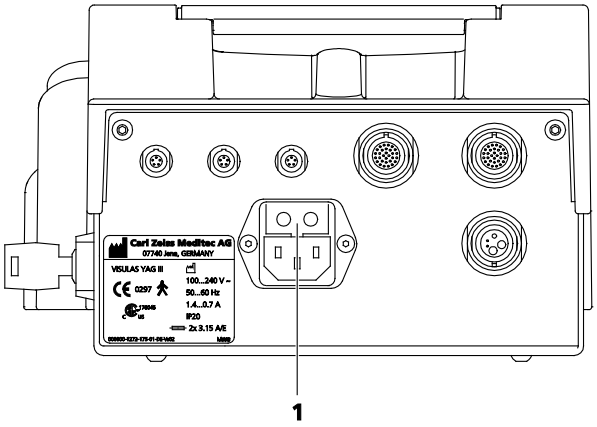
Fault	Possible cause	Remedy
No function at all	- Laser console power cable not connected. - Laser console not switched on. - Connecting cable not properly inserted into laser console. - Fuse defective.	- Connect the power cable. - Switch on the laser console. - Insert connector into socket (**5**, **6**, Fig. 8). - Replace the fuse. (→ page 94)
No slit illumination	- Slit is closed. - Halogen bulb defective.	- Adjust slit width using knob (**10**, Fig. 5 and Fig. 13). - Replace halogen bulb (→ page 95).
Poor slit illumination	- Selected lamp voltage too low. - Halogen bulb not properly inserted. - Slit length not correctly adjusted. - Slit width not correctly adjusted. - Filter selector not correctly set.	- Set halogen lamp brightness as required using the brightness control (**9**, Fig. 3). - Ensure that halogen bulb is properly inserted (→ page 95) - Adjust slit length using knob (**9**, Fig. 5 and Fig. 13). - Adjust slit width using knob (**10**, Fig. 5 and Fig. 13). - Check position of filter selector knob (white line should be pointing upward).
Difficulties when looking through corneal microscope	- Magnification of corneal microscope not correctly adjusted. - Interpupillary distance of binocular tube not correctly adjusted. - Eyepieces not correctly adjusted.	- Turn magnification changer knob (**7**, Fig. 5 and Fig. 13) to select the desired magnification. - Adjust interpupillary distance of binocular tube. - Adjust eyepieces.
Movement of instrument base too stiff	- Instrument base locked with fast-action base lock. - Base locked with clamp screw.	- Unlock fast-action base lock (**8**, Fig. 3). - Unscrew clamp screw (**5**, Fig. 3).

Replacing the fuses

Replacing the fuse on the VISULAS YAG III laser console

The fuses are integrated into the combined power inlet connector/fuse assembly of the laser console. This assembly is located on the rear side of the laser console (see **7**, Fig. 8).

- Switch the instrument off at the power switch.
- Disconnect the power cable.
- Open the flap (**1**, Fig. 50) using a suitable tool.
- Remove the defective fuses and insert new ones.



1 Flap

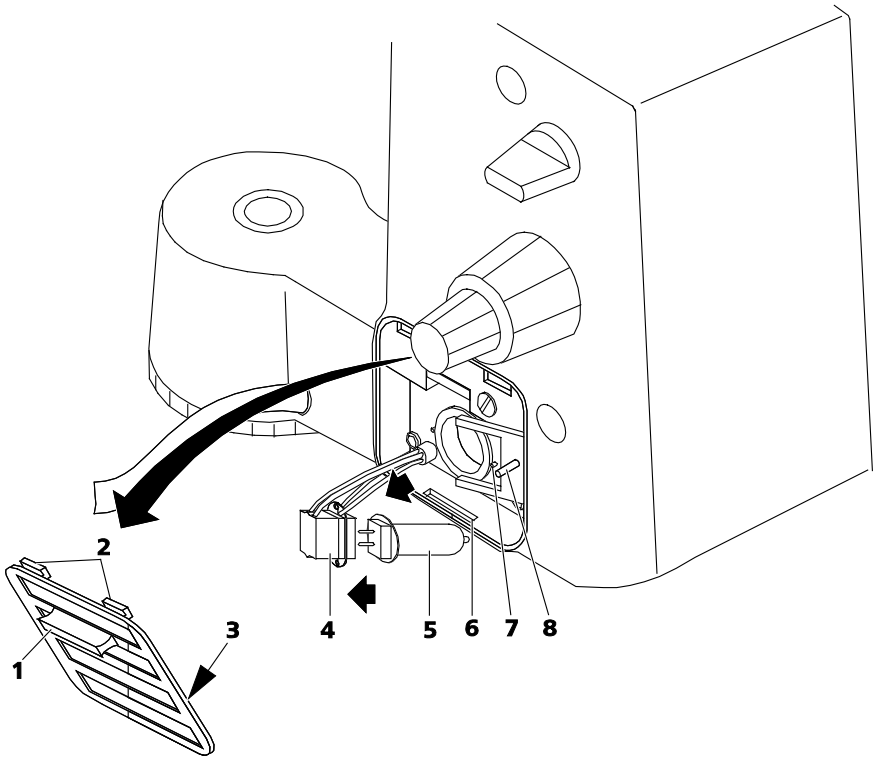
Fig. 50 Replacing the fuse

Use fuses with the correct rating only (see section *Technical data*, page 104 and following).

Replacing the halogen bulb in the laser slit lamp

CAUTION - RISK OF BURNS

Before replacing the lamp, switch the system off at the key switch and disconnect the power cable. Allow the lamp to cool down or wear protective gloves.



1 Cover flap
2 Holders
3 Holder (not shown)
4 Socket plug
5 12 V/30 W halogen bulb
6 Slot
7 Locating pins
8 Lever

Fig. 51 Replacing the halogen bulb

Replace the halogen bulb (**5**, Fig. 51) as illustrated in Fig. 51.

- The lamp housing can be removed by pressing down and simultaneously pulling the lug (**1**, Fig. 51).
- To unlock the lamp holder, turn the lever (**8**, Fig. 51).
- Pull the socket plug (**4**, Fig. 51) from the bulb (**5**, Fig. 51).
- Then remove the defective bulb (**5**, Fig. 51). Push a new bulb into the opening, paying attention to the locating pins (**7**, Fig. 51). Do not touch the bulb with the bare fingers.
- Push the socket plug (**4**, Fig. 51) onto the pins of the bulb (**5**, Fig. 51).
- Lock the lamp holder again with the lever (**8**, Fig. 51).
- Insert the cover with holder (**3**, Fig. 51) into the slot (**6**, Fig. 51) of the lamp housing and press it in until the retainers (**2**, Fig. 51) engage.

Maintenance and care

Care and cleaning

WARNING - RISK OF ELECTRIC SHOCK

Prevent moisture from penetrating the instrument or keyboard. Disconnect the power cable from the power supply before cleaning or disinfecting the device.

CAUTION - RISK DUE TO CROSS-CONTAMINATION

Parts with which the patient has come into contact during the examination (chin rest, forehead rest) should be cleaned with a disinfectant approved for the purpose. These parts are resistant to cleaning agents categorized as "low" (e.g. suds, quaternary ammonium compounds) and "intermediate" (e.g. alcohol, Javel water, iodine); classification pursuant to: Disinfectants and activity spectrum according to the Center of Disease Control and Prevention, Atlanta, USA.

CAUTION - RISK OF FALSE DIAGNOSIS

Use the supplied dust cover to protect the device against dust when not in use.

CAUTION - PROPERTY DAMAGE

The national disinfecting regulations must be observed in the choice of disinfectants and methods. Please note that some cleaning agents and disinfectants may have an adverse effect on plastic components. Damage caused by such disinfectants is not covered by our warranty. The surfaces of the instrument have been tested to withstand frequent and long-term treatment with alcoholic disinfectants and cleaning agents.

Never use aggressive or abrasive cleaning agents.

Cleaning of optical components

The multilayer T* (T-star) antireflection coating of the optical components (e.g. eyepieces and objectives) results in excellent image quality.
Even slight contamination of the optics or a fingerprint will impair image quality. In order to protect the internal optical elements from dust, never leave the device without the objective, binocular tube or eyepiece attached. After use, cover the device to protect it from dust. Always store objectives, eyepieces and accessories that are not being used in dust-free cases.

The external surfaces of optical components (eyepieces, objectives), can be cleaned as required:

- Dust on the optical surfaces can be removed using a squeeze blower or a clean, grease free brush.
- Thorough cleaning can be performed quickly and easily using a moist, anti-static cleaning cloth.
  Please follow the instructions on the cleaning cloth packaging.

This will enable you to maintain the high image quality of your product.

Cleaning and disinfection of painted surfaces

- All painted surfaces may be cleaned with a damp cloth.
- Do not use aggressive or abrasive cleaning agents.
- Use spray or wipe disinfectants for cleaning and disinfecting the instrument case, foot switch, chin rest and forehead strap.
- The display should be cleaned with a lightly moistened cloth only.

The national disinfecting regulations must be observed for selecting the suitable disinfectant and method of disinfecting to clean the casing and the control panel.
We recommend the use of ethanol 80 % vol or isopropanol 70 % vol for disinfecting.

- Ensure that no moisture penetrates the instrument and the foot switch during cleaning and disinfection.
- Paper pads should be replaced after each patient.

Safety inspections

WARNING - RISK OF ELECTRIC SHOCK

The user is required to have the instrument inspected for safety once a year. Safety inspections may only be carried out by persons authorized by Carl Zeiss Meditec and solely according to the service instructions issued by Carl Zeiss Meditec. For planning and implementing these safety inspections please contact Carl Zeiss Meditec service or your local dealer.

These inspections should also be carried out when the instrument has been out of use for more than one year.

Optional accessories

WARNING - RISK OF OPTICAL RADIATION

Use only accessories and spare parts approved by Carl Zeiss Meditec.

- ACCENTO eyepiece for data display, including cable
- ACCENTO Ergo tube
- Monocular co-observer tube
- Convergent tube f = 140 mm
- Foot switch 1.2m
- Foot switch 5.0 m
- ACCENTO foot switch (only for VISULAS Trion Combi)
- Instrument table IT 1060 (see instrument table user manual)
- Instrument table IT 760 (see instrument table user manual)
- Table mounting for VISULAS 532s/VISULAS YAG III Combi for IT 1060
- Adapter plate for foot switch on IT 1060 or IT 760
- Physician's safety filter for surgical microscope
  - Active physician's safety filter, simple, for Zeiss/Möller-Wedel surgical microscope
  - Active physician's safety filter, double, for Zeiss/Möller-Wedel surgical microscope
  - Fixed physician's safety filter for Zeiss/Möller-Wedel surgical microscope
  - Active physician's safety filter, simple, for Leica/Wild surgical microscope
  - Active physician's safety filter, double, for Leica/Wild surgical microscope
  - Fixed physician's safety filter, for Leica/Wild surgical microscope
- Laser endoprobes
  - Sterile endoprobes, 20 gauge, straight (5 pcs.)
  - Sterile endoprobes, 20 gauge, angled (5 pcs.)
  - Sterile endoprobes, 23 gauge, straight (5 pcs.)
  - Sterile endoprobes, 23 gauge, angled (5 pcs.)
  - Sterile endoprobes, 25 gauge, straight (5 pcs.)

- Contact lenses
  - Mainster Standard 90° contact lens (OMRA-S)
  - Mainster Wide Field 118° contact lens (OMRA-WF)
  - Mainster PRP 165° contact lens (OMRA-PRP 165)
  - Goldmann three mirror contact lens, small (OG3MSA)
  - Goldmann three mirror contact lens (OG3MA)
  - Ritch trabeculoplastic contact lens (ORTA)
  - Abraham capsulotomy contact lens
  - Abraham iridotomy contact lens
- YAG laser safety goggles
- Laser safety goggles Argon / 532
- Laser safety goggles Trion
  - Laser safety goggles 532/561
  - Laser safety goggles 659
- Laser warning lamp (see laser warning lamp addendum)
- Transport case for VISULAS YAG III:
- Breathing shield
- Laser training eye with holder (complete kit with 10 spare capsules, membranes, fundi and irises)
- Spare capsules for laser training eye (25 pc.)
- Spare membranes for laser training eye (25 pc.)
- Spare iris for laser training eye (25 pc.)
- Spare fundi for laser training eye (25 pc.)
- AT 020 applanation tonometer (see AT 020 user manual)
- AT 030 applanation tonometer (see AT 030 user manual)
- Mount for AT 030
- Measuring prism in case (2 prisms)
- 12 V/30 W halogen bulb

A complete, up-to-date list of accessories can be obtained from your dealer.

Contact lenses

WARNING - RISK OF LASER RADIATION

Always hold the contact lens at right angles to the laser beam. Incorrect positioning of the contact lens will cause distortion of the laser focus. This can lead to unwanted side effects.

Never trigger the laser if the aiming beam is not clearly visible in the target area.

A 90 D contact glass (Volk lens) may not be used together with the laser slit lamp.

Always use the correct contact lens for the intended application.

Essential performance

The essential performance features of the instrument are exclusively limited by the parameters and specifications listed in the following. Any other features not contained in this table are not essential performance features.

- Emission of pulsed laser radiation with defined values for pulse length, pulse mode and spot size within a specified energy range.
  - Pulse mode: Single, double or triple pulse
  - Energy range (without attenuation):

    Pulse mode 1: 9.0 to 13.0 mJ (max.)
    Pulse mode 2: 18.0 to 28.0 mJ
    Pulse mode 3: 29.0 to 45.0 mJ
  - Pulse length: < 4 ns (typically 2 ns to 3 ns)
  - Focus diameter 10 µm in air
- Focus shift between aiming beam and therapy beam
  - Posterior: +150 µm (therapy beam focus behind aiming beam)
  - Zero: 0 µm (no focus shift between therapy and aiming beam)
  - Anterior: -150 µm (therapy beam focus in front of aiming beam)
  - Tolerance: ± 25 µm
- Emission of a 4-point aiming beam for exact targeting of the treatment beam (all 4 aiming beam segments are in the focal plane of the slit illumination).
- Focuses of the aiming and treatment beam are concentric to one another.
- Changes in the preselected energy in pulse mode are only possible by turning the rotary knob or tapping on the corresponding symbol.
- Emissions of the treatment beam can only be activated by the hand or foot switch.
- Shutting down and switching off the device by interruptions or fluctuations in the power supply does not present an unacceptable risk.

Technical data

VISULAS YAG III laser system

Wavelength of therapy beam	1064 nm		
Focus shift between aiming beam and therapy beam	Posterior: +150 µm Zero: 0 µm Anterior: -150 µm Tolerance: ± 25 µm		
Mode	Super Gaussian		
Pulse length	< 4 ns (typically 2 ns to 3 ns)		
Pulse mode	Energy (typ.)	Max. pulse repetition rate	Burst frequency
1 (single pulse)	9.0 to 13.0 mJ	2.5 Hz (5 shots/2 s)	-
2 (double pulse)	18.0 to 28.0 mJ	1 Hz (1 shot/2 s)	33 kHz
3 (triple pulse)	29.0 to 45.0 mJ	0.5 Hz (1 shots/2 s)	33 kHz
Energy attenuation	22 levels: 2/4/6/8/10/12/14/16/20/24/28/32/36/40/42/48/56/60/64/70/80/100 % Transmission		
Focus diameter	10 µm in air		
Angle of exit aperture (divergence)	16° (round angle)		
Aiming beam	Wavelength: 660 nm to 680 nm Power: max. 150 µW 4-point aiming beam system for focusing		
NOHD	2 m		
Rated voltage; frequency	100 V to 240 V ± 10 %; 50 Hz/60 Hz		
Rated current	Max. 1.4 A to 0.7 A, transient max. 2.8 A (< 1 s)		
Fuses	2x T 3.15 AE, 5 x 20 mm in accordance with IEC 60127		
Protection class	I		
Protection mode	IP 20		
Instrument type	B (in accordance with DIN EN 60601-1)		
Dimensions of laser console (H x W x D)	135 mm x 210 mm x 330 mm		
Laser console weight	4 kg		

LSL YAG III laser slit lamp

Instrument base motion range	Lateral: 110 mm Horizontal: 90 mm Vertical: 30 mm
Slit lamp	12 V, 30 W halogen lamp, adjustable Slit length variable in steps of: 1/3/5/9/14 mm Special slit: 1 x 5 mm, ± 45°, 90° Slit width continuously adjustable: 0 mm to 14 mm Slit image rotation: 0°, ± 45°, 90°
Corneal microscope	Magnification with magnification changer 5x/8x/12x/20x/32x for 10x eyepiece and f = 140 mm tube. Parallel tube f = 140 mm with pupil distance adjustment 55 mm to 78 mm Optional: convergence tube Optional: eyepieces 12.5x
Dimensions (including laser head) (H x W x D)	625 mm x 300 mm x 450 mm
Weight (including laser head, tube, eyepieces)	11 kg
Electrical power supply	Electrical power is supplied via the VISULAS YAG III laser console.
Protection mode	IP 20

LSL YAG III Combi/LSL Trion Combi laser slit lamp

Instrument base motion range	Lateral: 110 mm Horizontal: 90 mm Vertical: 30 mm
Slit lamp	12 V, 30 W halogen lamp, adjustable Slit length variable in steps of: 1/3/5/9/14 mm Special slit: 1 x 5 mm, ± 45°, 90° Slit width continuously adjustable: 0 mm to 14 mm Slit image rotation: 0°, ± 45°, 90°
Corneal microscope	Magnification with magnification changer 5x/8x/12x/20x/32x for 10x eyepiece and f = 140 mm tube. Parallel tube f = 140 mm with pupil distance adjustment 55 mm to 78 mm. Optional: convergence tube Optional: eyepieces 12.5x
Dimensions (including laser head) (H x W x D)	623 mm x 350 mm x 400 mm
Laser treatment spot size	Continuously adjustable from 50 µm to 1000 µm (without contact lens) parfocal, larger spot sizes depending on contact lens used
Laser beam delivery	Interlaced with slit illumination system
Weight (including laser head, tube, eyepieces)	12.0 kg
Electrical power supply	Electrical power is supplied via the VISULAS YAG III laser console.
Protection mode	IP 20

Ambient conditions for intended use of all devices

Temperature	+10 °C to +35 °C
Relative humidity	30 % to 90 %, non-condensing
Altitude	up to 3000 m above sea level

Ambient conditions for the storage of all devices without original packaging

Temperature	-10 °C to +55 °C
Relative humidity	10 % to 95 %, non-condensing

Ambient conditions for the storage and transport of all devices in original packaging

Temperature	-40 °C to +70 °C
Relative humidity	10 % to 95 %, non-condensing

Electromagnetic compatibility

Special precautionary measures apply to this device with regard to electromagnetic compatibility (EMC). To avoid electromagnetic disturbances, the device may only be installed, operated and serviced in accordance with the user manual and using the components supplied by Carl Zeiss Meditec.

CAUTION - GENERAL HAZARDS

Portable and mobile RF communications equipment may affect the device. When operating radio devices or components for radio transmission, observe the distances to all system components recommended in this section.

CAUTION - RISK OF ELECTROMAGNETIC RADIATION

The VISULAS YAG may not be placed next to or stacked together with other equipment with the exception of device configurations described in this user manual. If operation close to or on top of other devices is necessary, the VISULAS YAG III must be closely observed to monitor proper functioning in this configuration.

Replacement cables may only be purchased at Carl Zeiss Meditec.

The use of accessories, all types of transducers and cables not specified in this user manual or not sold by Carl Zeiss Meditec as replacement parts may result in higher emissions or reduced immunity of the device.

Relevant accessories, cables and transducers:

- Power cable of laser console VISULAS YAG III (2,5 m)
- Foot switch with connection cable (1,2 m)

The following guideline applies only to the accessories specified for and delivered with the device from Carl Zeiss Meditec.

Guidance and manufacturer's declaration - electromagnetic emissions		
The VISULAS YAG III is intended for use in the electromagnetic environment specified below. The user of the VISULAS YAG III should assure that it is used in such an environment		
Emissions test	**Compliance**	**Electromagnetic environment - guidance**
RF emissions CISPR 11	Group 1	The VISULAS YAG III uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11	Class B	The VISULAS YAG III is suitable for use in all establishments, including domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic emissions IEC 61000-3-2	Class A	
Voltage fluctuations/flicker emissions IEC 61000-3-3	Complies	

Guidance and manufacturer's declaration - electromagnetic immunity			
The VISULAS YAG III is intended for use in the electromagnetic environment specified below. The user of the VISULAS YAG III should assure that it is used in such an environment			
Immunity test	**IEC 60601 test level**	**Compliance level**	**Electromagnetic environment - guidance**
Electrostatic discharge (ESD) IEC 61000-4-2	± 6 kV contact ± 8 kV air	± 6 kV contact ± 8 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30 %.
Electrical fast transient/burst IEC 61000-4-4	± 2 kV for power supply lines ± 1 kV for input/output lines	± 2 kV for power supply lines ± 1 kV for input/output lines	Mains power quality should be that of typical commercial or hospital environments.
Surge IEC 61000-4-5	± 1 kV line(s) to line(s) ± 2 kV line(s) to ground	± 1 kV line(s) to line(s) ± 2 kV line(s) to ground	Mains power quality should be that of typical commercial or hospital environments.
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	< 5 % UT (> 95 % dip in UT) for 0.5 cycle 40 % U_T (60 % dip in U_T) for 5 cycles 70 % U_T (30 % dip in U_T) for 25 cycles < 5 % U_T (> 95 % dip in U_T) for 5 s	< 5 % UT (> 95 % dip in UT) for 0.5 cycle 40 % U_T (60 % dip in U_T) for 5 cycles 70 % U_T (30 % dip in U_T) for 25 cycles < 5 % U_T (> 95 % dip in U_T) for 5 s	Mains power quality should be that of typical commercial or hospital environments. If the user of the VISULAS YAG III requires continued operation during power mains interruptions, it is recommended that the VISULAS YAG III be powered from an uninterruptible power supply or a battery.
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.
Note: U_T is the a.c. mains voltage prior to application of the test level.			

Guidance and manufacturer's declaration - electromagnetic immunity			
The VISULAS YAG III is intended for use in the electromagnetic environment specified below. The user of the VISULAS YAG III should assure that it is used in such an environment			
Immunity test	**IEC 60601-1-2 test level**	**Compliance level**	**Electromagnetic environment - guidance**
Conducted RF IEC 61000-4-6	3 V/m 150 kHz to 80 MHz	3 V	Portable and mobile RF communications equipment should be used no closer to any part of the VISULAS YAG III, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. **Recommended separation distance** $d = 1.2 \sqrt{P}$
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2.5 GHz	3 V/m	$d = 1,2 \sqrt{P}$ 80 MHz to 800 MHz $d = 2,3 \sqrt{P}$ 800 MHz to 2.5 GHz where P is the maximum 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 RF transmitters, as determined by an electromagnetic site survey[a], should be less than the compliance level in each frequency range[b]. Interference may occur in the vicinity of equipment marked with the following symbol: 
Note 1:	At 80 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.		

[a] 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 asses the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the VISULAS YAG III is used exceeds the applicable RF compliance level above, the VISULAS YAG III should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as re-orienting or relocating the VISULAS YAG III.

[b] Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.

Recommended separation distances between portable and mobile RF telecommunications equipment and VISULAS YAG III

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

Rated maximum output power of transmitter W	Separation distance according to frequency of transmitter m		
	150 kHz to 80 MHz	80 MHz to 800 MHz	800 MHz to 2.5 GHz
	$d = 1.2 \sqrt{P}$	$d = 1.2 \sqrt{P}$	$d = 2.3 \sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.37	0.37	0.74
1	1.2	1.2	2.3
10	3.7	3.7	7.4
100	12	12	23

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 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.

Abbreviations/Glossary

CISPR	Comité international special sur les perturbations radioelectrique (Special international committee on radio interference)
D	Diopter
DIN	Deutsches Institut für Normung (German Institute for Standardization)
EMC	Electromagnetic compatibility
EN	European Standard
Fig.	Figure
IEC	International Electrotechnical Commission
LSL	Laser split lamp
MPG	Medizinproduktegesetz (German Medical Products Act)
NOHD	Nominal Ocular Hazard Distance (safety distance from laser source)
PC	Personal computer
RF	Radio frequency
UMDNS	Universal Medical Device Nomenclature System
YAG	Yttrium aluminium garnet

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VISULAS YAG III
Specifications subject to change

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