NIDEK

Green Laser Photocoagulator GYC-500

Attachable Delivery Unit

OPERATOR'S MANUAL

[Supplement to the GYC-500 Operator's Manual]

Original instructions

NIDEK CO., LTD.

NIDEK CO., LTD. **(Manufacturer)**	: 34-14 Maehama, Hiroishi-cho, Gamagori, Aichi 443-0038, JAPAN Telephone: +81-533-67-6611 URL: https://www.nidek.com/
NIDEK INC. **(United States Agent)**	: 2040 Corporate Court, San Jose, CA 95131, U.S.A. Telephone: +1-800-223-9044 (USA Only) URL: https://usa.nidek.com/
NIDEK S.A. **(EU Authorized Representative)**	: Ecoparc, rue Benjamin Franklin, 94370 Sucy En Brie, FRANCE

CE
0344

2022-09-30
17402-P9C2-A0
Printed in Japan

Before Use

This Operator's Manual describes the operating procedure, safety precautions, and specifications of the delivery unit that comprises the photocoagulation system with the NIDEK Green Laser Photocoagulator GYC-500.

Be sure to read the operator's manual prior to operation of the device to understand the safety precautions and operating procedures thoroughly.

Keep this manual handy for reference.

If you encounter any problems or have questions about the device, please contact NIDEK or your authorized distributor.

Table of Contents

1 SAFETY PRECAUTIONS

1.1 For Safe Use

⚠ **BEFORE USE, READ THIS MANUAL.**
Be sure to read the operator's manual prior to operation of the device to understand the safety precautions and operating procedures thoroughly. Keep this manual handy for reference.

In this manual, signal words are used to designate the degree or level of safety alerting. The definitions are as follows.
⚠ **WARNING** Indicates a potentially hazardous situation which, if not avoided, may result in death or serious injury.
⚠ **CAUTION** Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or property damage accident.
Even situations indicated by ⚠ **CAUTION** may result in serious injury under certain conditions. Safety precautions must be strictly followed at all times.

1.2 Usage Precautions

Before use

⚠ WARNING

- If any serious device-related incident occurs, report it to NIDEK and the competent authority in the country where the user or patient, or both reside.
- Use of the device is limited to treatment of ocular diseases by qualified physicians in accordance with the instructions in this Operator's Manual and the Operator's Manual of the main laser device. Physicians are responsible for any applications other than those specified in this Operator's Manual.

  Use of the device outside the scope may cause adverse events and adverse device effects.
- The Operator's Manuals of the main laser device and delivery unit must be read before use and the safety precautions and operating procedures must be thoroughly understood.

  Use of the device outside the scope may cause an accidental exposure to laser beam, adverse events, and adverse device effects.
- Only service personnel trained by NIDEK are allowed to install or adjust the device.
- Use the device with at least one assistant in the room.

  This is in precaution to a case such as electric shock. It is desirable that the assistant is trained in resuscitation.
- Backup measures for the scheduled surgery must be prepared should unexpected failure of the device occur.
- Pay attention when using the device with other equipment that comes into contact with the patient.

  Electromagnetic wave or other interference may cause danger.

  Using an electrocautery for coagulation may cause electric shock or burns to the contact area.
- Never use accessories other than those specified by NIDEK.

  Use of the device outside the scope may cause adverse events and adverse device effects.

  "6.1 Specifications" (page 37)
- Never modify or touch the internal structure of the device.

  Electric shock or malfunction may result.
- Prior to starting the device, make sure that there is no flammable anesthetic gas in the operating room.

  Laser emission may cause fire or explosion.
- All personnel in the operating room other than the operator and patient must wear the recommended safety goggles during operation of the device to protect their eyes. In addition, instruct them not to look directly at the laser beam even while wearing the safety goggles because eyes may still be damaged.

  Recommended goggles: Wavelength 532 nm, OD ≥ 5, 532 DI LB5 (En207)
- To prevent unexpected accidents, prior to starting the device, perform both the operation check and function check, and record the results.
- To prevent accidents caused by unauthorized personnel, never leave the device unattended while it is in operation. If the operator has to be away from the device, remove the key card and keep it in a secure place.
- Prior to surgery, provide the patient with sufficient information about the expected results and possible adverse events.
- Connect the power plug to a grounded outlet.

  Electric shock or fire may occur in the event of malfunction or power leakage.

⚠ CAUTION

- Install the device in an environment that meets the following conditions:
  - A location that is not exposed to direct sunlight or ultraviolet radiation
  - A location that is not exposed to water or rain
  - A location that is free from condensation
  - A location that is free from chemicals or organic solvent
  - A location that is free from salt, sulfur, corrosive gas, or large amount of dust in the air
  - A location that is level, stable surface free from vibration and bumping
  - A location that meets the specifications

  "6.1 Specifications" (page 37)
- After unpacking or changing the location of the device, let the device stand at room temperature to prevent condensation.

  Use of the device outside the scope may cause device error.
- Avoid installing the device where it is exposed to direct air flow from an air conditioner.

  Changes in temperature may result in condensation inside the device or adversely affect the functionalities.
- Never tilt the device 10º or more when installing or moving it.

  The device may topple causing injury or malfunction.
- Maintain 10 cm or more between walls and the air vents located on both front and rear sides of the device to allow the device to cool down sufficiently.
- Install the system where the power outlet that the power plug is inserted into is easily accessible during use. In addition, ensure that the power plug can be disconnected without the use of any tool.

  Otherwise, it may interfere with disconnection of the system from the input power source in case of abnormality.
- Securely connect the cords and cables to the specified connectors.

  Malfunction may result.
- When connecting or disconnecting the cords and cables, always hold them by the plug, not the cord, with dry hands. Do not coil the cord too tightly, or crush or pinch it with heavy objects.

  Electric shock or fire may result.
- Do not run the cords or cables near any device that emits heat.

  The casing may melt.
- If the internal wires are exposed, replace the cords and cables with new ones.

  Electric shock or fire may result.
- Immediately replace the cords and cables if the power is intermittent, or the cord or plug is hot to the touch.

  Malfunction or fire may result.
- Never drag the main laser device or delivery unit by the cords or cables.

  Cables may break and the device may topple causing injury or malfunction.
- Be sure to use a power outlet that meets the specified power requirements.

  The device may not work properly, or malfunction or fire may result.
- Never use power strips or extension cables for power supply of the device.

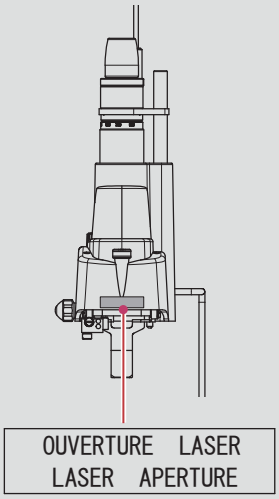
  The electrical safety may be lowered.

During use

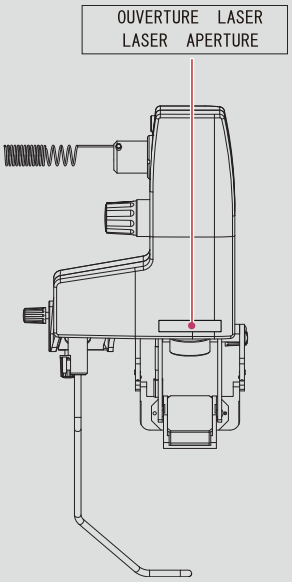
⚠ WARNING

- Use of controls or adjustments, or performance of procedures other than those specified herein may result in hazardous radiation exposure.
- To prevent accidental laser exposure, never look directly at the aiming beam emitted from the laser aperture, or point the beam toward others. Always pay attention to the laser beam direction.

For NIDEK or ZEISS slit lamp



For HAAG slit lamp



- When the treatment beam (wavelength: 532 nm) is applied to tissue, the following symptoms may occur. Always pay attention to the laser beam direction.

  Eye symptoms: Damage to the cornea and such, or blindness

  Skin symptoms: Pain, burn injury

- Only physicians trained by NIDEK are allowed to perform eye observation. Do not project unnecessarily high-intensity light on the patient's eye.

  Damage to the patient's retina may occur.

- Be sure to adjust the eyepiece diopter for each eye and do not turn the diopter adjustment ring from the - side to the + side.

  Inaccurate diopter adjustment may adversely affect laser beam emission.

⚠ CAUTION

- To ensure laser beam emission from the delivery unit is as selected, be sure to connect the fiber optic cable and delivery unit cable to the corresponding fiber optic cable connector and delivery unit connector.
- Attachable delivery units must be connected to CH1.
- Do not coil the fiber optic cable with a radius of 10 cm or less.

  Breakage or deterioration may result.
- Do not impact the fiber optic cable such as by dropping or bumping it.

  Breakage or deterioration may result.
- Do not damage the end surface of the fiber optic cable plug.

  Laser beam transmittance may be reduced.
- If any abnormal indication (other than treatment beam emission condition) is displayed on the control box during use of the device, follow the applicable instructions.

  Refer to the Operator's Manual of the main laser device.
- Confirm that there is no reflective object in the laser optical path.

  Exposure to the reflected laser beam may result.
- Start the treatment beam from the lowest power output, then gradually increase the power until the desired effect is obtained. Be sure to return the output power to the lowest after every operation.

  Excessively intense treatment beam may be emitted.
- When using a wide field indirect lens for laser emission, refer to and follow the recommended settings provided by the manufacturer of the lens.

  The cornea and crystalline lens may become damaged.
- When laser beam emission is not intended (such as when observing the eye), set the main laser device to STANDBY mode so that laser emission is not possible.

  Accidental exposure to the laser beam may result.
- Perform the following procedure to confirm that the device is in a proper condition for laser beam emission:

  - Project the aiming beam on a flat surface that is not reflective. Then confirm that the intensity is even over the entire spot as shown in the figure to the right.
  - Confirm that the intensity is not lowered and the spot is not obscured.
  - Confirm that the outline of the aiming beam is clear when the spot is in focus.

  If any abnormality is found, contact NIDEK or your authorized distributor for maintenance and calibration.
- Be sure to pull the slit lamp all the way toward the operator before the patient is seated.

  This is to prevent the slit lamp from coming into contact with the patient's face.
- Be sure to set the light intensity to the minimum level (not turning off) at the beginning, and raise it as necessary. Be sure to return the light intensity to the minimum level after every examination.

  The patient may suffer from excessive brightness at the beginning of the examination. A high-intensity light may cause thermal and photochemical damage to the patient's retina.
- When operating a delivery unit, follow the instructions below:
  - Set the light intensity as low as possible.
  - If absolute amount of light intensity needs to be obtained, dilate the patient's pupil.
  - Minimize the illumination area (slit width, slit length) as much as possible.
  - Maximize the angle between the illumination light and visual axis as much as possible when projecting the illumination light.
  - Use an illumination filter as necessary.
- Pay particular attention when projecting the illumination light into the eyes of infants, aphakic patients and patients with eye disease.

⚠ CAUTION

- For models that incorporate a halogen lamp as an illumination lamp, do not unnecessarily touch the lamp housing during observation.

  Regardless of light intensity, if the light is left illuminated, the lamp housing becomes hot and burn injury may result. As a general guide, if the light is kept on for 10 minutes, leave it off for 20 minutes to cool down.

- Before observing each patient, clean the forehead rest, chinrest, and grips of the slit lamp with clean gauze or absorbent cotton.
- Before transporting the delivery unit, be sure to lock all the movable parts of the slit lamp.

  Impact damage or injury, or optic axis deviation may result.

- Never use any contact lens with a laser spot magnification of 0.85 and less.

  Damage to the patient's retina may occur.

- When the laser beam is emitted for photocoagulation using a slit lamp, in some instances, the treatment beam may be observed in the visual field.

  This occurs when the laser beam that is reflected from the contact lens enters the observation optical system. The symptom differs depending on the contact lens type, and condition in which the laser beam enters the contact lens. The reflected laser beam is attenuated to a safe level by the protective filter incorporated in the slit lamp.

  If the light is felt to be overly intense, immediately stop using the device, and contact NIDEK to have it checked.

- When attaching the delivery unit to the HAAG 900 BQ slit lamp equipped with the Stereo Variator (optional accessory provided by HAAG STREIT), be sure to set the total magnification to 10 times magnification or greater.

  Otherwise, extremely weak scattered light may be observed in the visual field.

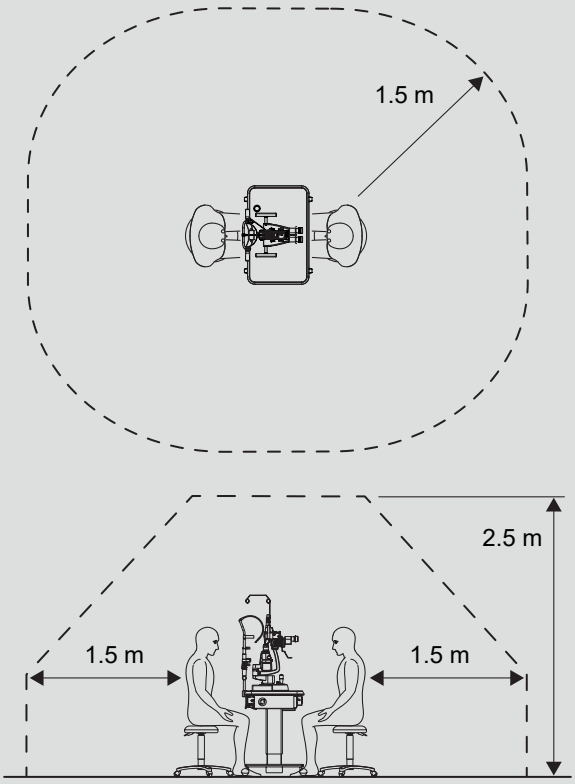
⚠ CAUTION

- Patient environment

  The patient environment is the volume of space in which contact can occur between the patient and any part of the device (including connecting devices) or between the patient and any other person(s) touching the device (including connecting devices).

  Use devices that comply with IEC 60601-1 in the patient environment.

  If any device that does not comply with IEC 60601-1 is to be used, use an isolation transformer or common protective grounding.



After use

⚠ CAUTION

- After using the device, turn off the main laser device and place the dust cover over the delivery unit.

  Dust may affect the performance of laser beam emission.

- After using the device, remove the power cord plug from the power outlet to disconnect the device from power source.
- When removing the power cord plug from the power outlet, maintain separation of 50 cm or more.

  Working in an insufficient space may result in injury.

- Follow the instructions below for transportation of the device:
  - Disconnect the delivery unit from the main laser device and store them separately in their shipping cartons.

    Injury or malfunction may result.
  - Do not bump the delivery unit or main laser device even when they are stored in their shipping cartons.

    Optical axis may be shifted.
  - Care should be taken so that the temperature varies as little as possible during transport.

    Changes in temperature may result in condensation inside the device or adversely affect the functionalities.

Maintenance

⚠ WARNING

- To protect the exterior and maintain the operability of the device, do not use organic or abrasive solvents for cleaning.
- Never damage the laser reflective mirror of the delivery unit to prevent reduction in laser performance.

⚠ CAUTION

- Only service personnel trained by NIDEK are allowed to repair the device.

  NIDEK assumes no responsibility for any adverse events resulting from improper servicing.
- Before maintenance, be sure to secure sufficient work space and turn off power to the device. Also make sure that there is no patient around the device.

  Working in insufficient space may cause injury.
- Use the specified fuses only.

  Malfunction or fire may result.
- When sending the device back to NIDEK for repair or maintenance, clean the surfaces of the device (especially, the areas that come into contact with the patient) with a clean cloth dampened with rubbing alcohol.
- To ensure the continued safe use of the device, the manager of this device must make sure that maintenance and preventive inspection are performed at least once a year.

  For details of maintenance and preventive inspection, ask NIDEK or your authorized distributor. If the manager of this device cannot perform the maintenance and preventive inspection, contact NIDEK or your authorized distributor.

Disposal

⚠ CAUTION

- When disposing of the device, contact NIDEK or your authorized distributor.
- Follow local governing ordinances and recycling regulations regarding disposal or recycling of device components when disposing of the foot switch or delivery unit.

  Inappropriate disposal may contaminate the environment.

  For details, contact NIDEK or your authorized distributor.
- When disposing of the packing materials, sort them by material and follow local governing ordinances and recycling regulations.

  Inappropriate disposal may contaminate the environment.

1.3 Safety Devices

- Emission indicator

  While the device is turned on (the start button of the main laser device is turned on), the emission indicator lights up to call attention to the operator.

- Protective filter

  Protects the operator's eye from the reflected treatment beam.

  The following types are available:

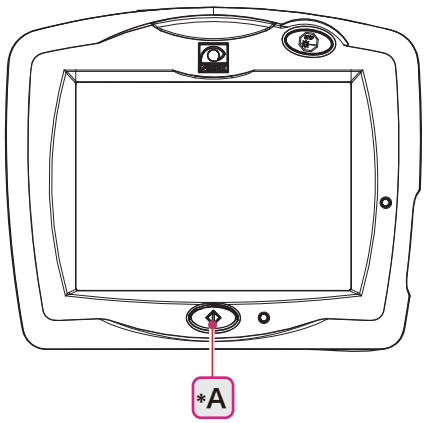
Type	Outline
Electrically-powered	The protective filter is automatically inserted into the optical path during photocoagulation. If the protective filter fails to be inserted due to a device abnormality, a series of warning beeps sounds and an error message appears preventing treatment beam emission.
Fixed	Equipped with the fixed protective filter.

  Selectable protective filter types differ depending on the delivery unit. For details, contact NIDEK or your authorized distributor.

- Manual reset function

  When the device operation has been interrupted by an unexpected event such as a blackout, this function prevents automatic resumption of operation after the interruption cause has been cleared.

  Press the button (*A) to resume operation.



1.4 Labels and Symbols

■ To call attention to users, labels and indications are provided on the device. If labels are peeling off, characters are fading, or otherwise becoming illegible, contact NIDEK or your authorized distributor.

	Indicates that the operator is advised to refer to the related instructions in the operator's manual.
	Indicates cautionary information.
	Indicates the state of the master switch. When the switch is turned to the side of this symbol, power is not supplied to the device.
	Indicates the state of the master switch. When the switch is turned to the side of this symbol, power is supplied to the device.
	The device is in normal condition while this indicator is on, and the device is in abnormal condition when it is blinking.
MD	Medical device
EC REP	EU Authorized Representative

2 INTRODUCTION

2.1 Outline

■ The delivery unit is connected to the Green Laser Photocoagulator GYC-500 to comprise the photocoagulation system and to treat affected areas using a slit lamp.

The photocoagulation system enables photocoagulation using a green laser beam (532 nm) while observing the patient's eye with the slit lamp. In order to reduce damages to the ocular media, the optical system (SOLIC*1) that ensures low laser power density on the anterior segment is incorporated.

The following delivery units are available:

Delivery unit	Outline
Attachable delivery unit	A delivery unit to be attached to an existing slit lamp mounted on an existing motorized optical table. The delivery unit is then connected to the main laser device to comprise the photocoagulation system. The following types are available: • NIDEK SL-1800/SL-1600 type • ZEISS SL130 type • ZEISS 30 SL/M type • HAAG 900 series type

*1. Safety Optics with Low Impact on Cornea. Not available for the attachable delivery for HAAG 900 series.

2.2 Intended Use

- The delivery unit connected to the specified main laser device is intended to be used in ophthalmic surgical procedures including retinal and macular photocoagulation, iridotomy and trabeculoplasty.

2.3 Intended Patient Population

- In accordance with the GYC-500 Operator's Manual

2.4 Intended User Profile

- In accordance with the GYC-500 Operator's Manual

2.5 Contraindications and Precautions in Patient Selection

- For contraindications and precautions in patient selection, refer to the Operator's Manual of the main laser device.

2.6 Adverse Events and Adverse Device Effects

- Possible adverse events and adverse device effects may include, but are not limited to the following:

○ Adverse device effects

If any abnormality is found with the main laser device or delivery unit during the pre-operation check, do not use them.

If the main laser device or delivery unit becomes inoperable due to malfunction, laser beam emission may be interrupted or need to be reattempted.

If the main laser device or delivery unit fails, intended treatment results may not be obtained and health hazards or unexpected adverse events described in [Adverse events] below may result.

○ Adverse events

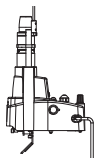
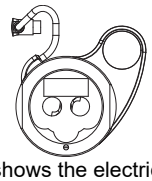
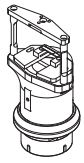
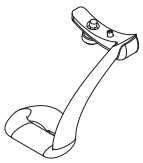
For adverse events, refer to the Operator's Manual of the main laser device.

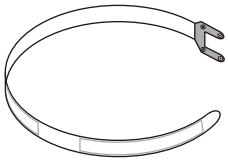
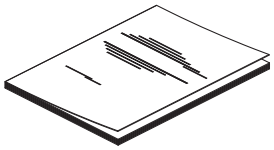
2.7 Packed Contents

■ The following are included in the standard configuration. Check the contents before use.

The illustration shows the NIDEK SL-1800 type. Depending on the delivery unit, the appearance may differ.

2.7.1 Attachable delivery unit

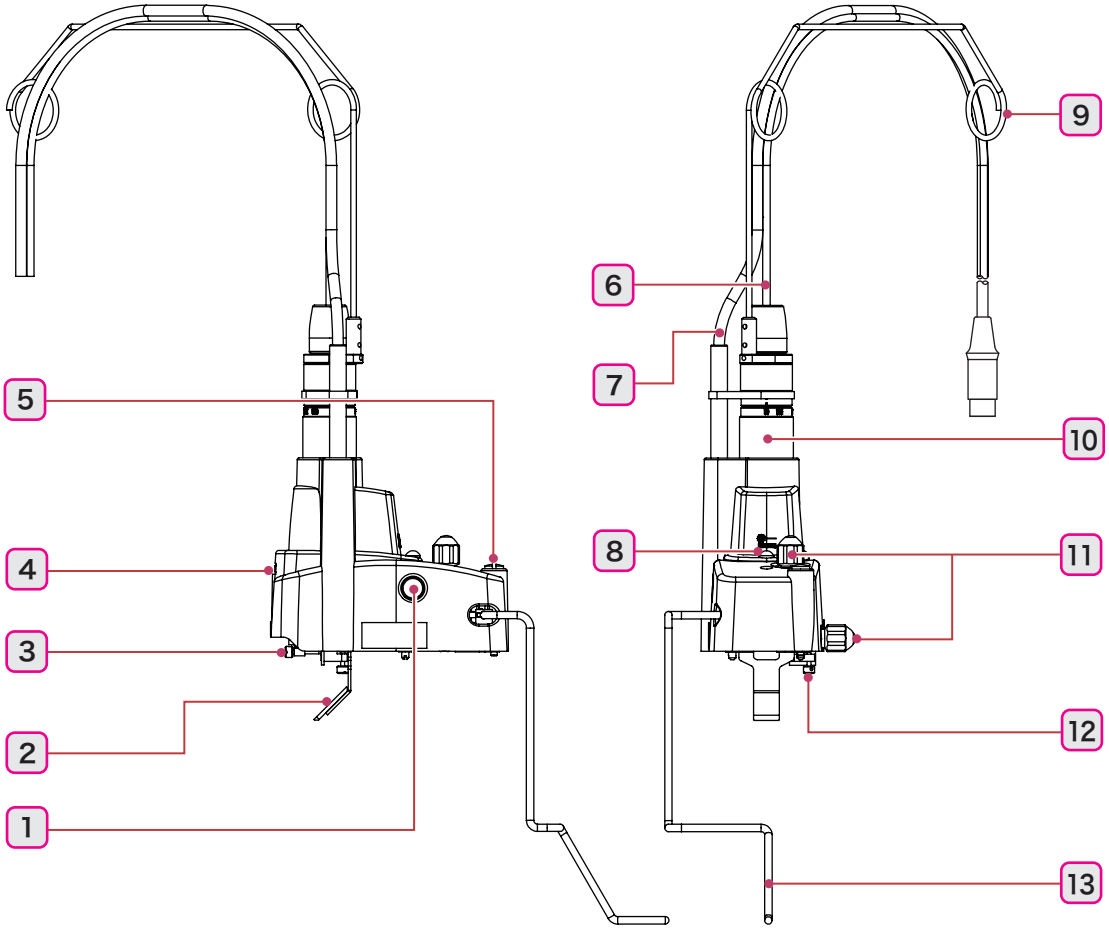
Part name	Quantity	Appearance
Photocoagulation unit	1 unit	
Protective filter (Not supplied with the HAAG 900 series type)	1 unit	 The illustration shows the electrically-powered type.
Split mirror illumination unit (included depending on user preference) (Those for the SL-1800 or HAAG 900BQ do not come with the device.)	1 unit	
Finger rest (Not supplied with the HAAG 900 series type)	1 unit	
Cable cover (Not supplied with the HAAG 900 series type)	1 unit	
Fixation pin (Supplied only with the HAAG 900 series type)	1 unit	
Fiber optic cable	1 unit	
Arm rest	1 unit	

Part name	Quantity	Appearance
Head belt	1 unit	
Operator’s Manual	1 volume	

3 DEVICE CONFIGURATION

3.1 Attachable Delivery Unit

3.1.1 NIDEK SL-1800/SL-1600 type



1 Filter port

The protective filter cable is connected here.

2 Laser reflective mirror

Guides the laser beam into the eye.

3 Origin point control (horizontal)

Used to adjust the laser beam position to the center of the visual field in horizontal direction.

4 Laser focus control

Used to align the focus of the laser beam with the focus of the slit lamp.

5 Fastening screw

Used to fasten the delivery unit to the slit lamp.

6 Fiber optic cable

Delivers the laser beam from the main laser device to the delivery unit.

7 Delivery unit cable

The cable used for the delivery unit identification and communication between the main laser device.

8 Emission indicator

Lights up while the main laser device is turned on.

9 Fiber optic cable guide

Holds the fiber optic cable and delivery unit cable in place that run from the main laser device.

10 Spot size control

Used to adjust the spot size of the laser beam.

The position and structure of the control may differ depending on the model.

11 Laser beam origin point control

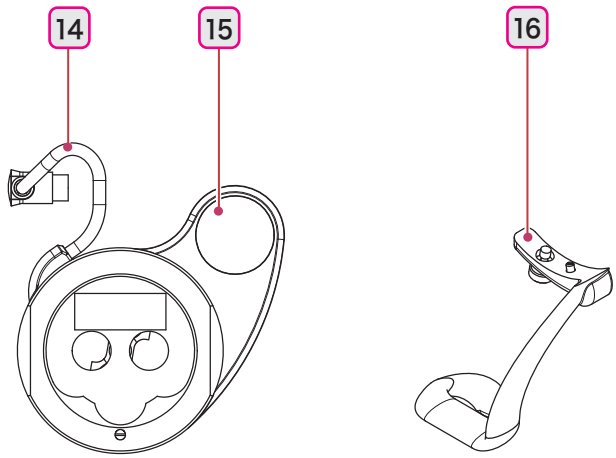
Used to adjust the origin point of the laser beam.

12 Origin point control (vertical)

Used to adjust the laser beam position to the center of the visual field in vertical direction.

13 Micromanipulator lever

Used for fine adjustment of the laser beam position. When the micromanipulator lever is released, the laser beam position returns to the center of the visual field.



14 Protective filter connecting cable

Connect this cable to the filter port of the delivery unit.

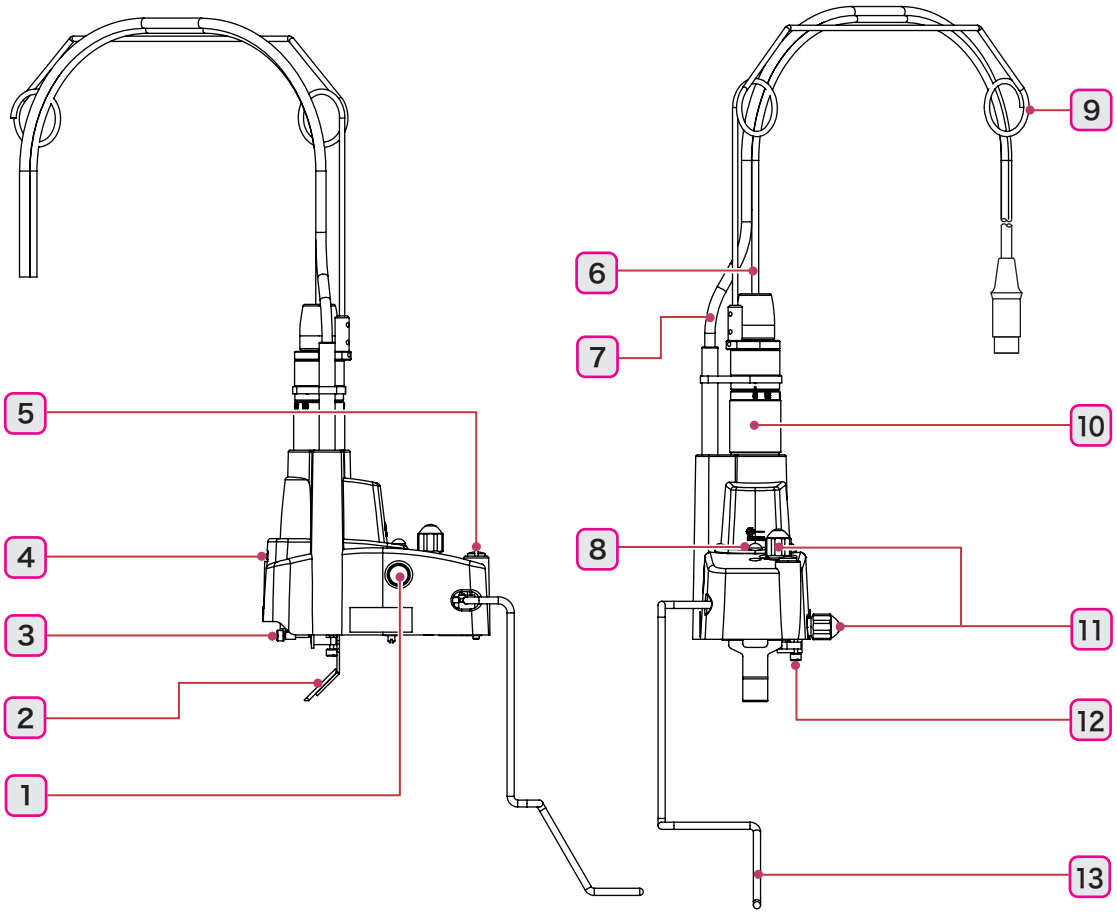
15 Protective filter (electrically-powered type)

Protects the operator’s eye from the reflected treatment beam.

16 Finger rest

Placing a finger here facilitates stable operation of the micromanipulator lever.

3.1.2 ZEISS SL130 type



1 Filter port

The protective filter cable is connected here.

2 Laser reflective mirror

Guides the laser beam into the eye.

3 Origin point control (horizontal)

Used to adjust the laser beam position to the center of the visual field in horizontal direction.

4 Laser focus control

Used to align the focus of the laser beam with the focus of the slit lamp.

5 Fastening screw

Used to fasten the delivery unit to the slit lamp.

6 Fiber optic cable

Delivers the laser beam from the main laser device to the delivery unit.

7 Delivery unit cable

The cable used for the delivery unit identification and communication between the main laser device.

8 Emission indicator

Lights up while the main laser device is turned on.

9 Fiber optic cable guide

Holds the fiber optic cable and delivery unit cable in place that run from the main laser device.

10 Spot size control

Used to adjust the spot size of the laser beam.

The position and structure of the control may differ depending on the model.

11 Laser beam origin point control

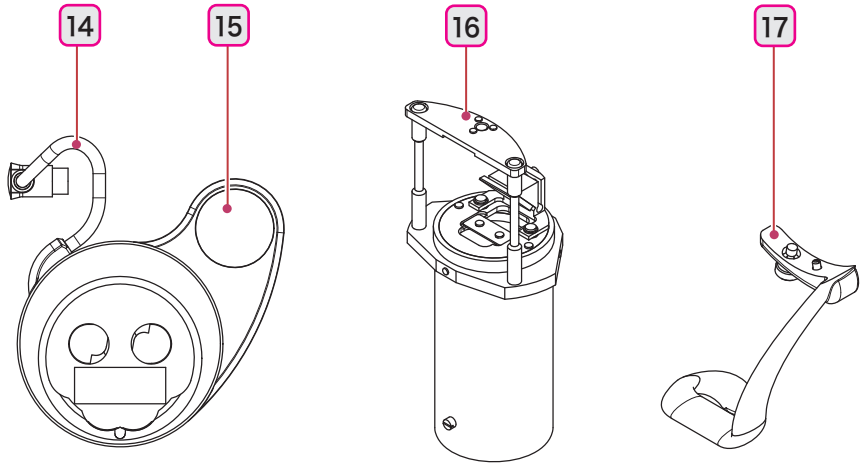
Used to adjust the origin point of the laser beam.

12 Origin point control (vertical)

Used to adjust the laser beam position to the center of the visual field in vertical direction.

13 Micromanipulator lever

Used for fine adjustment of the laser beam position. When the micromanipulator lever is released, the laser beam position returns to the center of the visual field.



14 Protective filter connecting cable

Connect this cable to the filter port of the delivery unit.

15 Protective filter (electrically-powered type)

Protects the operator’s eye from the reflected treatment beam.

16 Split mirror illumination unit

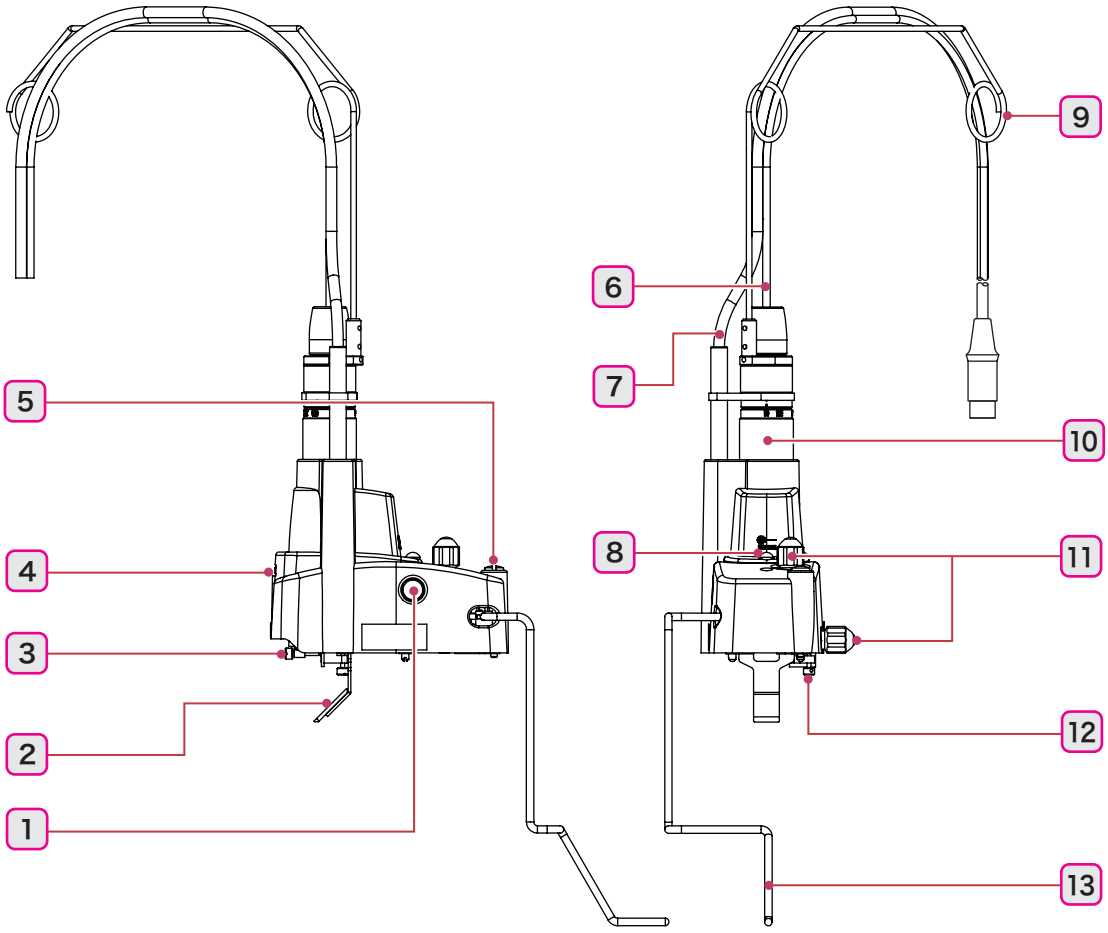
Delivers the illumination light into the patient’s eye for observation.

The delivery unit may be ordered with or without the split mirror illumination unit.

17 Finger rest

Placing a finger here facilitates stable operation of the micromanipulator lever.

3.1.3 ZEISS 30 SL/M type



1 Filter port

The protective filter cable is connected here.

2 Laser reflective mirror

Guides the laser beam into the eye.

3 Origin point control (horizontal)

Used to adjust the laser beam position to the center of the visual field in horizontal direction.

4 Laser focus control

Used to align the focus of the laser beam with the focus of the slit lamp.

5 Fastening screw

Used to fasten the delivery unit to the slit lamp.

6 Fiber optic cable

Delivers the laser beam from the main laser device to the delivery unit.

7 Delivery unit cable

The cable used for the delivery unit identification and communication between the main laser device.

8 Emission indicator

Lights up while the main laser device is turned on.

9 Fiber optic cable guide

Holds the fiber optic cable and delivery unit cable in place that run from the main laser device.

10 Spot size control

Used to adjust the spot size of the laser beam.

The position and structure of the control may differ depending on the model.

11 Laser beam origin point control

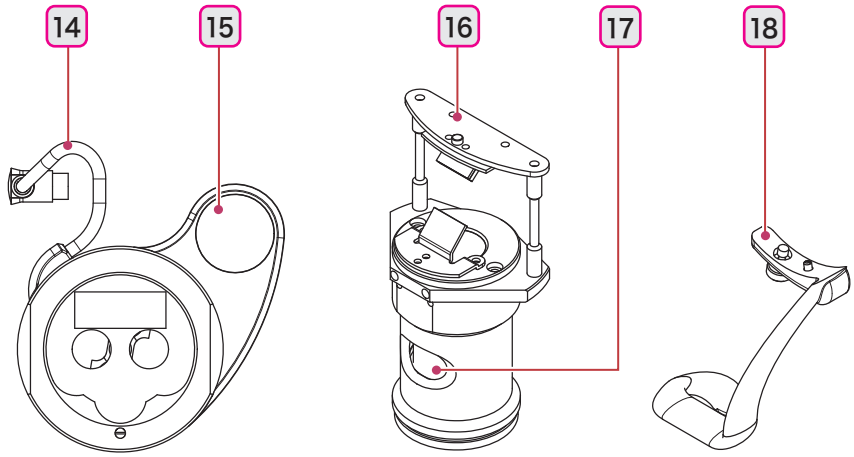
Used to adjust the origin point of the laser beam.

12 Origin point control (vertical)

Used to adjust the laser beam position to the center of the visual field in vertical direction.

13 Micromanipulator lever

Used for fine adjustment of the laser beam position. When the micromanipulator lever is released, the laser beam position returns to the center of the visual field.



14 Protective filter connecting cable

Connect this cable to the filter port of the delivery unit.

15 Protective filter (electrically-powered type)

Protects the operator’s eye from the reflected treatment beam.

16 Split mirror illumination unit

Delivers the illumination light into the patient’s eye for observation.

The delivery unit may be ordered with or without the split mirror illumination unit.

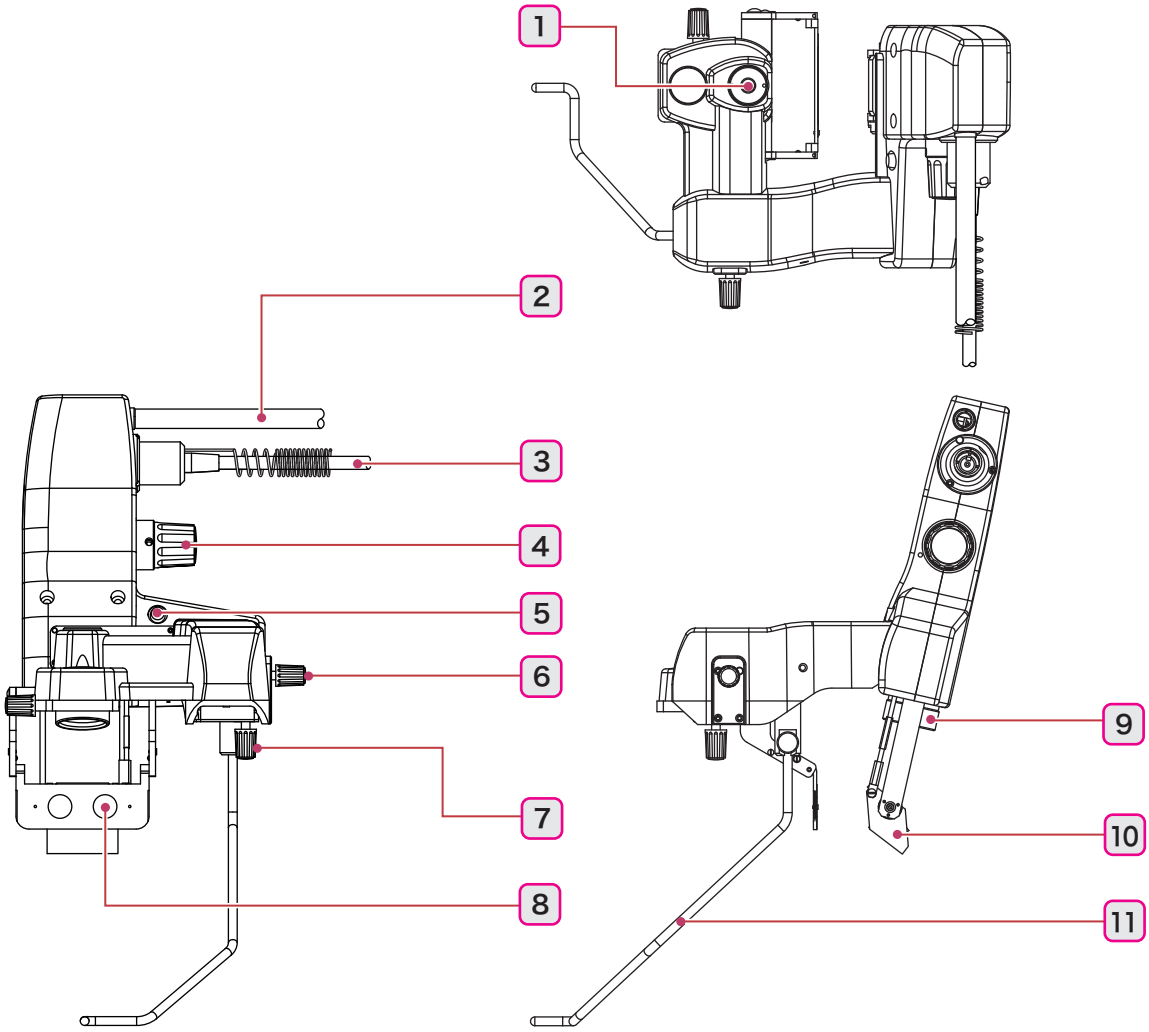
17 Illumination focus control

Used to align the focus of the illumination with the focus of the microscope.

18 Finger rest

Placing a finger here facilitates stable operation of the micromanipulator lever.

3.1.4 HAAG 900 series type



1 Mounting hole

Insert the fixation pin or holder here to connect the delivery unit to the slit lamp.

2 Delivery unit cable

The cable used for the delivery unit identification and communication between the main laser device.

3 Fiber optic cable

Delivers the laser beam from the main laser device to the delivery unit.

4 Spot size control

Used to adjust the spot size of the laser beam.

5 Emission indicator

Lights up while the main laser device is turned on.

6 Laser beam origin point control (horizontal)

Used to adjust the origin point of the laser beam in the horizontal direction.

7 Laser beam origin point control (vertical)

Used to adjust the origin point of the laser beam in the vertical direction.

8 Protective filter

Protects the operator's eye from the reflected treatment beam.

9 Laser focus control

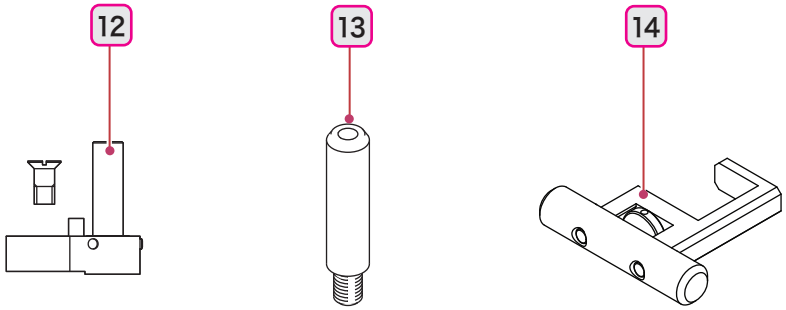
Used to align the focus of the laser beam with the focus of the slit lamp.

10 Laser reflective mirror

Guides the laser beam into the eye.

11 Micromanipulator lever

Used for fine adjustment of the laser beam position. When the micromanipulator lever is released, the laser beam position returns to the center of the visual field.



12 Holder

Used to connect the delivery unit to the slit lamp.

Designed for HAAG 900BM, 900CN, NIDEK SL-250, and SL-450.

13 Fixation pin

Used to connect the delivery unit to the slit lamp. Designed for the HAAG 900 BQ.

14 Finger rest

Placing a finger here facilitates stable operation of the micromanipulator lever.

4 OPERATING PROCEDURE

4.1 Operation Flow

Device startup

“4.2.1 Device startup” (page 24)

Eye observation

“4.2.2 Laser emission preparation” (page 25)

Laser emission

“4.2.3 Treatment beam emission” (page 29)

Device shutdown

“4.2.4 Device shutdown” (page 31)

4.2 Operating Procedure

■ To explain basic operating procedures, the attachable delivery unit (NIDEK SL-1800 type) is used here.

4.2.1 Device startup

1 Connect the power cord to the power outlet.

2 Have all personnel in the operating room other than the operator and patient wear safety goggles.

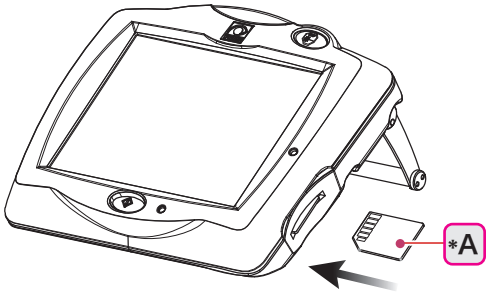
⚠ WARNING

- All personnel in the operating room other than the operator and patient must wear the recommended safety goggles during operation of the device to protect their eyes. In addition, instruct them not to look directly at the laser beam even while wearing the safety goggles because eyes may still be damaged.

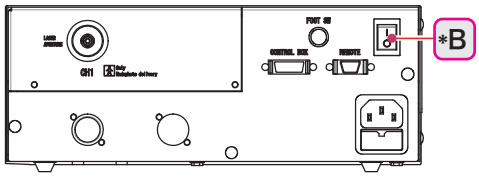
  Recommended goggles: Wavelength 532 nm, OD ≥ 5, 532 DI LB5 (En207)

3 Turn on the device.

1) Insert the keycard (*A) into the control box of the GYC-500.

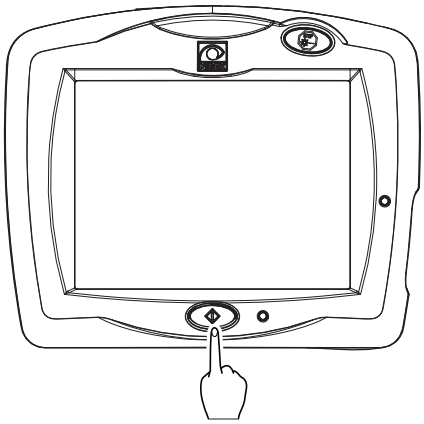


2) Turn on (|) the master switch (*B) of the GYC-500.



3) Press the start button of the control box.

   The LCD lights up and the device enters STANDBY mode.

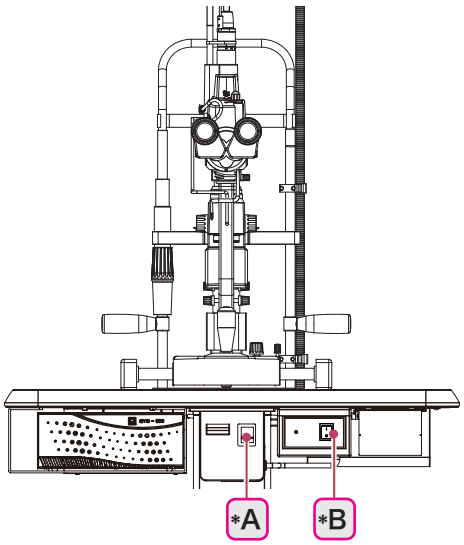


4 Perform checks before use.

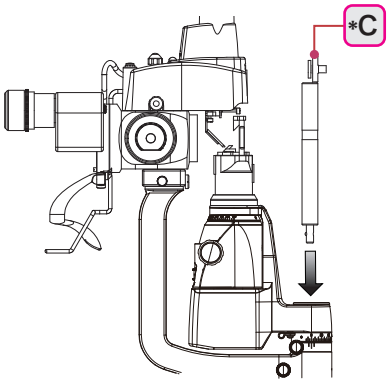
Referring to the Operator's Manual of the main laser device, perform checks before use and record the results on the checklist.

4.2.2 Laser emission preparation

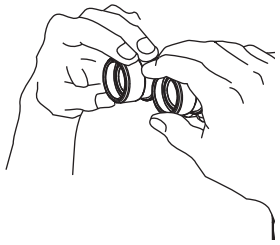
1 Turn on (|) the master switch (*A) on the motorized optical table and the slit lamp power switch (*B).



2 Adjust the eyepiece diopter and pupillary distance for the operator.



1) Remove the plug from the focusing rod mounting hole, then insert the focusing rod (*C) into the hole. Turn the focusing rod so that its flat surface faces the microscope.
2) Project the illumination light that is appropriate in length, width, and intensity onto the focusing rod.



3) Fully turn the diopter adjustment rings to the + side and look through the microscope.
   For eyeglass wearers, push in the eyecups.
4) While observing the slit image with one eye, slowly turn the diopter adjustment ring to the - side until the slit image is focused sharply.
5) In the same manner, adjust the diopter of the other eye.

⚠ WARNING

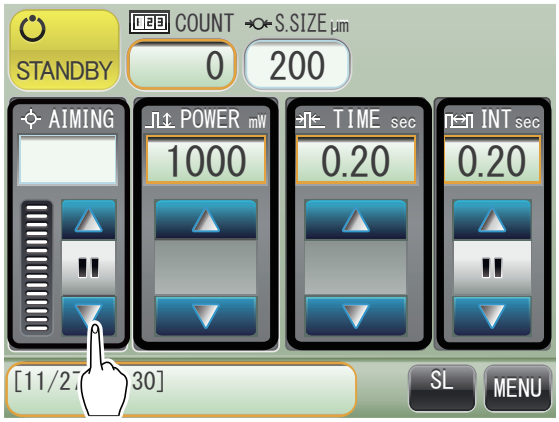
- Be sure to adjust the eyepiece diopter for each eye and do not turn the diopter adjustment ring from the - side to the + side.

  Inaccurate diopter adjustment may adversely affect laser beam emission.

6) Adjust the pupillary distance by moving the binocular tubes until the slit images observed by both eyes are aligned.
7) Remove the focusing rod and attach the plug to the focusing rod mounting hole.
   Store the focusing rod in the drawer of the motorized optical table.

3 Press the AIMING button on the control box to turn off the aiming beam.

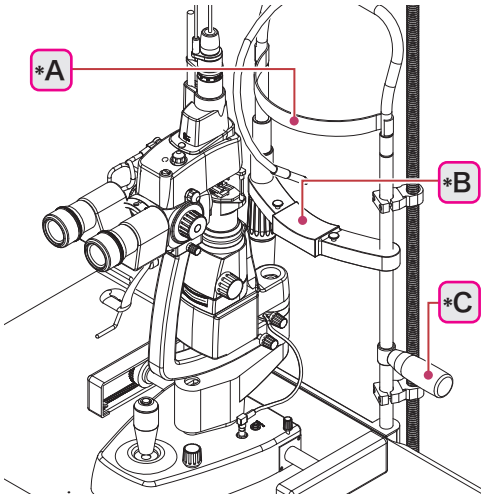
Clearing the bar graph or the value turns off the aiming beam.



4 Conduct patient preparation.

1) Wipe the forehead rest (*A), chinrest (*B), and grips (*C) with clean absorbent cotton or gauze dampened with rubbing alcohol.

When using the chinrest paper, remove one sheet of paper.

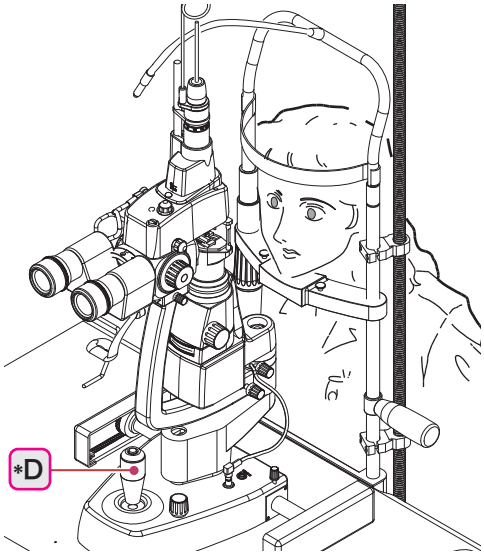


2) Hold the joystick (*D) to pull the slit lamp all the way toward the operator.

⚠ CAUTION

- Be sure to pull the slit lamp all the way toward the operator before the patient is seated.

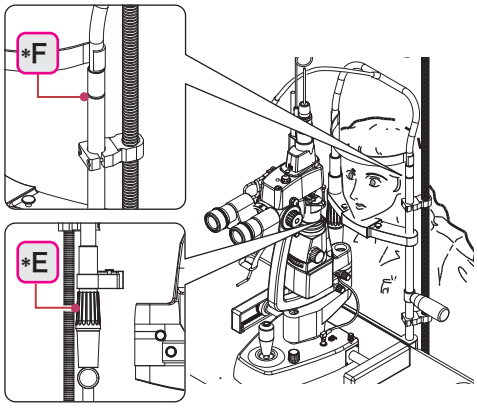
  This is to prevent the slit lamp from coming into contact with the patient's face.



3) Instruct the patient to remove their glasses or contact lenses and sit on the chair.

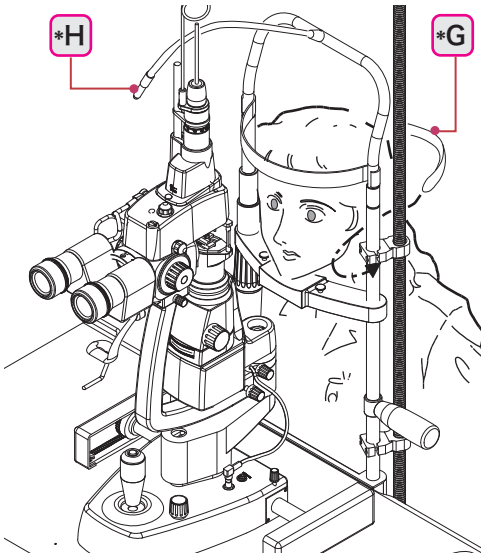
4) Instruct the patient to place their chin on the chinrest as far forward as possible with their forehead resting gently on the forehead rest. Also, instruct the patient to hold the grips to keep a stable posture.

5) Rotate the chinrest elevation control (*E) to align the level of the patient's eye with the eye level marker (*F).



6) Fasten the patient's head with the head belt (*G).

7) Instruct the patient to focus on the fixation lamp (*H) to stabilize their visual axis.



5 Observe the patient's eye.

⚠ CAUTION

- Be sure to set the light intensity to the minimum level (not turning off) at the beginning, and raise it as necessary. Be sure to return the light intensity to the minimum level after every examination.

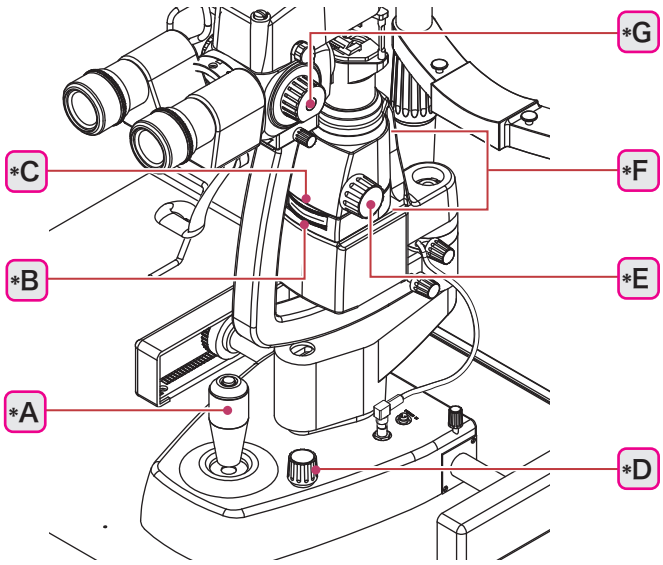
  The patient may suffer from excessive brightness at the beginning of the examination. A high-intensity light may cause thermal and photochemical damage to the patient's retina.
- When operating a delivery unit, follow the instructions below:
  - Set the light intensity as low as possible.
  - If absolute amount of light intensity needs to be obtained, dilate the patient's pupil.
  - Minimize the illumination area size as much as possible.
  - Maximize the angle between the illumination light and visual axis as much as possible when projecting the illumination light.
  - Use an illumination filter as necessary.
- Pay particular attention when projecting the illumination light into the eyes of infants, aphakic patients and patients with eye disease.
- For models that incorporate a halogen lamp as an illumination lamp, do not unnecessarily touch the lamp housing during observation.

  Regardless of light intensity, if the light is left illuminated, the lamp housing becomes hot and burn injury may result. As a general guide, if the light is kept on for 10 minutes, leave it off for 20 minutes to cool down.
- When using the SL-1800, be sure to insert an illumination filter into the observation optical path.

  Damage to the patient's retina may occur.

1) Manipulate the joystick (*A) to project the illumination light on the patient's eye.
2) Adjust the illumination light intensity by turning the illumination control (*D).
3) Manipulate the joystick to focus the slit image on the patient's cornea.
4) Place either a contact lens or hand-held lens in front of the patient's eye. Manipulate the joystick to observe the eye while looking through the microscope.

   When using a contact lens, apply anesthetic eye drops beforehand. If necessary, use a corneal protectant.
5) As necessary, adjust the slit lamp.



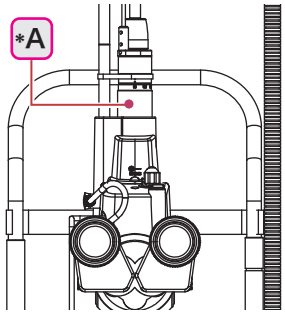
*A	Joystick
*B	Filter changer
*C	Filter/diaphragm rotation ring
*D	Illumination control
*E	Slit width control
*F	Slit rotator
*G	Magnification changer

4.2.3 Treatment beam emission

1 Set the laser emission conditions.

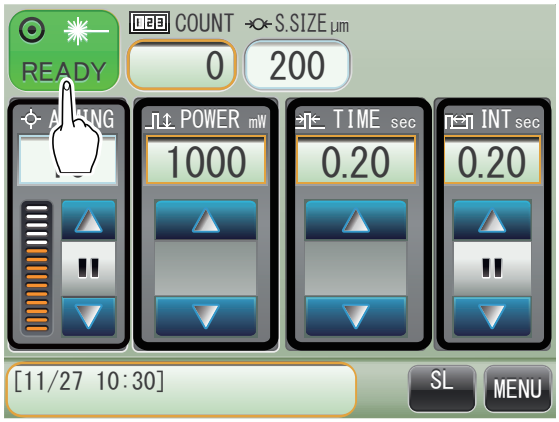
For the control box setting procedure, refer to the Operator's Manual of the main laser device.

Adjust the spot size by turning the spot size control (*A).



2 Press the status button to set the main laser device to READY mode.

While the aiming beam is turned off, the main laser device cannot enter READY mode.

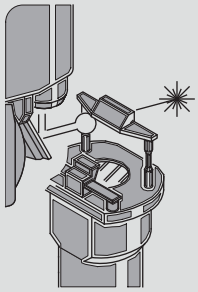


⚠ CAUTION

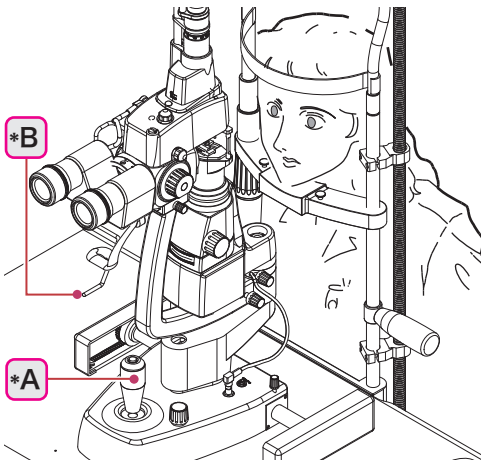
- Before pressing the status button, confirm that the laser beam emission conditions are properly set.
- When the treatment beam is not to be emitted, press the status button to set the main laser device to STANDBY mode.

  The treatment beam cannot be emitted even if the foot switch is accidentally pressed.
- When the split mirror illumination unit blocks the laser beam, move the illumination unit arm to the right or left.

  Otherwise, expected treatment results cannot be obtained.



3 Adjust the positions of the joystick (*A), micromanipulator lever (*B), and contact lens. Press the foot switch at the target position to emit the treatment beam.



4

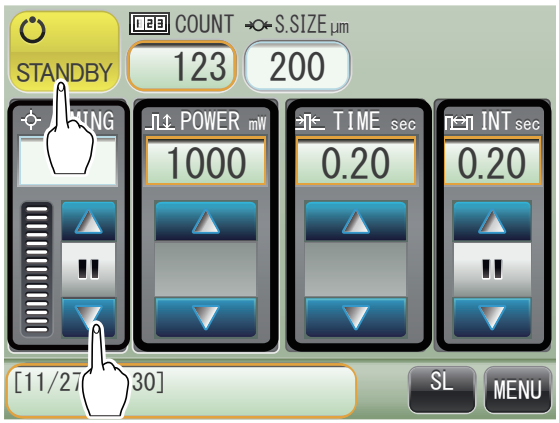
Note

- When a series of beeps sounds and the treatment beam cannot be emitted even when the foot switch is pressed, check whether the main laser device is set to READY mode and the aiming beam is projected.

  The treatment beam cannot be emitted while the main laser device is in STANDBY mode or the aiming beam is turned off.

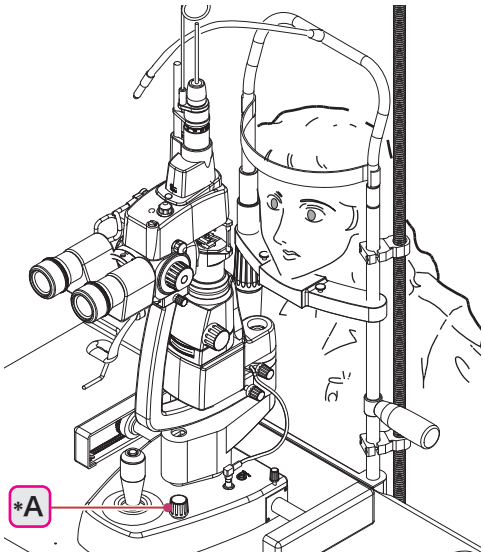
- When the treatment beam cannot be emitted and a series of beeps does not sound even when the foot switch is pressed, check whether the foot switch is connected to the main laser device.

4 When treatment beam emission is complete, press the status button to set the main laser device to STANDBY mode. Then, press the AIMING button to turn off the aiming beam.



5 Turn the illumination control (*A) to set the light intensity to the minimum.

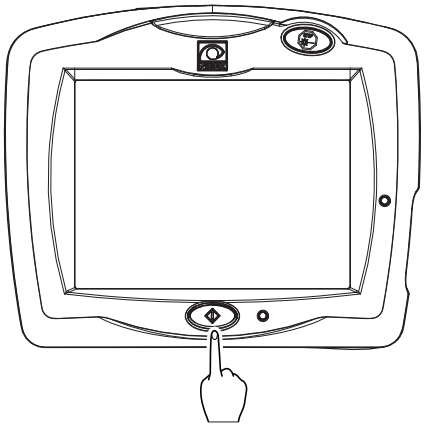
6 Remove the head belt from the patient.



4.2.4 Device shutdown

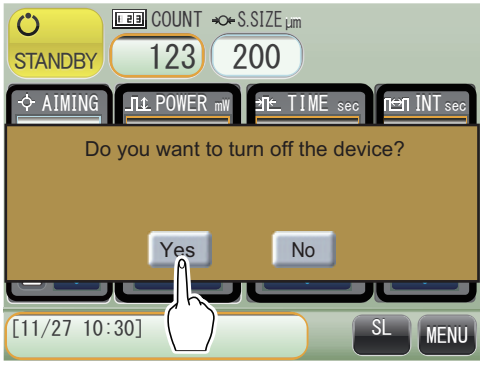
1 Turn off the device.

1) Press the start button of the control box.

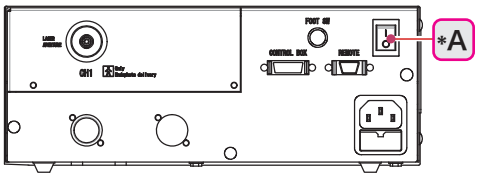


2) Press “Yes”.

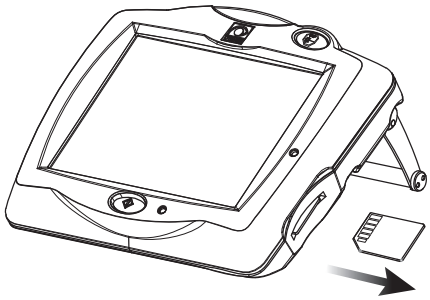
3) Instruct all personnel to remove their safety goggles.



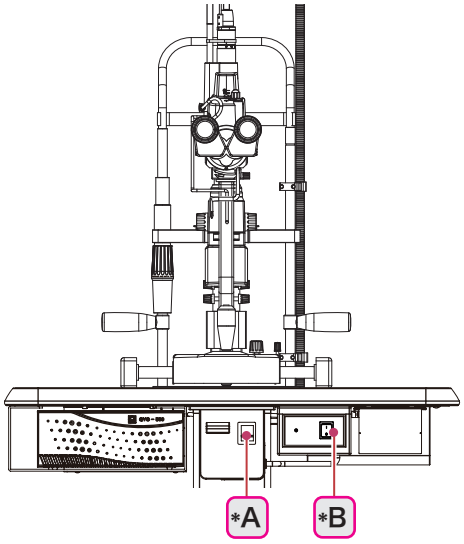
4) Turn off (◯) the master switch (*A) of the GYC-500.



5) Remove the keycard from the control box and store it in a secure place.



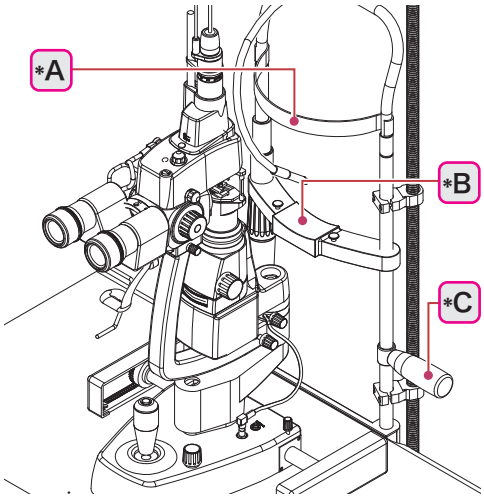
2 Turn off (◯) the slit lamp power switch (*B) and master switch on the motorized optical table (*A).



3 Disconnect the power cord from the power outlet.

4 Clean the forehead rest (*A), chinrest (*B), and grips (*C).

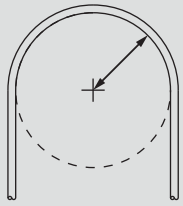
"5.1.1 Cleaning the device exterior" (page 35)



5 Place the dust cover over the main laser device and delivery unit.

⚠ CAUTION

- Do not coil the fiber optic cable with a radius of 10 cm or less.
  Breakage or deterioration may result.

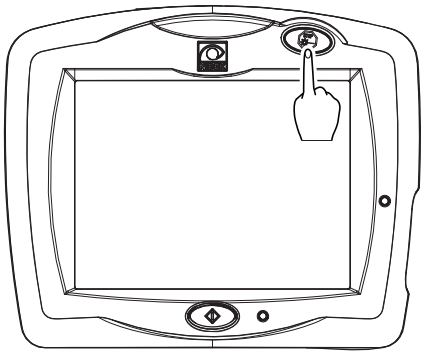


This completes the operating procedure.

4.3 Emergency Stop

■ To stop the device operation due to an emergency, press the emergency stop button.

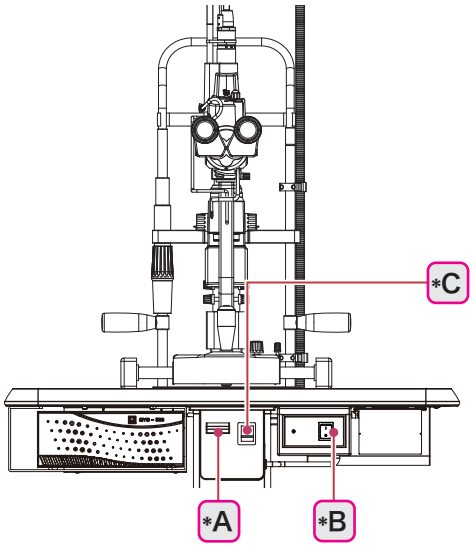
The safety shutter blocks the laser beam optical path and power to the main laser device turns off.



4.4 Delivery Unit Transportation

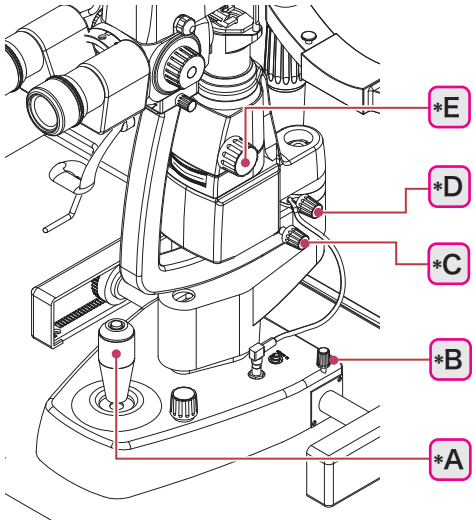
1 Turn off (◯) the delivery unit.

1) Hold down the table up/down lever (*A) to move the motorized optical table to the bottom.
2) Turn off the slit lamp power switch (*B) and master switch on the motorized optical table (*C).
3) Disconnect the power cord from the power outlet.



2 Prepare the slit lamp for transportation.

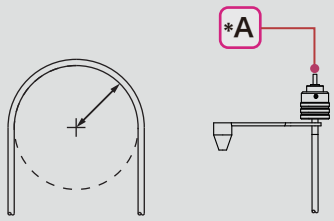
1) Rotate the joystick (*A) to move the microscope to the bottom.
2) Tighten the base unit fastening knob (*B) to lock the slit lamp.
3) Tighten the microscope arm fastening knob (*C) and illumination unit arm fastening knob (*D) to lock the microscope arm and illumination unit arm.
4) Maximize the slit width using the slit width control (*E).



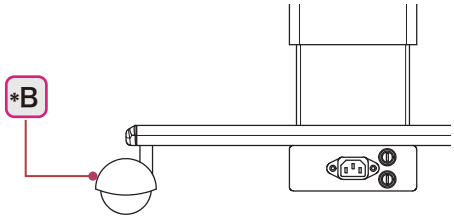
3 Disconnect the cables from the main laser device.

⚠ CAUTION

- Do not coil the fiber optic cable with a radius of 10 cm or less.
  Breakage or deterioration may result.
- Do not soil or damage the tip of the fiber optic cable plug (*A).
  Laser beam transmittance may be reduced.
- When connecting the cables again, follow the instructions below:
  - To ensure laser beam emission from the delivery unit is as selected, be sure to connect the fiber optic cable and delivery unit cable to the corresponding fiber optic cable connector and delivery unit connector.
  - Attachable delivery units must be connected to CH1.



4 Flip up the locking lever (*B) to unlock the casters.



5 Carefully move the delivery unit avoiding rough movement as much as possible.

⚠ CAUTION

- Never tilt the device 10º or more when installing or moving it.
  The device may topple causing injury or malfunction.

5 MAINTENANCE

5.1 Cleaning

5.1.1 Cleaning the device exterior

When the cover or panel of the device becomes dirty, clean it with a soft, dry cloth. For severe stains, soak the cloth in a neutral detergent, wring well, and wipe. Finally wipe it with a soft, dry cloth.

⚠ CAUTION

- Never use organic solvents such as paint thinner or alcohol.
- Never use an overly wet sponge or cloth.
  Water may leak into the interior of the device resulting in malfunction.

5.1.2 Cleaning optical parts

1. Remove any dust from the optical parts by using the blower.
2. Wrap lens cleaning paper around a thin stick (or cotton swab), damp it with alcohol, and wipe the optical parts. Alternatively, wipe the optical parts using gauze or such dampened with alcohol.

Note

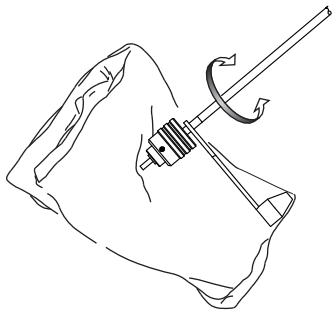
- Use a thin stick that will not scratch optical parts.
- When cleaning lenses, wipe lightly from the center of the lens to the outside in a circular motion.

5.1.3 Cleaning fiber optic cable

If the plug tip accidentally comes into contact with human body when connecting or disconnecting the fiber optic cable, clean the plug by following the procedure below. Emitting the laser beam with damaged or unclean plug tip may make the fiber optic cable unusable.

1 Damp a clean gauze cloth with rubbing alcohol or distilled water.

2 Holding the gauze cloth, lightly touch the plug to the cloth and clean the end surface by slowly rotating the plug tip.



⚠ CAUTION

- When touching the end surface of the plug to the gauze cloth, do not apply excessive force.
  The fiber optic cable may be damaged.

3 Move the plug end surface to a clean area of the gauze cloth and repeat cleaning two or three times.

4 Check the condition of the plug tip.

1) Turn on the device.
2) Project the aiming beam on a flat surface that is not reflective to confirm the following:
   - The intensity is even over the entire spot.
   - The intensity is not lowered. The spot is not obscured.
   - The outline of the aiming beam is clear when the spot is in focus.

Note

- If intensity is lowered or the spot is obscured, contact NIDEK or your authorized distributor.

6 SPECIFICATIONS AND TECHNICAL INFORMATION

6.1 Specifications

• Common specifications		
Connectable laser photo-coagulator	GYC-500	
Attachable slit lamp (attachable delivery unit)	GYC4SZ-1A GYC4SZ-1	ZEISS 30SL/M
	GYC4SZ-2A GYC4SZ-2	NIDEK SL-1800, SL-1600
	GYC4SZ-4A GYC4SZ-4	ZEISS SL130
	GYC4SG-2	HAAG 900BM, 900BQ NIDEK SL-250 Takagi Seiko SM-70 (special tonometer holder is required)
Treatment beam power output	In accordance with the specifications of the main laser device	
Aiming beam power output	In accordance with the specifications of the main laser device	
Maximum power density	86.6 kW/cm^2 Condition: GREEN 1,700 mW, Spot size: 50 µm	
Environmental conditions	In accordance with the specifications of the main laser device	
Expected service life	In accordance with the specifications of the main laser device	
Packing unit	1 unit	
Classifications	Protection against electrical shock: Class I ME equipment Protection against electric shock (applied parts): Type B applied part Protection against harmful ingress of water or particulate matter: IPX0 Method(s) of sterilization: ME equipment that does not contain any part that needs sterilization. Suitability for use in an oxygen rich environment: ME system that is not intended for use in an oxygen rich environment Mode of operation: Continuous operation	

• NIDEK SL-1800 type		
Spot size	50 to 990 µm (parfocal)	
Spot position movable range	6 mm or more in diameter	
Beam divergence	0.2 rad. (spot size 50 µm) to 0.01 rad. (spot size 990 µm)	
Protective filter	Optical property OD ≥ 5 Electrically-powered or fixed type	
Protective filter (GYC4SZ-2)	Optical property OD ≥ 4 Electrically-powered	
Nominal Ocular Hazard Distance (NOHD)	29.0 m	
Dimensions	Attachable delivery unit	Photocoagulation unit: 79.4 (W) × 128.4 (D) × 224.3 (H) mm Protective filter: ø70 × 20.5 (D) mm
	Attachable delivery unit (GYC4SZ-2)	Photocoagulation unit: 60 (W) × 128 (D) × 208.5 (H) mm Protective filter: 106.5 (W) × 98.5 (D) × 29 (H) mm
Mass	Attachable delivery unit	Photocoagulation unit: Approx. 0.8 kg Protective filter: Approx. 0.1 kg
	Attachable delivery unit (GYC4SZ-2)	Photocoagulation unit: 1.40 kg Protective filter: 0.28 kg
Accessories	Photocoagulation unit, protective filter, finger rest, cable cover, fiber optic cable, arm rest, head belt, Operator's Manual	

• ZEISS SL130 type		
Spot size	50 to 990 µm (parfocal)	
Spot position movable range	6 mm or more in diameter	
Beam divergence	0.2 rad. (spot size 50 µm) to 0.01 rad. (spot size 990 µm)	
Protective filter	Optical property OD ≥ 5 Electrically-powered	
Protective filter (GYC4SZ-4)	Optical property OD ≥ 4 Electrically-powered	
Nominal Ocular Hazard Distance (NOHD)	29.0 m	
Dimensions	Attachable delivery unit	Photocoagulation unit: 79.4 (W) × 128.4 (D) × 230.8 (H) mm Protective filter: 102.5 (W) × 41 (D) × 102.9 (H) mm
	Attachable delivery unit (GYC4SZ-4)	Photocoagulation unit: 60 (W) × 128 (D) × 208.5 (H) mm Protective filter: 106.5 (W) × 98.5 (D) × 41 (H) mm
Mass	Attachable delivery unit	Photocoagulation unit: Approx. 0.8 kg Protective filter: Approx. 0.3 kg
	Attachable delivery unit (GYC4SZ-4)	Photocoagulation unit: 1.40 kg Protective filter: Approx. 0.34 kg

Accessories	Photocoagulation unit, protective filter, split mirror illumination unit (included depending on user preference), finger rest, cable cover, fiber optic cable, arm rest, head belt, Operator's Manual	
• ZEISS 30 SL/M type		
Spot size	50 to 990 µm (parfocal)	
Spot position movable range	6 mm or more in diameter	
Beam divergence	0.2 rad. (spot size 50 µm) to 0.01 rad. (spot size 990 µm)	
Protective filter	Optical property OD ≥ 5 Electrically-powered or fixed type	
Protective filter (GYC4SZ-1)	Optical property OD ≥ 4 Electrically-powered	
Nominal Ocular Hazard Distance (NOHD)	29.0 m	
Dimensions	Attachable delivery unit	Photocoagulation unit: 79.4 (W) × 128.4 (D) × 224.3 (H) mm Protective filter: ø70 × 20.5 (D) mm Split mirror illumination unit: 66 (W) × 44.5 (D) × 113 (H) mm
	Attachable delivery unit (GYC4SZ-1)	Photocoagulation unit: 60 (W) × 128 (D) × 208.5 (H) mm Protective filter: 106.5 (W) × 98.5 (D) × 29 (H) mm Split mirror illumination unit: 65.9 (W) × 43.5 (D) × 111.5 (H) mm
Mass	Attachable delivery unit	Photocoagulation unit: Approx. 0.8 kg Protective filter: Approx. 0.1 kg Split mirror illumination unit: Approx. 0.18 kg
	Attachable delivery unit (GYC4SZ-1)	Photocoagulation unit: 1.40 kg Protective filter: Approx. 0.28 kg Split mirror illumination unit: 0.18 kg
Accessories	Photocoagulation unit, protective filter, split mirror illumination unit (included depending on user preference), finger rest, cable cover, fiber optic cable, arm rest, head belt, Operator's Manual	

• HAAG 900 series type	
Spot size	50 to 500 µm (parfocal)
Spot position movable range	6 mm or more in diameter
Beam divergence	0.15 rad. (spot size 50 µm) to 0.015 rad. (spot size 500 µm)
Protective filter	Optical property OD ≥ 5 Fixed
Nominal Ocular Hazard Distance (NOHD)	14.6 m
Dimensions	Photocoagulation unit: 121 (W) × 164 (D) × 213 (H) mm
Mass	Photocoagulation unit: Approx. 1.0 kg
Accessories	Photocoagulation unit, fixation pin, fiber optic cable, arm rest, head belt, Operator's Manual
• Other	
Optional accessories	Split mirror illumination unit, antenna ASSY, position locking unit (available for the NIDEK SL-1800 type and ZEISS SL130 type only)

6.2 Glossary

■ The following terms and abbreviations are used in reference to the device and in the Operator's Manual.

○ Glossary

Term	Details
• Photocoagulation	To coagulate human tissues using the heat generated by the laser beam.
• Delivery unit	Attachable delivery unit A delivery unit to be attached to an existing slit lamp mounted on an existing motorized optical table. The delivery unit is then connected to the main laser device to comprise the photocoagulation system.
• Power output	Laser energy emitted from the terminal of the light-guiding path, or laser energy that passes the ø8 mm aperture at the position equivalent to the patient's pupil. (Unit: mW)
• Laser beam	Aiming beam and treatment beam
• Treatment beam	Laser beam that is used for photocoagulation. The GYC-500 use a green laser beam (532 nm).
• Aiming beam	Laser beam that indicates the position to which the treatment beam is to be emitted.
• Emission time	Length of time that the treatment beam is emitted. (Unit: second)
• Spot size	Diameter of the laser beam spot (Unit: μm)
• Protective filter	The device to protect the operator's eyes from beams reflected from a location where the laser beam is applied.
• Nominal Ocular Hazard Distance	The Nominal Ocular Hazard Distance (NOHD) is the distance along the axis of the unobstructed beam from the laser aperture where the irradiance falls below the applicable exposure limit.
• Main laser device	The GYC-500 to be connected with a delivery unit.
• Expected service life	A period of time beyond which the reliability and safety of the device cannot be guaranteed even under normal use and regular maintenance that involves repeated replacement of maintenance parts and consumable parts, repair, and overhaul.