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DENSIM OPTICS

Microscope

User's Manual

CE

IFU, rev 02_2017

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1. Introduction

The **DENSIM OPTICS microscopes** have been designed for diagnosis observations.

Its use is indicated for different medical specialties and odontology, to be able to assist the professional by obtaining a magnified view of the working area, allowing them to achieve a better professional performance.

The different models that are available of the **DENSIM OPTICS microscopes** together with the compatibility of all its accessories, allow this equipment to achieve all the necessary characteristics for the different specialties.

The content of this manual, describes the recommended procedures to be able to install and use the **DENSIM OPTICS microscope**. It contains all the necessary information for the care, and appropriate use of the microscope.

Please read carefully this manual before using the microscope.



This symbol will be used in the manual to indicate information that will include warnings or important precautions.

If you have any doubts on the contents of this manual, the operation or equipment security, please contact manufacturer.

Manufacturer:

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Slovakia

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2. Microscope description



Fig.1 Floor stand model

1. Wheels with brake	**8.** Blocking knob
2. Base	**9.** Parallelogram arm
3. Mast	**10.** Monitor LCD (optional)
4. Lens	**11.** Weight compensation control
5. Head of microscope	**12.** Double light source/power supply
6. Angle 60% mounting knob (do not ever change the position of it)	**13.** Fiber optics cable
7. Angle mounting knob (do not ever change the position of it)	**14.** Binocular

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Fig.2 Wall-mounted model

1. Light source/power supply	**7.** Angle 60% mounting knob(do not ever change the position of it)
2. Fiber optics cable	**8.** Regulation knob
3. Weight compensation control	**9.** Head regulation knob
4. Parallelogram arm	**10**. Handle
5. Angle mounting knob (do not ever change the position of it)	**11.** Head of microscope
6. Blocking knob	**12.** Wall support

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Fig.3 Ceiling-mounted model

1. Light source/power supply	6. Ceiling support	11. Regulation knob
2. Fiber optics cable	7. Parallelogram arm	12. Head regulation knob
3. Weight compensation control	8. Angle mounting knob (do not ever change the position of it)	13. Handle
4. External telescopic column	9. Blocking knob	14. Head of microscope
5. Internal telescopic column	10. Angle 60% mounting knob(do not ever change the position of it)	15. Binocular

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Fig.4 Head of microscope

1. Objective lens	**6.** Fork Pole for head
2. Head handle	**7.** Eyepiece rubber
3. Magnification selector	**8.** Balance movement control
4. CCD camera (optional)	**9.** Beam splitter (optional)
5. Eyepiece	**10.** Micro focus command

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Illumination system



Fig.5 Light source/power supply - halogen

1. Camera connector (video entrance)	4. Fiber connector
2. Fiber optic cable adapter	5. Adjusting the light intensity
3. Lamp selector switch	6. On/off switch



Fig.6 Light source/power supply - LED

1. Camera connector	3. Adjusting the light intensity
2. Fiber connector	4. On/off switch

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3. Technical Specifications

DENSIMOPTICS

MICROSCOPE

BINOCULAR TUBES	Straight / 45° Inclined / 195° Inclinable
OBJECTIVE LENS	Available f: 200 / 250 / 300 / 400 mm (one included)
MAGNIFICATIONS	Manual changer 5 positions: Factor 4 / 6 / 10 / 16 / 25 X
FINE FOCUS	Manual
EYEPIECES	10 X Wide angle Dioptric setting: + / - 5
FIELD OF VIEW (10 X)	Ø 24 mm / 0,95“ (for f: 200 mm) Ø 31 mm / 1,22” (for f: 250 mm) Ø 36 mm / 1,42” (for f: 300 mm) Ø 50 mm / 2,0” (for f: 400 mm)
INTERPUPILAR DISTANCE	2,16”- 2,95” 55 - 75 mm
FILTER	Green or orange
ILLUMINATION	
TYPE OF ILLUMINATION	Coaxial Illumination through 7 mm fiber optic light guide cable
LIGHT SOURCE	2 halogen lamps (150 watts 15 V each) Video camera input and video output integrated into light source
ILLUMINATED FIELD	Ø 70 mm / 2,75” (for f: 200 mm) Ø 90 mm / 3,54” (for f: 250 mm) Ø 107 mm / 4,2” (for f: 300 mm) Ø 145 mm / 5,7” (for f: 400 mm)
ILLUMINATION CONTROL	Manual mechanical diaphragm with continuous adjustment. Constant light color
POWER SUPPLY	100 - 120 VAC, 50 / 60 Hz 200 - 240 VAC, 50 / 60 Hz
PANTOGRAPHIC ARM	
TYPE	WBS - Weight balance system
ROTATION MOVEMENTS	System with proximal and distal rolling bearings
HEIGHT ADJUSTMENT	25” / 63.5 mm

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MODEL	DENSIM OPTICS
	FLOOR STAND
BASE	H shape 22,4"x 22,8" / 570 x 580 mm
OBJECTIVE - FLOOR HEIGHT (Min. / Max.)	30,31" - 55,51" 770 - 1410 mm
HORIZONTAL RANGE	44,1" / 1120 mm (max)
WEIGHT	142 pounds 64.5 Kgs

4. Components and elements list

The **DENSIM OPTICS Microscope** includes the following necessary components and elements, for its installation.

It is recommended to identify and check them before you proceed with the installation.

DENSIM OPTICS
Microscope

4 wheels with brake

Base and column

Pantographic complete arm with
HALOGEN light source
(2 halogen lamps with diachronic reflector)

Head with 1 Objective lens

Fiber optic cable

Power supply cable

Allen for adjustment of Column Joint

Cover

Users Manual

Extra fuse (2A / 4A, 250V)

Column handle Binocular

2 eyepieces

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5. Installation

Experienced or specific personnel are not required for the installation of the **DENSIM OPTICS Microscope**. (except wall-mounted and ceiling-mounted models).

Together with the equipment you are provided with the specific tools that are necessary for the installation: 1 Allen key for model DENSIM OPTICS Mobile Version. You will also need: a screwdriver, a French wrench and exclusively for the Wall-Mounted Microscope, you will be needing an electrical drill, wide broach and a tube wrench.



To avoid accidents regarding the manipulation of the different parts of the equipment, it is recommended that two persons perform the installation of the microscope carefully following the corresponding instructions.

Once the installation has been concluded, you must continue with the procedures detailed in the Revision and Operation section.

Finally, the company or authorized person who completed the installation, must complete the Installation Control card, which you can find at chapter 12. It is important not to omit this step. It is used in a future to verify the correct installation and the optimal functioning of the microscope.

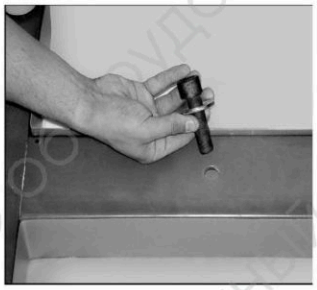
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5.1 Floor stand model



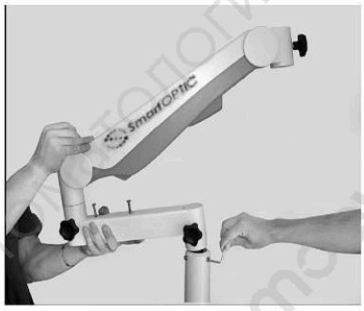
Step 1



Step 2



Step 3



Step 4



Step 5



Step 6



Step 7

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1. Place the support on a smooth surface in order to obtain the best possible stability without damaging the base. Install the 4 wheels with a 13-mm wrench. (step 1)
2. Insert the screw with washer as shown in the figure. (step 2)
3. Use the Allen wrench to tighten the screw to the column. If it is a hex screw head, use a screw wrench. (step 3)
4. Loosen the 3 screws on the column receiving end. Place the parallelogram arm as shown in the figure. You shall get a perfect match. Firmly tighten the 3 screws with the Allen wrench. (step 4)
5. Introduce the header fork in the parallelogram arm end and firmly tighten for the safety. (step 5)



This plug shall not be loosened while using the microscope with patient since this may cause the header fall.

6. Place the binocular on the support by matching the marks. Tighten the binocular screw to obtain the best possible fixing. (step 6)
7. Place the eyepieces on the binocular. Unscrew the rubber around the eyepieces. (step7)

Note: if the user has glasses, leave the rubber on.

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5.2 Wall-mounted model

Before proceeding to install the wall support, it is necessary to determine the adequate height to fix and level it correctly.

The wall support shall only be placed in high resistance walls.
It shall not be installed in hollow brick walls or those with a thickness lower than 15 cm., plasterboards, wooden partition walls or any other low resistant material.
It is recommended to get the advice of a building professional to analyze the correct fixing of the support.



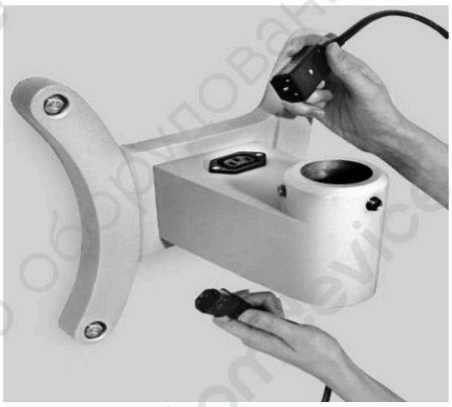
Step 1



Step 2



Step 3



Step 4

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1. Make a 7”-length horizontal line on the wall, perfectly leveled with the floor at 49.2” height from it. (step 1)
2. Place the support on the wall so that the line draw on it perfectly matches the lower straight part of the element; check with a level if it is even. (step 2)
3. Mark with a pencil the top left hole-position on the wall in order to use it as reference. Remove the support. (step 2)
4. Using a driver-drill and a wall drill, perforate the top left hole, place the Fisher plug, put the wall support again and insert the corresponding bolt. The bolt shall be screwed with the socket wrench until a strong resistance is achieved in it.
5. Once the top left end is fixed, repeat point 3 and 4 to fix the top right end first and then the lower ones.
6. The wall support shall be firm.

DENSIM shall not be liable for the physical and/or material damages that may occur due to the incorrect fixing of the wall support.

7. Loosen the 3 bolts of the forearm receiver in the wall support.
8. Place the microscope as shown in the figure. A perfect match shall be achieved with the support. Tighten the 3 screws of the support with the Allen wrench. (step 3)
9. Check that the procedure was properly done by rotating the forearm around the support in both directions until reaching a butt. The movement is limited to reach a 170º range.
10. Connect one of the power supply cables from the light source to the wall support top connector and the other one from the wall support to the electrical network. (step 4)
11. Follow steps 6 to 7 from section **5.1** to install the header, binocular and eyepieces.

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5.3 Ceiling-mounted model

DENSIM does not provide the materials or the instructions to fix the ceiling support and is not liable for its incorrect fixing or any other physical and/or material damage that may occur due to this fixing.
A building professional shall analyze the correct fixing of the ceiling support.



Step 1



Step 2



Step 3



Step 4



Step 5

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1. A building professional shall fix the support base to the ceiling. (step 1)
2. Loosen the 3 screws of the internal telescopic column.
3. Firmly fix the column to the support base.
4. Slide the plastic cover through the end of the column and hold it at the desired height with the corresponding washer. (step 2)
5. Insert the telescopic column through its covering by previously loosening the Allen screws. (step 3)
6. Place the washer and the lock screw at the end of the column.
7. Screw with a 14-mm wrench.
8. Set the column height with the 2 lateral Allen screws. (step 4)
9. If you acquired an extension column, place it now. Loosen the Allen screws at the end of the column, place the extension and tighten the Allen screws again.
10. Loosen the 3 screws at the end of the column.
11. Place the microscope arm as shown in the figure. A perfect match shall be achieved with the column. Tighten the 3 screws at the end of the column using an Allen wrench. (step 5)
12. Follow steps 6 to 7 from section **5.1** in order to install the header, binocular and eyepieces.

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5.4 Table-mounted model

Before installing the microscope check that the table material, where it will be installed, resists at least eight (8) times the microscope weight.



Step 1



Step 2

1. Place the support on the table where the microscope will be installed.
2. Pass the vise bolt through the hole, as shown in the figure. (step 1)
3. Tighten the screw so that the support remains firmly fixed to the table.
4. Loosen the 3 screws on the column end.
5. Place the microscope arm as shown in the figure. A perfect mach shall be achieved with the column. Tighten the 3 screws on the column end with an Allen wrench. (step 2)
6. Follow steps 6 to 7 from section **5.1** in order to install the header, binocular and eyepieces.

5.5 Installing the Light Source



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1. Place the light source below the forearm, as shown in the figure.
2. Introduce the washers in the slots of the light source top surface.
3. Once inserted, slide the light source backwards before tightening the Allen screws.



The lamps can be moved during microscope transportation. Before turning the light source on, check that the lamps are correctly positioned and aligned with the fiber optic cable connector.

5.6 Installing the Lens



1. Screw the lens to the header, leaving the micro-focal control in the desired position.
2. Tighten the washer counter-thread in order to achieve a correct lens fixing.

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5.7 Installing the Beamsplitter and Video Camera



Step 1



Step 2

1. If the binocular is already installed, remove it by loosening the screw from the support.

2. Screw and tighten the camera to the beamsplitter. (step 1)

3. Mount the beamsplitter with the video camera on the binocular support, checking the matching of the notch in each part. Manually tighten the header lock screw in order to achieve the greatest possible firmness in the assembly. (step 2)

4. Mount the binocular in a similar way, placing it above the beamsplitter.

5. Remove the fiber optic cable from the microscope arm.

6. Introduce the camera cable in the header through the parallelogram arm cover.

7. Introduce the fiber optic cable again through the microscope arm.

8. Connect the fiber optic cable to the header.

9. Connect the video cable from the light source video output to the monitor.

10. Turn the light source and the monitor on.

11. Make focus on an image looking through the binocular with maximum magnifying glass.

12. Adjust the image focus in the monitor through the focal control on the beamsplitter.

13. If the monitor image is rotated, loosen the 3 1.5-mm Allen screws mounted on the beamsplitter camera and rotate the camera until you achieve the correct positioning.

14. Tighten the 3 1.5-mm Allen screws again.

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5.8 Arms

1. Unscrew the 3 screws at the column end.

2. Lift and place the arm of the microscope. You must achieve a perfect fit with the column. With the Allen wrench tighten up the 3 screws of the column.

5.9 Head

1. Place the head at the end of the parallelogram arm and adjust the corresponding notch firmly.



This control should not be touched during the use of the microscope with a patient because it could cause the falling of the head.

2. Place the binocular in the corresponding binocular support, verifying that the marks coincide. Adjust the screw of the binocular to achieve the best fixation possible.

3. Attach the eyepieces to the binocular and unfold the rubber surrounding the eyepieces in the case the user does not wear glasses.

Note: if the user wears glasses to see through the binocular, the rubber protectors should be folded.

4. Introduce the connector of the fiber optic cable in the head through the cover of parallelogram arm.

5. If it is necessary, once the microscope has been installed, adjust the weight compensation command, located at the proximal end of the parallelogram arm.

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6. Revision and operations

Revision

Once the installation is finished, and before setting up the microscope, we recommend the following checkpoint control:

Check that the voltage to be used is the same as the voltage indicated on the back of the light source.

Verify that the electrical network used has its corresponding grounding connection in perfect conditions, and that it connects perfectly with the equipment.

Check that the fuse holder has fuses and that they are the correct ones. (2A / 4A, 250V)

Check that the ventilation grating of the light source is free of obstructions.

Verify that there is no water or liquids close to the equipment that could damage it, as well as gases, or flammable gases in the room.



If before you connect the microscope, you detect any abnormality, please contact the technical department of your local distributor, prior to the use of the microscope on a patient.

Operation

Turn the On/Off switch to the “OFF” position.

Connect the power supply cable to the microscope, and then to the local electrical network.

Select the lamp you wish to use.

Insert the end of the fiber optic cable in the microscope head

.

Turn the On/Off switch to the “ON” position.

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Fans should always be working while light source is turned on.

If for any reason these do not operate, immediately turn the equipment off to avoid lamp failure due to high temperature.

While the microscope is not being used, it is recommended to have it turned OFF.

7. Manipulation and movements

The **DENSIM OPTICS Microscope** has been designed to obtain milled rotation movements with great stability. The movement systems based on high resistance ball bearings allows an easy manipulation, and correct positioning of the head for better observation.

1. Parallelogram arm rotation command
2. Forearm rotation command
3. Weight compensation command
4. Parallelogram arm movement brake
5. Head rotation command
6. Head turning command
7. Balance movement command
8. Magnification selector
9. Color filter command
10. Diopter correction command

Forearm movement

Rotation larger than 220º of the forearm will allow you to position the microscope on either side of the patient. The microscope possesses an adjustment mode and blocking that allows you to regulate the strength of the movement. It also has a rotation range in both directions that must be fixed at the moment of the installation.

The illumination system has a fiber optic cable with a selected length, to be able to avoid movement limitations, allowing a free turn of the head without damaging the cable.

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Movement of the parallelogram arm

The parallelogram arm can rotate more than 220º respect with the forearm. If it is necessary to give more strength to this rotational movement, turn the command that control this parameter. To completely block these movements, adjust this command tightly.

Articulating the arm, you will achieve the correct height positioning of the microscope, which has been designed and calibrated to be able to achieve auto stability in the desired place with a minimum effort. It has an adjustment and blocking command for the vertical movement. It also has an auto compensation system (*WBS - Weight Balance System* -) for weights between 3 and 7 Kg. This characteristic will allow you to adjust the movements according to the quantity of the accessories installed, using this command.

Rotational movement of the head

This movement allows you to locate the microscope on either side of the patient without moving the patient. The microscope has an elbow or slanted support that gives you a fixed 60º angle with respect to the arms. This movement involves the 60º angle/head and reaches 360º, with respect to the arm of the microscope. If you wish you can regulate the movement or block it totally using the adjustment control command.



If this command is completely loosened, the head can rotate freely with respect of the end of the arm.

Avoid damaging the fiber optic cable, forcing a maximum possible rotation.

Movement of the rotation of the head

The head can rotate on the forked pole allowing a better positioning of the direction of the optic center, in relation of the object to be observed. The possible movement is of 360º. You can regulate the movement or completely block it using the control command.

Balancing movement of the head

The microscope allows an inclination of 195º and possesses a stop switch or control command, located on the right of the binocular that allows a gradual adjustment or complete blocking of this movement. This characteristic allows the possibility of controlling the balancing movement of the microscope to position the head of the microscope in the desired place with a milled and minimum effort.

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Before loosening this command,

verify that the fiber optic cable is not strained.

Avoid damaging the cable by forcing the balancing movement.

Interpupillary distance adjustment

To perform this adjustment you must hold the body of the binocular with both hands and turn them simultaneously. You must move this backwards and forwards until the distance between them coincides with the interpupillary distance of your eyes. The Interpupillary distance can be manually adjusted between 55 and 75 mm.

Adjustment of the correction of diopters

The microscope possesses diopter correction in both eyepieces. The adjustment is made by turning the eyepieces towards the + sign or towards the – sign. This way you can obtain the necessary diopter correction for your sight, either for a myopia, hyper myopia or ametropy (normal).

Magnification variation

The magnification selector has six positions: 4/6/10/16/25x. The 10x position is repeated in the selector, and the mark on the body of the microscope, will indicate the magnification selected.

You can change the magnification of your microscope with any of the commands located on either side of the binocular, turning the command slowly until you feel the correct fit (click).

Color filter

If the operator considers it necessary, you can put a color filter between the illumination device and the objective lens by pulling out the corresponding command control.

Movement and shipment of the microscope

The microscope has been designed to be moved over short distances within a doctor's office or room. If it is necessary to move the microscope over larger distances, you should pay special attention to the following recommendations:



Place the arm in a "closed" position, as this is the most favorable on for the stability of the microscope.

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Activate all the corresponding brakes to avoid movements of the forearm-arm-head.

Put the corresponding head cover on.

Disconnect the power cable of the electrical network and a microscope during moving of microscope.

Free the brakes of the wheels to be able to transport the microscope.

Two persons should transport the microscope due to its weight. Device should be moved when one person holds the column, and the second person supports microscope arm.

Do not circulate over slanted surfaces with a larger angle than 10º, avoiding the microscope to collapse.

By following these recommendations, you will avoid accidents during transport and any further damage to the microscope due to incorrect manipulation.

Light source

The **DENSIM OPTICS Microscopes** has an integrated illumination module with two halogen lamps of 150 watts, whose use is not simultaneous. In case that the lamp being used fails during an intervention, this emergency mechanism allows you to change the lamp immediately, with no need to change the burnt out one. This will be done once the procedure has been finished. Both lamps posses a mechanical diaphragm which can be started manually and are of continuous adjustment.



The focal point of the lamp achieves a very high temperature, so the point of the fiber optic cable that is in contact with it, will get hot.

Never touch the inside end of the fiber optic cable.

Do not look directly into the end of the light canal or the end of the objective lens of the microscope.

It is recommended to connect the fiber optic cable before you turn on the light source.

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8. Maintenance

In order to keep an optimum operation of DENSIM OPTICS microscope, it is recommended to perform a minor annual inspection of the equipment.
This procedure shall include:
• Cleaning.
• Electrical connections check.
• Spare parts: to avoid time losses due to downtime of the equipment, it is recommended to have a spare fuse (T2AL250V for 220V, and T4AL250 for 110V power supply).
To perform any revision and maintenance work, contact your local distributor or the closest Eur-med Slovakia s.r.o.
All technical service works, repairs or modifications should be noted on the Maintenance Card of this manual, indicating the work performed, date and name and signature of the person that performed the job.

Before cleaning the system, disconnect the power supply cable to avoid electrical discharges.
Improper and/or incomplete reprocessing can cause infection of the patient or medical personnel. Do not sterilize the camera header or cable by autoclave.
The system contains dangerous voltage.
In case of emergency, turn the equipment off immediately.
Ruthlessly observe, when moving the unit, to remove the fiber optics cable from the outlet on the power supply.

External surfaces cleaning

Clean all metallic surfaces with a clean cloth or cotton wool moistened with alcohol.

Clean the exterior of the unit at least once every 15 days.



Perform, all cleaning with special care, avoiding water access or humidity to the equipment

Do not use detergents, solvents or any other abrasive agents

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Electrical connections check

Constantly check the condition of all components and their aging process.
Verify that the following does not exist:

1. Faulty, broken or cut cables.
2. Faulty connection between the cable and the plug.
3. Oxide corrosion in connection pins.

Fuse changing



1. The fuse box is on the rear panel, as well as the voltage selector.
2. Disconnect the power supply cable from the electrical network.
3. Disconnect the DENSIM OPTICS microscope power supply cable.
4. Under the power supply cable connector there is a small rectangular plastic holder where the fuses are located. With the help of a screwdriver and with slight pressure, remove the lid to replace the damaged fuse.
5. Remove the burnt fuse and replace it with the spare fuse located inside the same plastic holder. Use T2AL250V fuses for 220V and T4AL250V for 110V power supply.
6. Place the fuse lid back, pushing until a “click” is heard.
7. Connect the power supply cable to the DENSIM OPTICS MICROSCOPE and the electrical network.

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Lamp changing





Before you change an equipment lamp

disconnect the light source of the microscope from the electrical network

And check that the equipment and lamp are cold.

The focal point of the lamp reaches very high temperatures, while the end of the fiber optic cable that is in contact, will get hot.

Never touch the inside end of the fiber optic cable.

It is recommended to connect the fiber optic

cable prior to turning on the light source

1. Put the light switch command in the "Off" position.
2. Remove the lid of the cabin, exposing the lamp to be changed.
3. Press down on the retainer spring and loosen the lamp to be replaced.
4. Remove the lamp from the ceramic lamp holder.
5. Position the new lamp introducing the pins in the corresponding holes. Make sure that you introduce the full length of the pins.
6. Place the new lamp in the lamp holder while you press down on the retainer spring. Check the correct position of the lamp with the holder, in order to prevent any displacement.
7. Before you replace the lid, correctly place the cable of the lamp holder.

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Cleaning of objective lens and eyepieces

Using a thin tissue paper with acetone, smoothly rub the tissue on the surface using circular movements.

Fiber optic cable changing

1. Turn the On/Off switch to the "OFF" position.

2. Take off the distal end of the fiber optic cable, placed inside the microscope head. Released the other end of the fiber optic cable from the light source.

3. Release the fiber optic cable from the plastic cover.

4. Pass the new fiber optic cable trough the plastic cover of the parallelogram arm beginning with the end near the arm/forearm joint.

5. Connect the fiber optic cable to the light source.

6. Connect the power supply cable to the microscope, and then to the local electrical network.

7. Select the lamp you wish to use.

8. Turn the On/Off switch to the "ON" position

9. Disassembling and Assembling the System

This chapter provides instructions to disassemble the system panels and its electronic components. In order to assemble the system parts and electronic components carry out the disassemble procedure backwards.

Disconnect the power supply cable from the system before proceeding to disassemble/assemble the electronic components.
Do not replace any of the original screws, jumpers

Disassembling equipment covers

It will be necessary to disassemble the top cover to access the electronic parts of the system

1. Loosen and remove the 4 4-mm Allen screws that hold the top cover, located on the light source laterals

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2. Remove the covers upwards.



Disassembling the Light Source Components

a. Remove the refrigeration nozzle together with the fan by taking out the Philips screws that hold them.
b. Disconnect all the voltage regulator plate connectors.
c. Using pliers press on the ties of the plate clamps and remove them one by one.
d. If you are unable to remove the plate in this way, take the 4 Philips screws away located on the equipment side and remove it.

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Voltage Regulator Plate

Changing the lamp

a. Remove the top cover from the burnt lamp side
b. Press the spring that holds the lamp downwards to release it.
c. Remove the lamp from the socket.
d. Place the new lamp introducing the pins in the corresponding holes. Make sure to introduce the whole length of the pins.
e. Introduce the new lamp in the lamp-holder while you press the spring with your finger. Check the correct matching of the spring in order to avoid its sliding.
f. Before placing the top cover, arrange the lamp-holder cable orderly.

Disassembling the transformer



a. Disassemble the top covers
b. Remove the lamps from the lamp-holders
c. Disassemble the refrigeration nozzles together with the fans, removing the screws that hold them (4 each)
d. Disassemble both diaphragms removing the knob first and the Grover washer that support them to the cabinet.

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e. Unthread the knurled washers from the front that hold both lamp-holders.
f. Remove both lamp-holders.
g. Remove the Allen screw supporting the metallic plate that separates from the transformer.
h. Disconnect the primary and secondary winding.
i. Remove the Transformer

Connectors Pin Out

Transformer Pin Out

Cable	Winding	Voltage [Vca]
Red + Black	Primary	Neutral (110)
White + Blue	Primary	Line (110)
White	Primary	Line (220)
Black	Primary	Neutral (220)
Red + Blue	Primary	In short-circuit (220)
Yellow x2	Secondary	15

10. The most common problems

The following is a table indicating the most common problems and their quick solutions.
Please consult this table, for any difficulty you may find.

PROBLEM	POSSIBLE CAUSE	ACTION
The light source does not work.	It is not connected to the local electrical network.	® Connect the cable to the network.
	The power supply cable is broken or cut.	® Change the cable
	The plug is not in good conditions	® Change the plug
	The fuse is broken or burnt out.	® Change the fuse
	The tension of the network is not compatible with the one required for the equipment.	® Verify
There is no illumination but the green pilot light is on.	The lamp is burnt	® Select the other lamp to work or change the lamp.

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The intensity of the light is not correct	The lamp is damaged The lamp is out of place	® Replace ® Verify that the lamp is secured in place.
High temperature at the light source	The fans do not work Obstruction of the ventilation gratings	® Notify technical service ® Liberate or clean the ventilation gratings
Noise in the light source	The cables of the lamp are touching the fan	® Put the cables of the lamp in such way that they do not touch the fan.

If you were not able to fix the problem, please contact your local distributor and request technical service.

11. Notice

The **DENSIM OPTICS Microscopes** are electrical equipments that provide very high intensity of light. It's use is recommended exclusively for personnel is are correctly trained and familiarized with the equipment.

Do not use in places where there is explosion danger.

Although the light source does not damage the eyes, we recommend not looking directly into the light channel or the end of the microscope and handle it according to instructions.

The microscope is grounded through a conductor of the power supply cable. This essential cable grounding is provided for a safe operation of the equipment.

In case of electromagnetic interference with other electro medical or electrical equipment, we recommend that you widen the distance between the microscope and the other equipment in order to minimize these effects.

If as a consequence of:

inadequate use of the equipment
no use of the instructions manual
bad care and maintenance
repair and manipulation by unauthorized personnel any
material or personal damage caused to third parties,
DIPLOMAT DENTAL s.r.o.., manufacturer, and provider of the equipment, does not assume any responsibility for such damages.

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12. Maintenance Card

Work performed	Responsible person	Date	Signature
		___/___/___	
		___/___/___	
		___/___/___	
		___/___/___	
		___/___/___	
		___/___/___	
		___/___/___	
		___/___/___	
		___/___/___	
		___/___/___	
		___/___/___	

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13. Repair service

The **DENSIM OPTICS Microscopes** must be repaired and/or maintained exclusively by authorized DIPLOMAT DENTAL s.r.o. technical service. We recommend the use of the following procedures to let a quicker repair service and replacement of products that are guaranteed.

Obtain telephone contact with the technical department of DIPLOMAT DENTAL s.r.o. Give

detailed information of the problem.

If the problem cannot be resolved by detecting failures, you must send the products for their repair or replacement.

You must attach the following product information:

Name of owner.
Owner's address.
Person to contact by phone and phone number.
Serial number of the product.
Description of the problem.

Send the microscope for repair or replacement. You must send the microscope in its original packing so that the equipment is not damaged during transport. Our company is not responsible for damages, which may occur during transport, caused by deficient packaging.

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14. Warranty

DIPLOMAT DENTAL s.r.o. states that the **DENSIM OPTICS Microscope** has complied with the quality control verification required and has no manufacturing defects, which guarantees the appropriate functioning under adequate use in agreement with the indications of this manual.
The warranty period is three years (36 months) from the date of purchase.

DIPLOMAT DENTAL s.r.o. is not responsible for any damage of the microscope, caused by incorrect use, negligence, cleaning or incorrect storage. Any repairs made by personnel who are not authorized by DIPLOMAT DENTAL s.r.o. will invalid the warranty. The previously warranty is exclusively valid for the original buyer.

The following parts are excluded from the warranty:

Parts and components that are manufactured by third parties;
Lamps;
Cables and plugs;
Damages resulting from incorrect connections to different power supply tensions.

Without taking into consideration the situation of the warranty, all shipment from and to the authorized technical service of DIPLOMAT DENTAL s.r.o.. is the sole responsibility of the client.

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15. Compatible accessories

Double light source HALOGEN

Image splitter double 50/50 or one port beamsplitter

Extension tube for a second doctor

45° inclined binocular

Straight binocular for ENT

CCD Camera Watec

CCD Camera PRO-CAM

SLR Camera

Eyepieces 10X, 12,5X, 16X

Objective lens 200mm

Objective lens 250mm

Objective lens 300mm

Objective lens 400mm Dust

cover

XENON light source

LED light source Inclinable

binocular 195 deg. Arm

extension

Binocular extender

Objective covers

Autoclavable covers on maneuvering handles

Binocular rotating ring

Long arm

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16. Safety Rules



Do not try to operate or perform the maintenance of the system before reading the safety information provided in this chapter.

This chapter describes the safety features included in the DENSIM OPTICS Microscope system, as well as the safety precautions to be considered when handling and using it.

Safety Features of the System

The DENSIM OPTICS microscope system contains the following safety

features: There shall be a main switch to turn the equipment ON and

OFF.
The system is labeled according to the international safety standards and pursuant to the specific voltage levels of the country.
The system is factory-equipped with adequate ground connection.

General Precautions

Do not touch or handle the internal parts of the system except during its maintenance / repair.
Only authorized personnel from the company shall perform the maintenance and repair of this system.
Make sure that all personnel involved in the study are familiar with the system controls and know how to turn it off immediately in case of emergency.

Personal Safety

When operating the system the main concern shall be the safety both of the patients and the equipment users. Follow these safety guidelines in order to keep a high personal safety level.

Check that the person performing the study is qualified to do it.
Before performing the study, get a detailed clinical record of the patient in order to check if he/she is in good condition to undergo it.
Inform the patient about the study, the possible results and any risk associated with it.

A Safe Environment

Keep the following environmental requirements to protect the system parts and allow an optimum operation.

Keep the system away from any corrosive material that may damage the electronic parts.

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Keep the system clean and away from metallic dust and dirt particles that may damage the electrical parts of the equipment.

The recommended room temperature is 20º-25ºC and a relative humidity lower than 80%.

Electrical and Mechanical Safety

Follow these instructions to guarantee the electrical and mechanical safety of the equipment:

Do not remove the system covers or panels while in service.

Check that the system is turned off and the electricity disconnected before trying to perform its maintenance or repair.

DENSIM OPTICS shall only be used in places with electrical installations that meet the national, provincial and local regulations in effect.

MICROSCOPE shall be connected to the grounding of the operation room or endoscopy tower through a ground cable.

The DENSIM OPTICS Microscope shall be connected to the voltage line through the power supply cable provided.

The power supply shall only be provided with a protected plug and the adequate ground connection.

Fire Risks

Follow these instructions in order to avoid fire risks:

For a continuous fire protection, replace the fuse only by one of the same type and voltage.

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