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Instruction Manual

DOM3000 Series Operation Microscope

SEMORR MEDICAL

www.semorr.com



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Indications for Use Statement

510(k) Number: Exempted

Device Name: DOM 3000 Series Operation Microscope

Indications for Use:

The dental operation microscopes are AC-powered microscope intended for use in oral examination. They are used to aid in the diagnosis or surgeries of dental sectors as endodontic, implant, periodontics and prosthodontics esthetics, etc.

Prescription use _____ (Per 21 CFR 801 Subpart D)

And/or over-the counter use_____ (21 CFR 801 Subpart C)

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Introduction

Thanks for purchasing DOM 3000 series Dental Surgery Microscope.

DOM 3000 series Microscope has the following features:

- Excellent optical system ensures an exquisite image in every detail
- Accurate 6 steps or Zoom magnification system
- Stable and lifelong LED illumination
- Inclinable Binoculars (with 210 ° movement)
- Flexible balance system
- Accessible to future update to premium edition

This user manual covers an overview of the basic operation, troubleshooting, checking and maintenance of the DOM 3000 series Microscope system.

Keep this manual with the Microscope for future reference.

Specifications

Microscope System	
Eyepieces	12.5X/18B(Aperture:18mm）
Binoculars	0～210° variable
PD adjustable range	50mm～75mm
Diopter Range	±6D
Magnifications	DOM3000B: 3.2X/5X/8X/12.8X/20X DOM3000C: 2.7X/4X/6.1X/9.6X/16X/24X DOM3000E: 3.6X～23X
Total magnification rate(*）	DOM3000B: 5 steps DOM3000C: 6 steps DOM3000E: ZOOM
Objective Lens	f=250mm
Fine focus of objective Lens	16mm
Diameter of FOV(*）	DOM3000B: 11mm/17mm/27.5mm/44mm/68mm DOM3000C: 9mm/14mm/22mm/37mm/56mm/83mm DOM3000E: 9.8mm～62.5mm
Illumination System	
Light source	LED module, variable brightness, over 6,000h life span
Minimum illumination intensity (f=250）	＞80,000lX
Diameter of illumination spot	85mm
Filter	Orange, Green
Color temperature	6500k close to natural light, true color
Support System	
Standard base	Mobile base
Swing arm	Radius gyration: 460mm， 360° rotation

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Microscope arm	Radius gyration:700mm，±160° rotation，up & down ±315mm
Longest arm reach	1390mm
Dimension of base	516mm X 516mm
Net weight	115kg
Electric System	
Input Voltage	AC100-240V，50/60Hz
Light source max consumption	20VA
Total consumption	70VA
Fuse	220V：T1.0AL 250V / 110V：T2.0AL 125V
Optional Accessories	
Eyepieces	10X/18B 16X/18B
Binoculars	45°/90° fixed angle,0～90° variable
Objective Lens	f=175/200/300/350/400mm 0~16mm fine focus facility included
Beam splitter	50%: 50%/20%:80%
Digital camera adapter	Canon EF-mount/Nikon
Video camera adapter	CCD
Rotating ring	45°/30° Rotation angle: ±25°
Foot pedal	Support Canon/Nikon digital camera

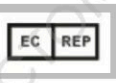
Precautions

- In case any trouble happens, please refer to the trouble-shooting guide. If the failure cannot be fixed, please contact the authorized distributor or our Semorr support service.
- Do not use this Microscope in the location prone to fire, blast and dust or with high temperature. Use it indoor and be careful to keep its surface clean and dry.
- Check that all the wires are correctly and firmly connected before using. Ensure that the Microscope is well grounded.
- Please pay attention to all the ratings of the electrical connecting terminal.
- Turn off the main power first before replacing the main bulb, flash lamp and fuse.
- When replacing the power cable, please use the power cable in accordance with the notes in the instruction manual.
- Don't touch the surface of the Lens or prism with hand or hard objects.
- Read carefully the safety and other signals on this machine in order to use the product safely.

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Displays and icons for safe use

In order to ensure the safe use of the product and to avoid any danger to users, or damage to property, important warning displays and icons are placed on the product and inserted in this manual. It's suggested for all users to learn the meaning of following displays and icons.

Displays/Icons	Meaning
	Manufacture Date
	Manufacture information
	European certificate of conformity
PN	Part number
SN	Serial number
	Warning
	Authorized representative in European community
	Ground fault protection
	Separate collection

Escape Clause

- Semorr shall not take any responsibility for damage due to fire, earthquakes, actions by a third party or other accidents, or the negligence and misuse of the user and use under unusual conditions.
- Semorr shall not take any responsibility for damage derived from the inability to use this Microscope, such as a loss of business profit and suspension of business.
- Semorr shall not take any responsibility for damage caused by operations other than those described in this Instruction Manual.
- Diagnoses shall be made on the responsibility of pertaining doctors and Semorr shall not take any responsibility for the results of such diagnoses.
- Semorr shall not take any responsibility for damage caused by the weakness of roof or floor of practices, which are not strong enough for supporting the Microscope.

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Structural Components

- Surgical microscope is composed of optic system (objective lens, magnification system, optic observation system and eyepieces), illumination system, supporting stand and electrical installation. Corresponding accessories can be mounted basing on different needs.
- The details of surgical microscope are shown in Figure. 1

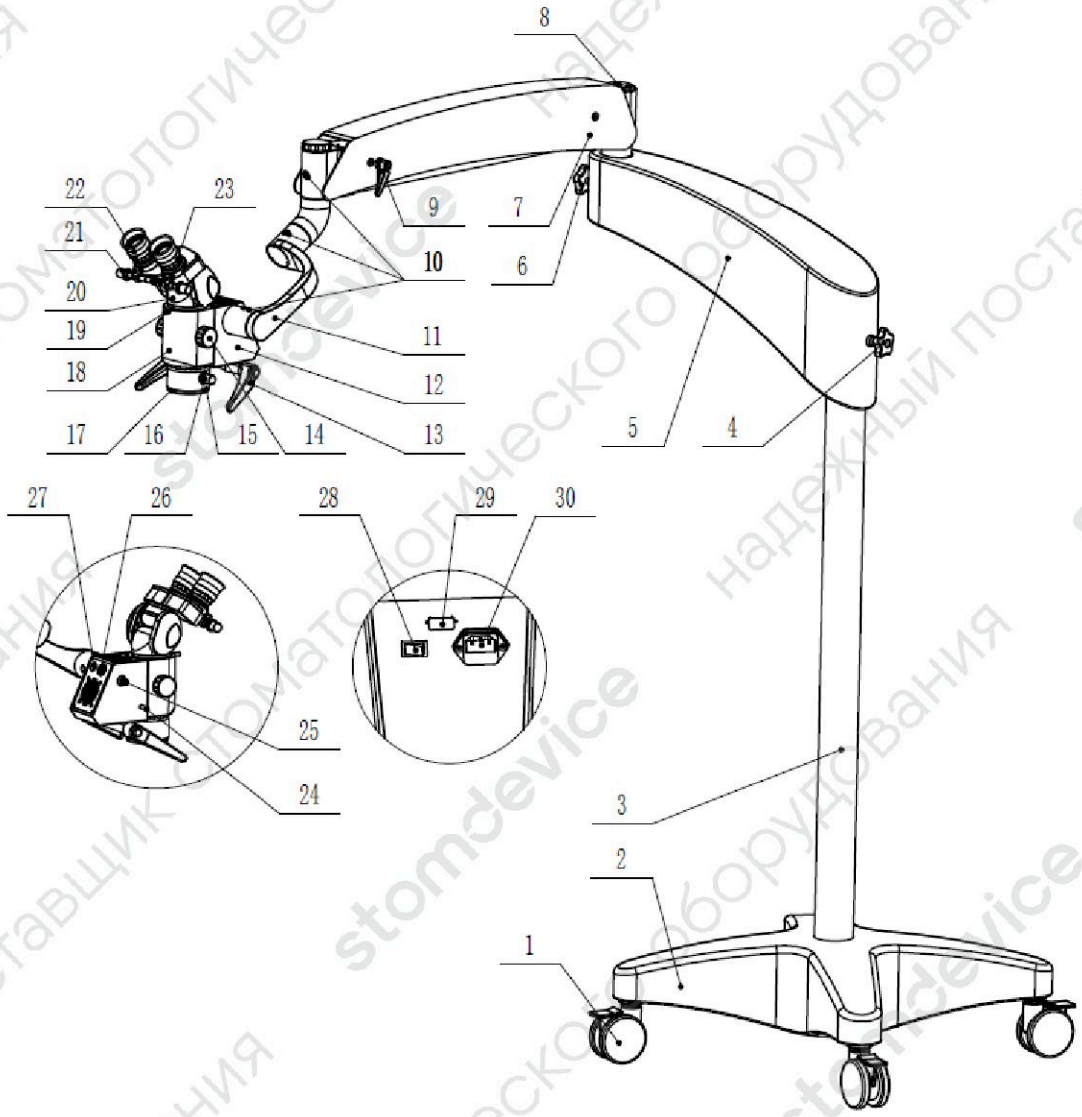


Fig.1 structure chart for surgical microscope

[1] Wheel: Move Microscope.

[2] Mobile Base: Support Microscope.

[3] Column

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[4] Lock knob of Cross Arm: Lock the cross arm from circumferential rotation.
[5] Cross Arm: Power cable inside.
[6] Lock knob of Swing Arm: Lock the Swing arm from circumferential rotation.
[7] Swing Arm: Keep the balance of microscope and support up and down movement.
[8] Balance knob: Maintain the balance of the microscope with accessories mounted.
[9] Position lock knob: Lock swing arm from up and down movement.
[10] Damping screw
[11] Microscope Arm: Support microscope body
[12] Illuminator: Provide lighting.
[13] Handle
[14] Magnification Knob: Adjust the microscope magnification.
[15] Objective lens
[16] Lens focusing knob: Fine focus
[17] Splash cover
[18] Microscope body
[19] Lock screw: Fix Binoculars.
[20] Binoculars
[21] Pupil distance adjustment knob: Adjusting the pupil distance of binoculars
[22] Eyepieces
[23] Diopter adjustment ring: Adjust the Eyepieces visibility
[24] Filter rod: Apply the filter or not.
[25] Brightness Adjusting Knob: Adjust the brightness of the light.
[26] Light socket: Supply power to illuminator
[27] CCD socket: Supply power to CCD or other imaging system
[28] Power Switch
[29] HDMI Socket: Export HDMI images
[30] Power Socket: Supply power for the whole microscope

Installation

The Microscope is easy to install with the help of this instruction manual. If there is any difficulty, please contact the authorized distributor or our Support service.
The microscope is packed in the carton with separated parts. Please follow the following steps to install the Microscope correctly.

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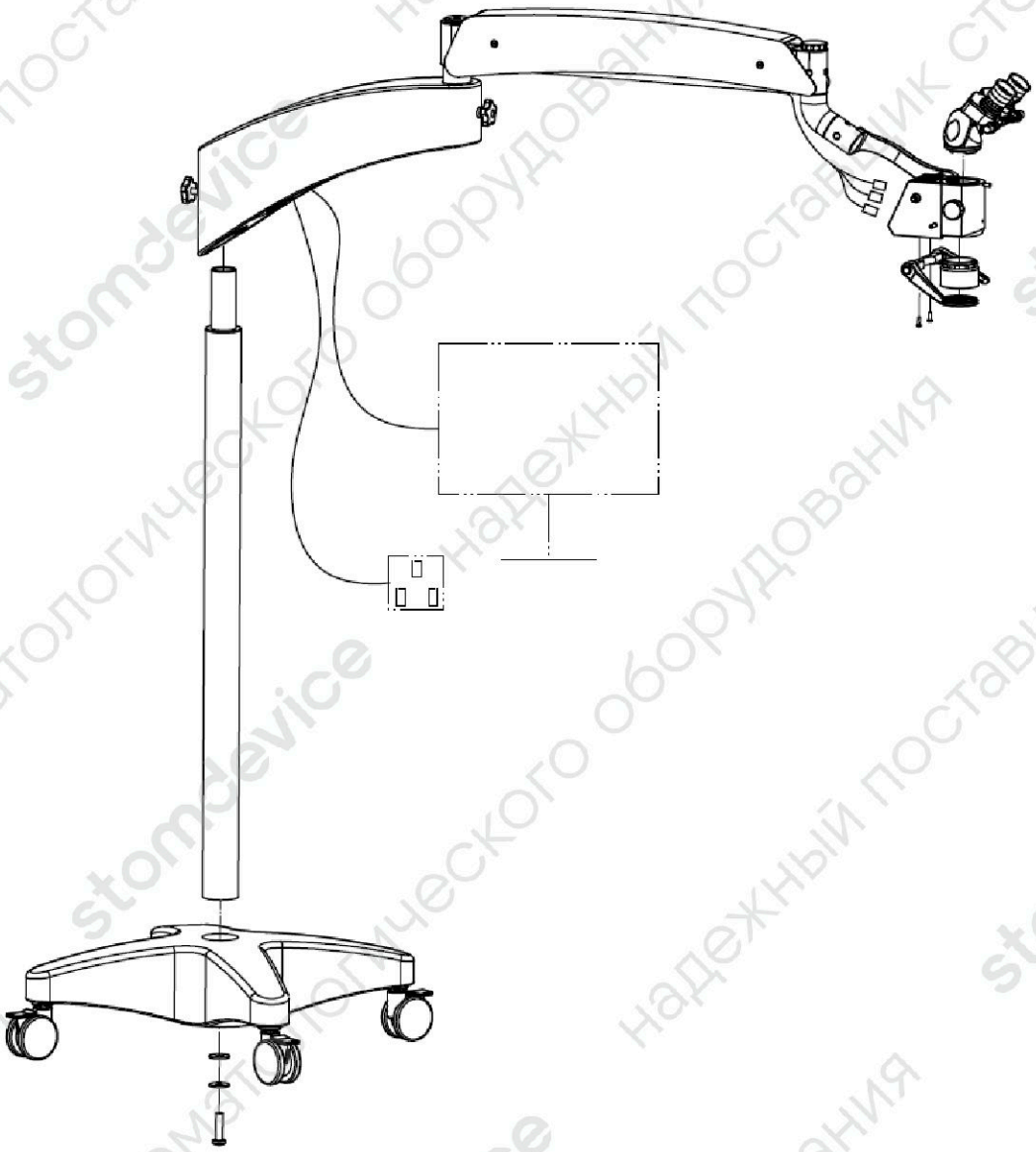


Fig.2 Microscope installation

Installation of Base

Unpack the box to take out the Base [2].

Take out the Column [3], wrung out screws and washer at the bottom. And then insert Column [3] into the hole of the base. Place the column into the hole of the base. Make sure to align the slot of the column with the cylindrical pin on the base.

Tighten the screw under base with a 10 mm Allen wrench (as pic below). Base installation is completed.

Installation of Cross Arm

Take out the Cross Arm part which includes the Cross arm [5], Swing Arm [7], Microscope Arm[11], Illuminator [12] , Microscope Body [12],and install the assembly on the Column [3], tighten the Cross Arm lock knob [4] (Fig.2).

Installation of Handle

Take out the handle from box. Screw out the locking screws mounted on the bottom of Objective Lens. And

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then fix handle to microscope head. A 3 mm Allen wrench is needed, which can be found in the tool package.

Installation of binoculars

Take down the dust cap on top of microscope body[18], loosen the lock nut [19], take out the binoculars [20] and mount to the microscope body [18], tightening the lock nut [19]

Installation of Splash Cover

Take out splash cover [17] and mount it to objective lens [15].

Electrical connection of Cross Arm and Microscope

Plug the extended cable plug of swing arm [7] into the corresponding sockets. This product includes illumination plug (connecting illumination socket [26] to provide power for illuminator [12]), mini HDMI plug (connecting camera to transfer HD videos) and external power pack plug of camera (connecting cameras and offer continuous power). Take out power cable and connect power socket [30] and output power.

Note: If the microscope includes monitor and monitor frame, please fix it to the column [3], connect monitor power and then use HDMI cables to connect HDMI socket [29] and the HDMI input port of the monitor.

Check before use

- Confirm that the Voltage/Frequency is correct for the Microscope. Do not connect the microscope to the power besides indicated in this instruction manual.

Note: Use correct fuse according to local voltage:
220V：T1.0AL 250V / 110V：T2.0AL 125V

- The Microscope uses a 3 cores power cord. Please choose an appropriate Power Socket to match.

Note: In order to ensure good instrument grounding, please use the specified power cord or power cords meets articles IEC227 standard.

Note: Using unspecified cable may lead to poor performance of equipment.

- Power switch [28] on the Cross Arm. "ON" means power is on. "OFF" means power is off.
- Make sure the power switch is OFF before connecting the microscope to main power.
- Connect the microscope to main power and well grounded.
- Turn on the Switch to make sure the Bulb works well.
- After inspection, shut down the power supply.

Usage of Microscope

Adjustment of the Microscope before using

- Loosen slightly of all the lock knobs to test the flexibility of each mount.

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- Hold the handle to move microscope to its focal plane (250mm from objective lens to operation surface). And then fasten to lock knob to get a stable observing position.

Note: The swing arm was well balance in factory. If an image kit is mounted to the microscope later, please rebalance the Swing arm [7] following the steps below:

- Fasten the position lock knob [9] of Swing Arm [7] from movement.
- Hold the Handle [13], swaying the Microscope [7] back and forth, tighten or untighten Microscope Damping Knob [10] according to the strength of damping force.
- Loosen the position lock knob [9], hold the handles [13], move the microscope up and down. Rotate balance knob [8] counterclockwise for mounting image kit to microscope, as shown in Fig. 4. Repeat the step until the up and down movement of swing arm is flexible.

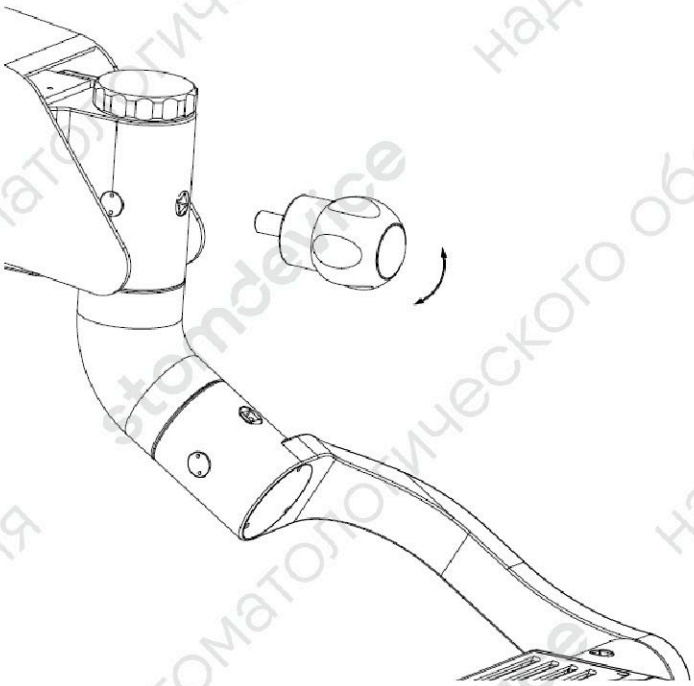


Fig. 3

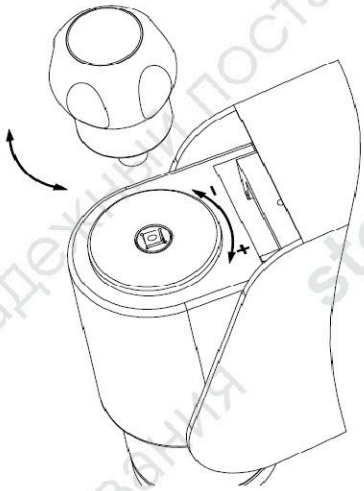
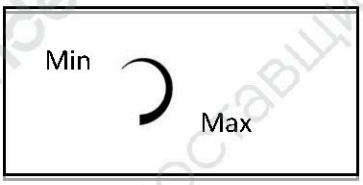


Fig.4

Regulation of Microscope in using

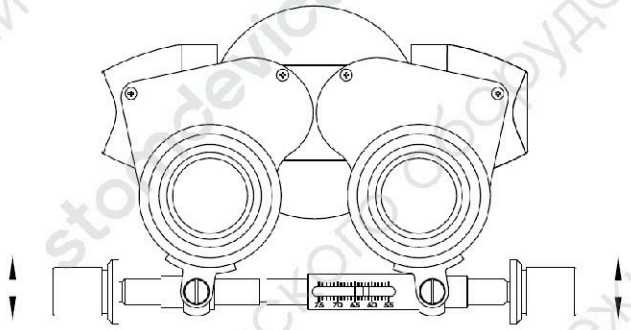
- Firstly move the Microscope to right place. Lock the brakes of the Wheel [1] to fix the Microscope.
- Connect the wire plug under the Cross Arm [5] into the Power Socket. Turn on Power Switch [28].
- Illumination Brightness control: rotating the Brightness Adjustment Knob [25] on the side of Illuminator [12] to regulate light intensity.
  Min: clockwise rotating
  Max: counterclockwise rotating.



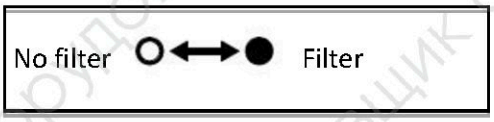
- Changing Magnification: rotate Magnification Knob [14] to change magnification ratio.
- Focusing: rotate Magnification Knob [14] to minimum, loosen the Position Locking Knob [9], and hold the Handle [13] to move microscope to make sure the subject in the center of the spot, clear and sharp. Use fine focus knob to observe different positions.
- Diopter regulating: Adjusting range is ±6D, in step of 1D (100 degree).

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- "+": Myopia/ "-": Hyperopia
- PD adjusting: turn the pupil distance adjusting knob under Eyepieces [21] until a clear and sharp stereo image appears in the microscope.



- Filter switch: pulling or pushing the Filter Rod-Yellow & Green [24] to apply the filter in or out of the optical path.



Move and storage after using

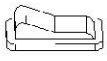
- Fold the Microscope arms to the side of Column [3]. Tighten the Lock Knob of each joint to fix the microscope.
- Shut down power supply.
- Loosen the brakes of the Wheel [1], hold the Cross Arm [5] and move Microscope carefully to avoid collision and dump.

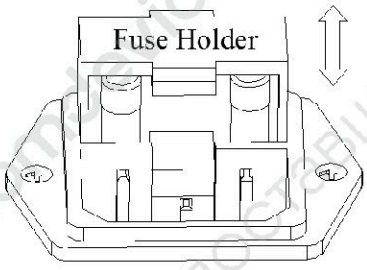
Note: when moving the equipment on slope ground, please move the Cross arm [5] and Swing arm [7] to the opposite direction of the slope, and move the wheels with brakes in the opposite direction of the moving direction.
For example, moving upward along the slope, Cross arm [5] and Swing arm [7] should be upward, two Wheels [1] with brake should be downward.

Routine Maintenance

Replacing the fuse

Remove the fuse in use from Power Socket [33] and insert a new one.





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Note: Use correct fuse according to local Voltage. For safety, switch off the microscope and pull the plug out before replacing the fuse.

Microscope cleaning and disinfecting

- The Microscope must be properly maintained. Please do not disassemble the Microscope without service technician's guide.
- Suggested cleaning and maintenance cycle is six months.
- Please do not put the Microscope in the environment with dust, moisture or containing corrosive gas.
- Please do not touch or remove the optical Lenses. If there is dust on the surface of lenses, blow away with blowing balloons or dust removal pen. Blood drop on lenses can be removed by cotton dipped in the mixture solvent of absolute alcohol and diethyl ether (proportion 1:1).
- Rub-up the external surface of the Microscope with wet cloth soaked in a mixture of 50% ethanol and 50% distilled water. Do not use corrosive cleaner.
- All the attachments not in use should be well preserved in box with desiccant inside.

Trouble-shooting guide

In case any trouble happens, please refer to the trouble-shooting guide below. If the failure cannot be fixed, please contact the authorized distributor or Semorr support service.

Fault	Possible reasons	Solution
No illumination	Brightness adjusting knob in the minimum position	Adjust brightness adjusting knob
	Power cable not well connected	Plug again
	Fuse is broken	Replacing the fuse
Lighting is too dim	Brightness adjusting knob in the minimum position	Adjust brightness adjusting knob

Consumption Ordering

Item	Name	Specification	Recommended models
DOM3000 series Microscope	Fuse	220V：T1.0AL 250V 110V：T2.0AL 125V	51S-010H、51S-020L

Responsibility

A circuit diagram or an electrical components list will be provided to user for repair purpose. Please contact an authorized agent or Semorr support service.

Transportation and storage

The Microscope should be stored well placed in a moisture-proof warehouse. Violent vibration is prohibited during transportation.

The Microscope should be stored in the environment:

- Temperature: -10 ℃ ~ + 40 ℃
- Relative humidity: 30% ~ 80%

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- Atmospheric pressure: 700 BPA and 1060 BPA
- No corrosive gas
- Good ventilation

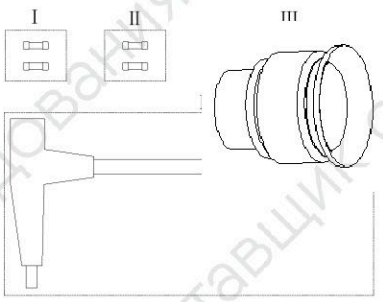
For short movement of the microscope, please fasten all lock knobs of the Microscope (see 5.3). If a there is slide is in the way of movement, the inclination angle should be less than 10 degree. The microscope must be packed in its original box for long distance delivery.

If the Microscope was stored in warehouse for more than 5 years, please contact an authorized dealers or Semorr support service to check the Microscope before using.

Please dispose the waste electrical and electronic equipment in accordance with relevant regulations and laws.

Spare parts and Tools

i. 2 pieces of 220V T1.0 AL 250V fuses.
ii. 2 pieces of 110V T2.0 AL 125V fuses.
iii. 1 piece of 3 mm Allen wrench.
iv. 1 piece of 10 mm Allen wrench.



Optional accessories and installation

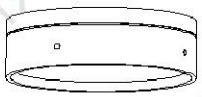
Straight Binoculars tube (for ENT)

Loosen the Lock Screw [23] and demount the 210 ° Obliquity Binoculars [24]. Mount the Straight binoculars and fasten the Lock screw [23].

Inclined Binoculars tube (for surgery)

Demount the 210 ° Obliquity Binoculars [20]. Mount the Inclined binoculars.

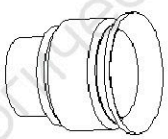
Objective Lens (F200mm/F300mm/F350mm/F400mm)



Remove the splash cover [17], demount the original objective lens [15] and replace with a specified one. Mount the splash cover [17] back.

Specifications	F200mm	F300mm	F350mm	F400m
Magnification (Times against original spec)	1.25	0.83	0.71	0.63
Diameter of FOV (Times against original spec)	0.8	1.2	1.4	1.6
Diameter of illumination spot (Times against original spec)	0.8	1.2	1.4	1.6

10 X Eyepieces



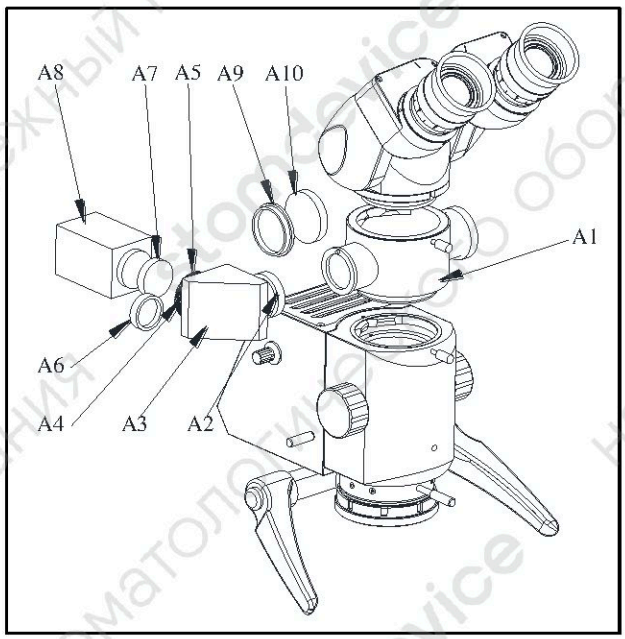
Pull out 12.5X Eyepieces of Binoculars, and replace with 10X Eyepieces. The magnification ratio is 0.8 times against the original eyepieces. The observation field is the same.

16 X Eyepieces

Pull out 12.5X Eyepieces of Binoculars, and replace with 16X Eyepieces. The magnification ratio is 1.28 times against the original eyepieces. The observation field is the same.

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Beam splitter and CCD interface



[A1] Beam Splitter

[A2] Locking Ring1

[A3] Video Camera Adapter

[A4] Focusing Ring

[A5] Locking Ring 2

[A6] Dust Cover 1

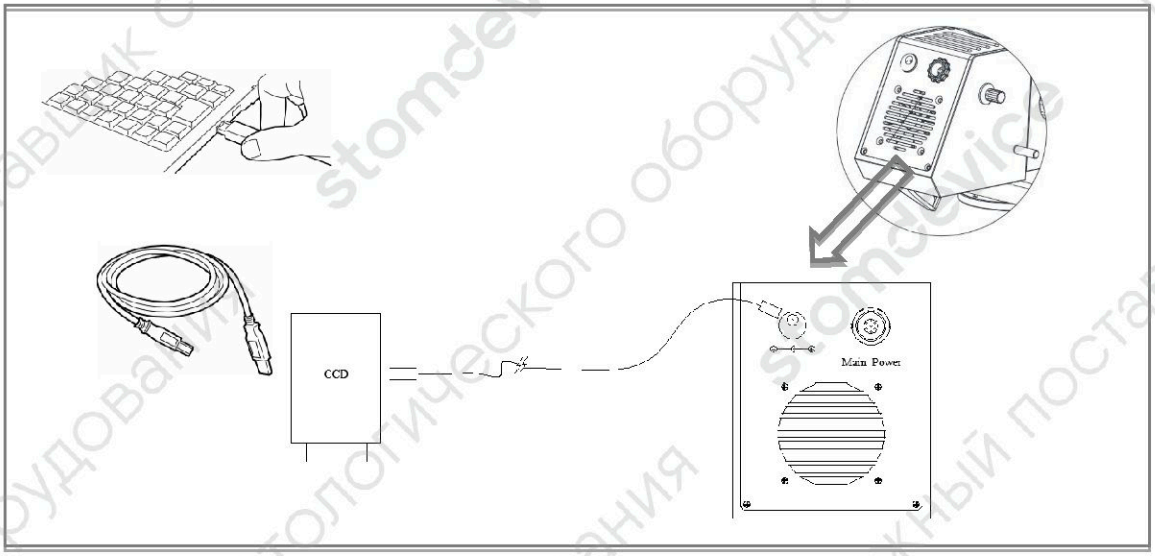
[A7] CCD Connector

[A8] Digital Camera Adapter

[A9] Dust Cover 2

[A10] Dust Cover 3

- Screw out lock screw [19], take out the binoculars [20], mount beam splitter and then tighten the lock screw[19];
- Mount the binoculars [20] on beam splitter, tighten the locking screw on the beam splitter;
- A DC adapter or CCD adapter can be attached to the beam splitter on left or right side accommodating to user's established habit. Collect the dust cover of beam splitter and keep it for future use.
- Mount the CCD adapter to beam splitter. Be sure aligning the pin on beam splitter to the slot on CCD adapter. And then tighten Locking Ring1 (A2).
- Mount video camera (CCD) to CCD adapter [A3], and fasten the locking ring.
- Connect the power cable and data cable of CCD to get a preview image in the display.
- Mount Binoculars on top of Beam Splitter [A1] and fasten the lock screw.



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Note: It is required to rebalance the Swing Arm [7] and adjust damping force of microscope [22] when mounting additional accessories.

Electromagnetic Compatibility

This equipment belongs to class A. It should be installed and used according to the Electromagnetic Compatibility requirements indicated in this instruction manual.

Portable devices as Wi-Fi router might cause disturbance to this equipment. Please use power cord that meets Electromagnetic Emission and anti-interference requirements:

Item	Length
Cable (10 A)	Less than 3m
Terminal wire	1.2m

Using unspecified accessories or cable might result in emission increasing or immunity reducing.

EMC precautions: Other medical instruments and equipment, which needs to be installed in the same location with this instrument, shall comply with the same electromagnetic compatibility principle. The equipment which is unable to comply with the electromagnetic compatibility or is known with poor electromagnetic compatibility shall be installed 3 meters at least away from this equipment and powered by different power supply.

Guide and Manufacturer's statement----Electromagnetic Emission This equipment is designed to be used in the following electromagnetic environment:		
Emission test	Compliance	Electromagnetic environment-- Guide
Frequency emission GB 4824(CISPR 11）	1 Group	The radio frequency energy emitted by this equipment is for its internal use only. Therefore, its radio emission is very low. It's not probable to cause interference to the other electronic equipment installed nearby.
Frequency emission GB 4824(CISPR 11）	Class A	None home use. No applicable to low-voltage supply network.
Harmonic radiation GB 17625.1	N/A	None home use. No applicable to low-voltage supply network.
Voltage fluctuation/ Scintillation emission GB 17625.2 IEC 61000-3-3）	N/A	None home use. No applicable to low-voltage supply network.

Guide and the manufacturer's statement - Electromagnetic Interference This equipment is designed to be used in the following electromagnetic environment:			
Perturbation resistance test	IEC60601 Experimental electric level	Actual electric level	Electromagnetic environment Guide

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Electrostatic discharge(ESD） GB/T 17626.2 (IEC61000-4-2）	±6kV Contact discharge ±8kV Air discharge	±6kV Contact discharge ±8kV Air discharge	The ground should be wood, concrete or ceramic tile. If the ground covered with synthetic material, the relative humidity should be more than 30%.
Electrical fast transient burst GB/T 17626.4 (IEC61000-4-4）	±2kV power supply cord ±1kV Input & output cord	±2kV N/A	Power supply should be qualified for using in a typical commercial or hospital environment.
Surging GB/T 17626.5 (IEC61000-4-5）	±1kV cord to cord ±2kV cord to floor	±1kV ±2kV	Power supply should be qualified for using in a typical commercial or hospital environment.
Voltage sag , short supply interruption and the voltage change of power supply cord GB/T 17626.11 (IEC61000-4-11）	< 5% UT，lasts 0.5 cycles (above UT, > 95% temporary reduce) 40% UT，lasts 5cycles(above UT , 60% temporary reduce) 70% UT，lasts 25cycles(above UT ,30% temporary reduce) < 5% UT，lasts 5s (above UT ,> 95% temporary reduce)	< 5% UT，lasts 0.5cycle (above UT ,> 95% temporary reduce) 40% UT，lasts 5cycles(above UT , 60% temporary reduce) 70% UT，lasts 25cycles (above UT,30% temporary reduce) < 5% UT，lasts 5s (Above UT, > 95% temporary reduce)	Power supply should be qualified for using in a typical commercial or hospital environment.
Power frequency magnetic field (50/60Hz) GB/T 17262.8 (IEC 61000-4-8）	3 A/m	3 A/m	Power frequency magnetic field should have a typical power frequency magnetic field characteristic of commercial or hospital environment.
Note：UT means voltage of Ac power grid before applying test voltage.			

Guide and the manufacturer's statement - Electromagnetic Immunity			
This equipment is designed to be used in the following electromagnetic environment:			
Perturbation resistance test	IEC60601 Experimental electric leve	Actual electric level	Electromagnetic environment Guide
Radio frequency transmission GB/T 17262.6 (IEC61000-4-6） Radiofrequency radiation GB/T 17262.3 (IEC61000-4-3）	3 V(Valid values） 150kHz - 80MHz 3 V/m 80MHZ - 2.5GHZ	3 V(Valid values) 3 V/m	The equipment which is unable to comply with the electromagnetic compatibility or is known with poor electromagnetic compatibility shall be installed 3 meters at least away from this equipment and powered by different power supply. The distance is calculated with formula by

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the transmitter frequency.

The recommended separation distance

d =1.2$\sqrt{(P)}$ 150kHz-80MHz

d =1.2$\sqrt{(P)}$ 80MHz-800MHz

d =2.3$\sqrt{(P)}$ 800MHz-2.5GHz

In the formula:

P- based on maximum rated output power supplied by transmitter manufacturers. Unit is Watt.

d- introduced separation distance. Unit is Meter.

Stationary field strength of the Radio Frequency transmitter is measured based on electromagnetic site survey, in every frequency range.

There will be interference near the mark  symbol of the following Microscope.

Note 1: On the frequency of 80 MHZ and 800 MHZ, use the formula of high frequency.

Note 2: These guidelines may not be suitable for all situations. Electromagnetic signal may be affected by buildings, objects or human body.

A Stationary transmitter such as: wireless cellular/cordless phones and grounded mobile radio base station, amateur radio, Am and FM radio and television broadcasting etc., the field intensity in theory can't be predicted.

For evaluating electromagnetic environment of fixed Radio Frequency transmitter, electromagnetic site survey should be taken into account. If measured Microscope field strength is higher than the mentioned Actual electric level, please make sure the Microscope runs well.

If there is abnormal performance, supplementary measures may be required, such as adjusting the direction or position of the Microscope.

B Throughout 150 KHZ - 80 MHZ frequency range, field strength should be lower than 3 v/M

Recommended separation distance between Portable or mobile radio communication equipment and other equipment

This Microscope is expected to be used in the environment with radiation harassment controlled.

Based on maximum power output, you can prevent electromagnetic interference by keeping minimum distance from Portable and mobile radio communication equipment with the Microscope.

Maximum rated output power of Transmitter W	Corresponded isolation distance (m) under different frequency transmitter		
	150kHz - 80MHz $d = 1.2\sqrt{(P)}$	80MHz - 800MHz $d = 1.2\sqrt{(P)}$	800MHz - 2.5GHz $d = 2.3\sqrt{(P)}$
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23

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For the above unmentioned maximum rated output power of the transmitter, recommended isolation distance (d) can be calculated by the formula in the Column of transmitter frequency. Unit is meters (m), P is maximum rated output power, supplied by the transmitter manufacturers, unit is watts (W).

Note 1: at 80 MHZ and 800 MHZ frequency, use high frequency formula.

Note 2: these guidelines may not be suitable for all situations, electromagnetic propagation will be effected by buildings, objects and human body.

Support Service

When calling for support service, please provide the following information about your unit:

Mode type

Product Serial number (SN) (Shown on the label stick on microscope body.)

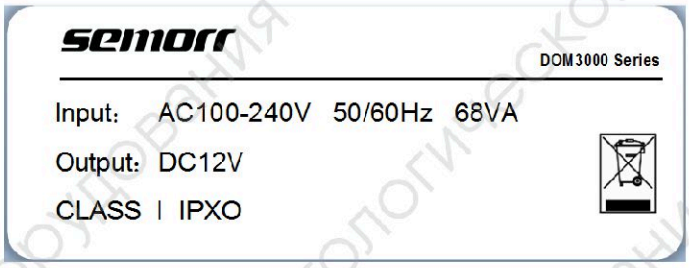
Purchasing date

Detailed description of Problem

DOM 3000 SERIES OPERATION MIACROSCOPE
INSTRUCTION MANUAL
Version 1.0
First edition: JAN, 2016
Second edition: NOV, 2017
Published by SEMORR
Subject to change in design or specifications without advance notification.

Labels





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