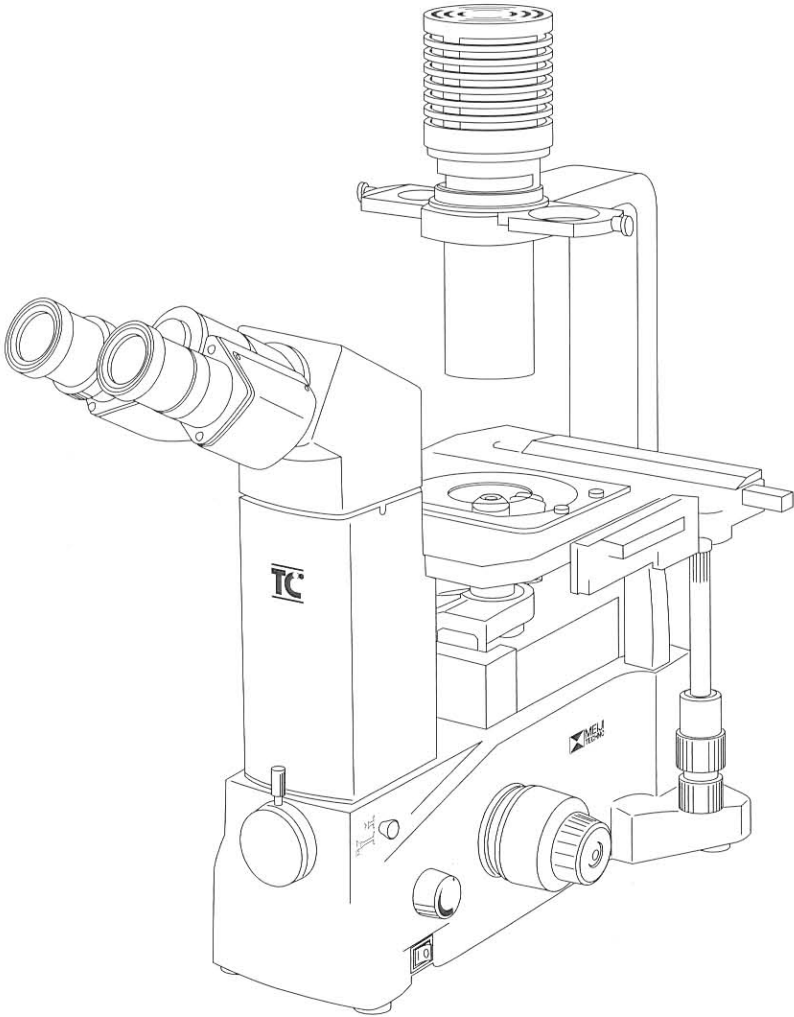




TC5000 Series

Inverted Microscope Instruction Manual



MEIJI TECHNO CO.,LTD.
JAPAN

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TC-5000 Series Inverted Biological Microscope

1. Introduction

The Meiji Techno TC-5000 Series inverted biological microscopes have a slim compact design that saves bench space. Easy operation through ergonomic placement of controls makes them ideal for use in production, research, education and clinical applications.

Meiji's TC Series is well suited for a wide variety of routine and clinical applications such as live cell observation, cell and tissue culture work, in-vitro fertilization, epi-fluorescence observation and high resolution video microscopy.

The TC-5000 Series Microscopes offer crisp, distortion-free, high resolution images in multiple modes of operation and the built-in photo port on the front of the body makes image documentation quick and easy. Contrast methods available include: Brightfield, Phase Contrast and Epi-Fluorescence.

Meiji Techno supplies a variety of standard specimen holders for the TC to accommodate many types of slides, cell culture glassware and well plates.

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1.1 Microscope Features

- CAD Designed Frame and Optics
- Slim Compact Footprint
- Infinity Corrected Optical System
- Low Positioned Ergonomic Coaxial Course and Fine Focus Controls
- Smooth Operating Quintuple Nosepiece
- Rugged Glass Stage Insert
- Optional Mechanical Stage (MA380/05)
- Brightfield, Phase Contrast and Epi-Fluorescence Observation Modes (with proper model)
- Integrated Pre-Centered 6V 30-watt Halogen Illumination System
- Phase Contrast Slider with 4X annulus plus a common annulus for 10X-20X-40X (Phase Contrast Model)
- Extra Long Working Distance Achromatic Condenser
- Siedentopf-type Binocular and Trinocular Viewing Heads
- Super Wide High Eyepoint Eyepieces
- Automatic Voltage Sensing Power Supply with detachable power cord
- Epi-Fluorescence Illumination (Option)
- HBO 100-watt Mercury Lamphouse (Option)
- Accepts Wide Variety of Specimen Holders
- Integrated Front Mounted Camera Port
- Wide Range of Filters and Accessories

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1.2 General Safety Guidelines

This manual contains important safety instructions and information concerning the installation, operation and maintenance of the Meiji Techno TC5000 Series inverted biological microscopes.

This manual should be read carefully before any attempt is made to operate this equipment. To ensure safe operation the user must read and adhere to all of the directions put forth in this manual.

Meiji Techno products are designed for safe operation under normal operating conditions. The instrument and accessories described in this manual have been built and tested according to industry safety standards for electronic laboratory instruments. Incorrect usage or non-conformance to operating instructions can cause personal injury or damage to equipment or property.

Safety Concerns Regarding Fluorescence Microscopy

The operation of the optional fluorescence capabilities of the TC-5500 & TC-5600 come with many potential hazards.

For example; when oxygen in the air is exposed to UV light, ozone is produced. The ozone emanates from the lamphouse during operation. There is no simple way of estimating the concentration of ozone. Operation of a mercury arc lamp in a small enclosed area may lead to high concentrations of ozone.

Ozone has a severe toxicity rating. The maximum exposure limit is 0.1 parts per million per hour. Ozone can be detected by smell. People with a keen sense of smell can detect concentrations of 0.015 parts per million.

A concentration of 1.0 parts per million produces a strong sulfur-like smell. If you can easily smell ozone, then the level is too high for prolonged exposure.

So operation of a fluorescence equipped microscope should be done in a large, well ventilated area.


It is advised to keep this manual near your instrument for easy reference.


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1.3 Warning/Caution Symbols Used in this Manual


You must be aware of all safety issues when you install and operate this microscope system. Several warning and caution symbols are listed below. These symbols are used throughout this instruction manual. For your safety, be sure to follow all instructions associated with the symbols listed below.

 **DANGER** Disregarding instructions marked with this symbol may lead to serious bodily injury or possibly death.

 **WARNING** Operational warning; failure to operate equipment properly may result in damage or injury.

 **WARNING** Possible electrical shock hazard exists

 **CAUTION** Disregarding instructions marked with this symbol may lead to serious injury or property damage.

 **HOT!** Caution for heat or hot surfaces. Risk of burns or serious injury!

 **NOTE** This symbol designates technical note or product tip.

1.4 Intended Product Use

Product Disclaimer: This product is designed and intended for use only as a biological microscope system. Modifying this instrument in any way for use in any situation other than the original and intended product design will automatically void the warranty. In no event shall Meiji Techno be liable to any person for any incidental, indirect or consequential damages, arising out of or in connection with the use or performance of a modified or altered product.

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1.5 Product Safety Information- Handling the Microscope



WARNING This microscope is not intended to be used in the immediate vicinity of water or a water outlet or placed in any location where water may penetrate the instrument. Water penetration may result in electrical shock or death. Choose only a suitable environment for your microscope.

Do not subject the microscope to extreme temperature fluctuations. Extreme temperature changes may lead to condensation within the microscope which may result in damage to the optical and electrical components.

Disassembly of the instrument may result in electrical shock, injury or death, equipment damage, loss of warranty coverage or may create other potential hazardous consequences.

Always turn off the power switch and disconnect the cord from the power supply when replacing fuses, connecting or disconnecting wiring, doing general maintenance or replacing the microscope lamp.



DO NOT OPERATE UNLESS THE UNIT IS PROPERLY GROUNDED!

Use only the specified power cord in a well grounded socket. Do not use in an ungrounded power receptacle or in cases where there is a break in the ground conductor or damage to the electrical wiring.

Only fuses of the specified type and rating are to be used as replacements. Switch off the power and disconnect the power cord before replacing fuses. Use of a non-compliant fuse may result in electrical shock or severe damage your equipment.

The lamp and lamp house become extremely hot during and after operation. Do not place any highly flammable or volatile material close to the lamp-house during or after operation. Do not touch the lamp house or attempt to replace the bulb for at least 30 minutes after the unit has been turned off or injury may result.

Do not obstruct the air vents on the lamp-house or power supply. The lamp housing and power supply should must be located at least 10 cm (4 inches) away from the wall or any combustible objects.

Modifying the instrument in any way or unauthorized attempts to disassemble or use the instrument for applications other than its intended design will automatically void the warranty.

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1.6 Warranty Notes

Meiji Techno warrants this product against defects in material and/or workmanship for the life of the instrument from the date of the original purchase to the original purchaser. Meiji Techno will repair or replace, at its option, any instrument which under normal conditions of use and service proves to be defective in material or workmanship. No charge will be made for labor or materials with respect to defects covered by this warranty, provided all repair work is done by Meiji Techno.

This warranty does not cover expenses incurred in the removal or reinstallation of any instrument or instruments, whether or not proven defective. Replacement or repairs furnished under this warranty are subject to the same terms and conditions of the original warranty. This warranty supersedes any other warranty and is subject to the following terms and conditions:

WARRANTY

Warranty of Meiji Techno's product extends to the original purchaser of the product and is not transferable.

WARRANTY DURATION

Meiji Techno warrants this product against defects in material and/or workmanship for the life of the instrument from the date of original purchase to the original purchaser. The electrical warranty is one year.

OWNER'S REGISTRATION CARD

Return of the owner's registration card by the original purchaser within ten (10) days after the original purchase is a condition precedent to coverage under this warranty. Meiji Techno will at its option accept written proof of purchase from the original owner in lieu of a product registration card.

EXCLUSIONS AND LIMITATIONS

Specifically excluded from this warranty are failures caused by abuse, neglect, misuse, improper operation, normal wear, accident, improper maintenance or modifications of ANY type. This warranty does not cover repair or replacement where normal use has exhausted the life of a part or instrument. All mechanical devices need periodic parts replacement and service to perform well. Service life of an instrument is dependent upon the care it receives and the conditions under which it has to operate. In no event shall Meiji Techno be liable for incidental or consequential damages.

SERVICE

To obtain service under this warranty, please contact Meiji Techno directly and ask for the Product Service Department. State the nature of the problem, model and serial number of the instrument, date of purchase and location and name of the distributor the instrument was purchased from. After verification of warranty registration, Meiji Techno will issue a return authorization number. Customer may then return the product postage prepaid and insured to the authorized repair facility.

In most instances, requests for warranty service will be performed in a prompt and routine manner and merchandise will be returned in a reasonable period of time or at Meiji Techno's convenience. In some

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cases, requests for warranty service are received which are not justified. In these cases, Meiji Techno will provide an explanation for non-warranty action.

WARRANTY TERMS

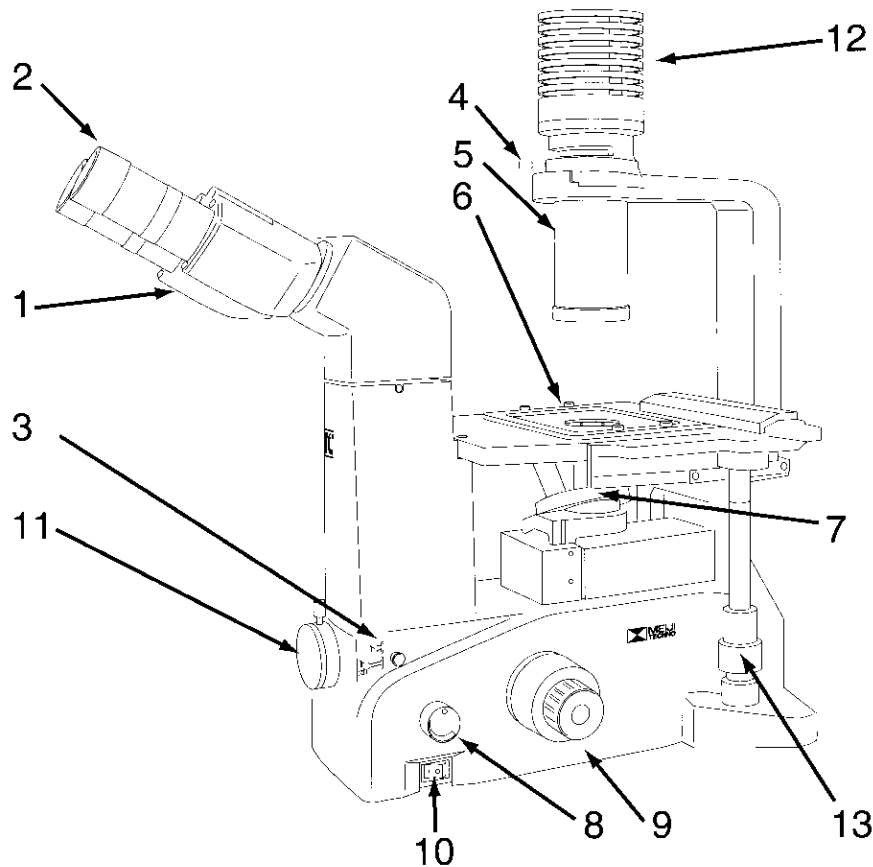
The terms of this warranty may not be varied by any person, whether or not purporting to represent or act on behalf of Meiji Techno. The limited lifetime warranty provided is in lieu of any and all warranties, expressed or implied, whether for merchantability or fitness for a particular purpose or otherwise. Liability for consequential damages under any, and all warranties are excluded to the extent exclusions are permitted by law. This warranty gives you specific legal rights and you may also have other rights which vary from state to state. This warranty sets forth the customer's exclusive remedy, with respect to defective products. This limited warranty shall become null and void in the event of a violation of the provisions of this limited warranty.

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2.0 The Microscope and its Components

The image below designates the main components of the TC-5100 Series Brightfield Inverted Microscope.

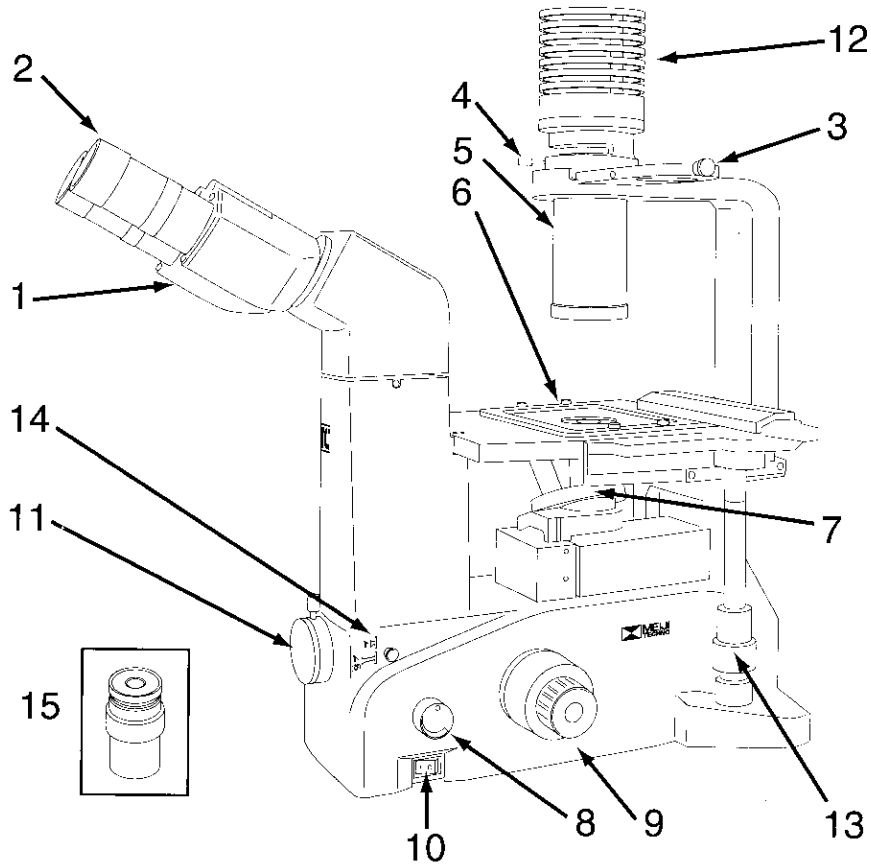


1. Binocular Head, 30° Inclination
2. Eyepieces, SWH10X (15X & 20X optional)
3. Beamsplitter for Front Camera Port
4. Aperture Diaphragm
5. Extended Working Distance Condenser
6. Specimen stage
7. Quintuple Nosepiece & Brightfield Objectives
8. Low Positioned Variable Brightness Control
9. Coaxial Course and Fine Focusing Controls
10. Power Switch
11. Front Camera Port
12. Integrated Illuminator 6V 30W
13. Optional Mechanical Stage with Drop down Coaxial Controls

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The image below designates the main components of the TC-5300 Series Phase Contrast Inverted Microscope.

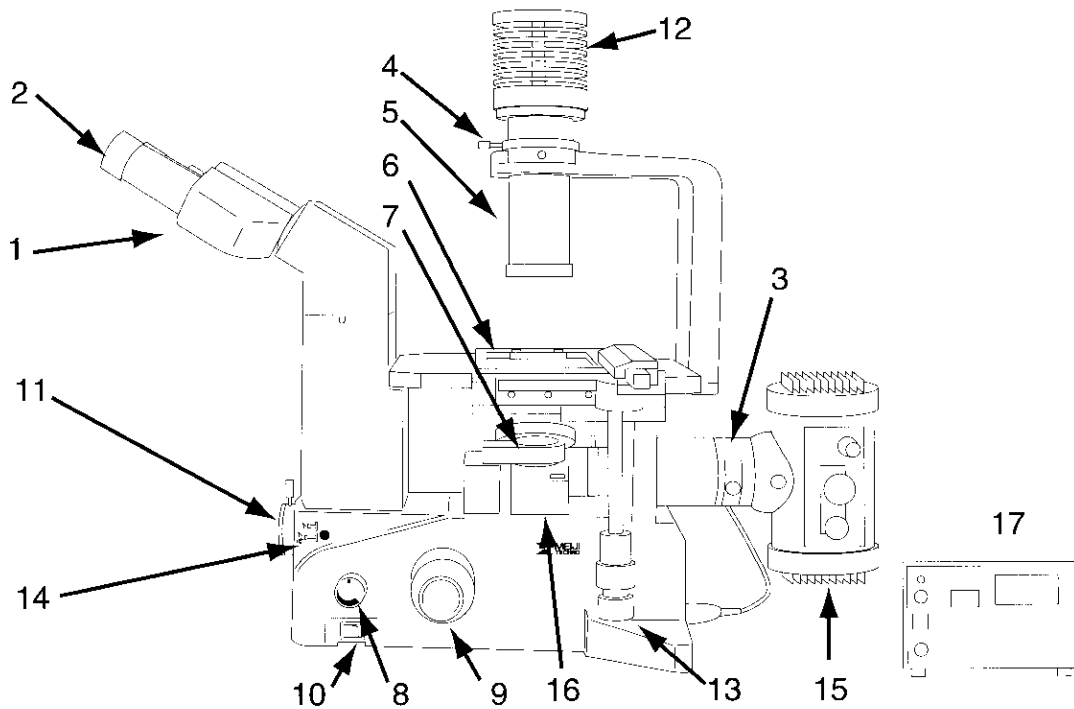


1. Binocular Head, 30° Inclination
2. Eyepieces SWF10X (15X & 20X optional)
3. Phase Slider
4. Aperture Diaphragm
5. Extended Working Distance Condenser
6. Specimen stage
7. Quintuple Nosepiece & Phase Objectives
8. Low Positioned Variable Brightness Control
9. Coaxial Course and Fine Focusing Controls
10. Power Switch
11. Front Camera Port
12. Integrated Illuminator 6V 30W
13. Optional Mechanical Stage with Drop down Coaxial Controls
14. Beamsplitter for Camera Port
15. Centering Telescope

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The image below designates the main components of the TC-5500 Epi- Fluorescence Inverted Microscope.



1. Binocular Head, 30° Inclination
2. Eyepieces SWF10X (15X & 20X optional)
3. Filter Slider
4. Aperture Diaphragm
5. Extended Working Distance Condenser
6. Specimen stage
7. Quintuple Nosepiece & Phase Objectives
8. Low Positioned Variable Brightness Control
9. Course and Fine Focusing Controls
10. Power Switch
11. Front Camera Port
12. Integrated Illuminator 6V 30W
13. Optional Mechanical Stage with Drop down Coaxial Controls
14. Beamsplitter for Camera Port
15. Nobska Lamphouse
16. Fluorescence Filter Carriage
17. Fluorescence Power Supply

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2.1 Installation Site

The microscope should be operated in a room with as little dust as practically possible. Keep your instrument away from solvents, chemical fumes and excessive humidity. Also try to avoid big swings in ambient temperature, direct sunlight and vibration as they can affect measurements and instrument performance.

Operating Ambient Conditions

Temperature: 10 - 36°C (50 - 96.8°F)

Relative Humidity: 0 - 80% up to 30°C (86°F)

Safety Concerns Regarding Fluorescence Microscopy

The operation of the optional fluorescence capabilities of the TC-5500 & TC-5600 come with many potential hazards.

When oxygen in the air is exposed to UV light, ozone is produced. The ozone emanates from the lamphouse during operation. There is no simple way of estimating the concentration of ozone. Operation of a mercury arc lamp in a small enclosed area may lead to high concentrations of ozone.

Ozone has a severe toxicity rating. The maximum exposure limit is 0.1 parts per million per hour. Ozone can be detected by smell. People with a keen sense of smell can detect concentrations of 0.015 parts per million. A concentration of 1.0 parts per million produces a strong sulfur-like smell. If you can easily smell ozone, then the level is too high for prolonged exposure.

So operation of a fluorescence equipped microscope should be done in a large, well ventilated area.

2.2 Unpacking

Please check your packing slip to insure that all materials are present. Keep a copy for your records so that you have the proper information when ordering more equipment, ordering replacement parts or accessories or when calling for technical support. Please make sure that no small pieces or parts are left in the packing material. Keep the packing materials in a safe place for the purpose of storage and transporting the microscope and its accessories.



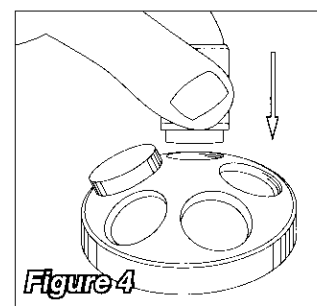
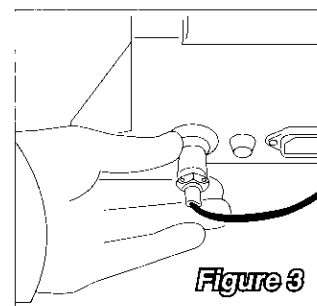
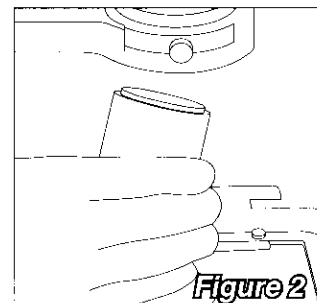
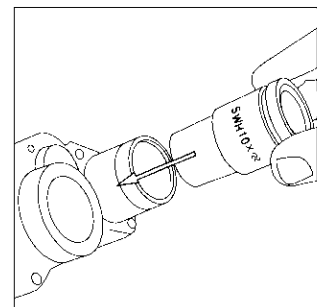
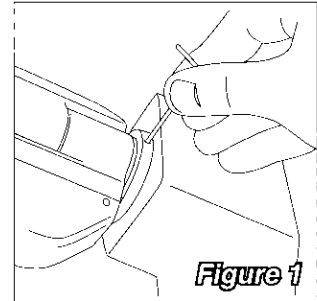
ATTENTION Avoid touching the surface of optical components such as lenses, filters and glass surfaces. Even very small traces of perspiration or finger oils can corrode the surfaces of optics in a short period of time.

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2.3 Microscope Set Up

- As a first step, remove all components from the shipping container and remove the packing materials. Save the container and packing in a dry location.
- Place the microscope frame on a stable work surface.
- **DO NOT PLUG IN THE MICROSCOPE AT THIS POINT.**
- Loosen the clamp screw on the microscope limb with the supplied 2mm allen wrench and then install the binocular head (MA814) and re-tighten the clamp screw while the head is in the correct position as shown in Figure 1.
- Install the two eyepieces (MA817) by sliding them into the head. The rubber eyeshields on top of each eyepiece can be folded down if the user is an eyeglass wearer. The eyepieces for TC-5000 Series are a standard 30mm diameter.
- Attach the condenser by screwing the condenser into the condenser holder of the transmitted-light illumination carrier from underneath as shown in Figure 2.
- Connect the cable from the transmitted-light illumination carrier to the power supply via the power socket on the rear of the instrument as shown in Figure 3.
- Remove the 10X and 20X objectives from their objective cases while being careful not to touch any part of the optics. Then, screw each objective into a nosepiece opening after removing each nosepiece dust plug. Install them as shown in Figure 4. (If you have purchased additional objectives, they can be installed now in order of magnitude.)



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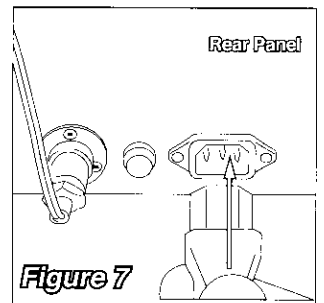
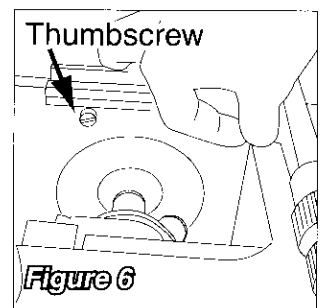
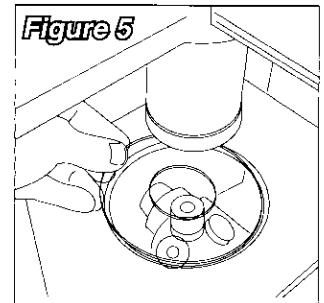
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- Next, install the stage glass insert into the center of the stage as shown in Figure 5.
- If purchased, un-wrap the mechanical stage (MA380/05). Locate the two holes on the bottom side of the plain stage on the right hand side. The two thumbscrews will attach the mechanical stage to the plain stage as shown in Figure 6. Tighten the thumbscrews snugly. Verify full un-restricted travel and movement with the coaxial controls.
- Plug the power cord into the microscope as shown in Figure 7 and the other end into a grounded outlet. Your TC has a voltage sensing power supply so it can use voltage from any country in the world from 100 volts to 240 volts AC.

⚠CAUTION

The mains power cord should only be plugged into a known grounded outlet. Contact your facilities technician if you are unsure of your mains outlet status. A simple outlet tester can be used to verify correct outlet polarity and the presence of a grounded circuit.

If no other accessories are going to be installed, the instrument is now ready for use.



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2.4 Installing the Phase Contrast Slider

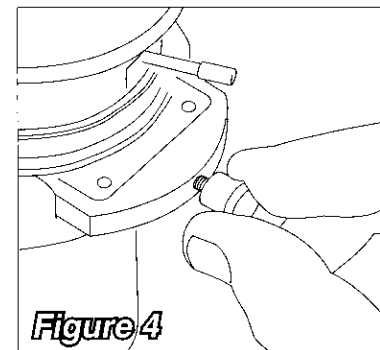
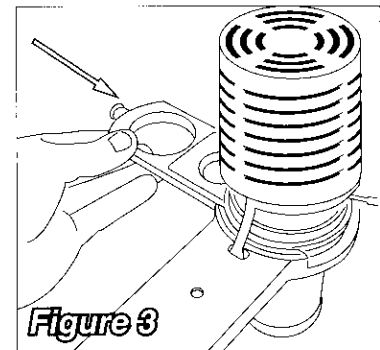
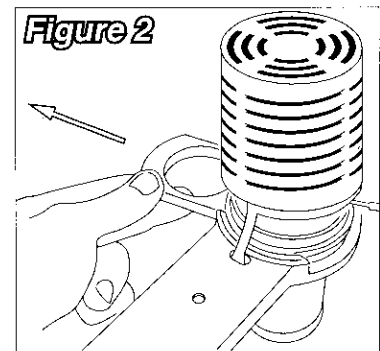
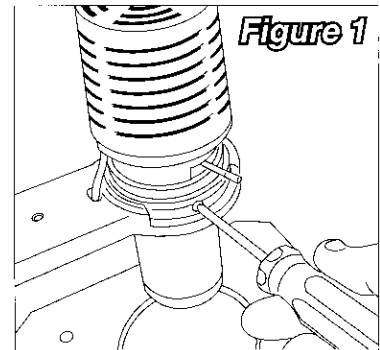
*** NOTE** These instructions are only to be followed if you currently have a Model TC-5100, TC-5200, TC-5500 and TC-5600 and you wish to upgrade your microscope to perform Phase Contrast Microscopy.

In addition to installing Phase Contrast objectives, the Phase Contrast Slider will also have to be installed. Fortunately, the procedure is very simple.

Upgrading Your Microscope with Phase Contrast

- First, remove the brightfield objectives from your microscope and return them to their storage containers that came with the microscope.
- Next, install your new Phase Contrast objectives into the nosepiece.
- Next, locate the slot where the Phase Contrast slider will be installed. The Phase Contrast slider will install just below the Aperture Diaphragm on the integrated illuminator. The slot is covered by a plate that will need to be removed by loosening the Phillips screw holding the plate into place as shown in Figure 1.
- Once the screw is removed, the plate can be easily pushed through to the back and removed entirely as shown in Figure 2. Re-install the screw into the plate for safe keeping.
- Next, remove the Phase Contrast slider knob on the end and insert the slider into the newly opened slot with the text markings facing upwards as shown in Figure 3.
- Lastly, re-install the chrome knob back onto the slider as shown in Figure 4. The knob prevents the slider from being removed.

Your microscope is now equipped for Phase Contrast observations. Refer to section 3.2 for instructions regarding Phase Contrast microscopy.



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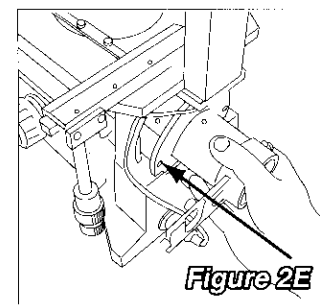
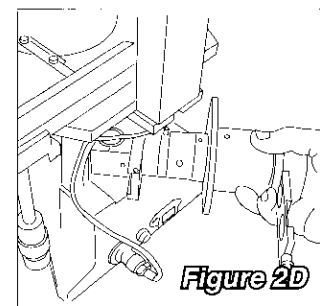
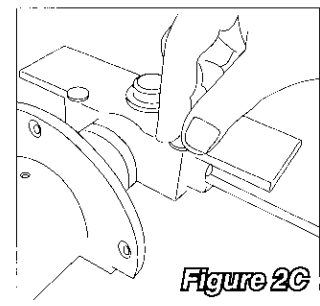
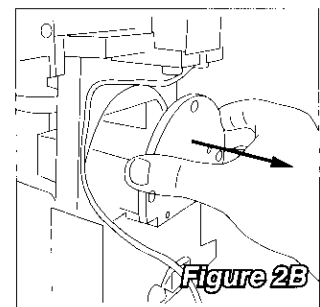
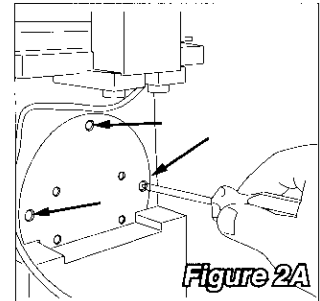
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2.5 Installing Fluorescence Option

The assembly steps below are not required if fluorescence accessories have not been purchased.

Installing the Fluorescence Module

1. Remove the fluorescence access cover on the back of the microscope as shown in Figure 2A using a #2 Phillips screwdriver and removing the three larger screws. Store the cover in a safe place as it will not be used with this configuration. Keep the three screws to later secure the installed fluorescence module.
2. Next, rack up the focus block as high as it will go and remove the fluorescence access cover as shown in Figure 2B.
3. Remove the filter carriage top cover by unscrewing the two knurled chrome plated thumbscrews as shown in Figure 2C. Remove the chrome filter selection knob at this time.
4. The filter assembly can now fit into the microscope body by angling the filter section into the body as shown in Figure 2D and then sliding the whole assembly into position like in Figure 2E.

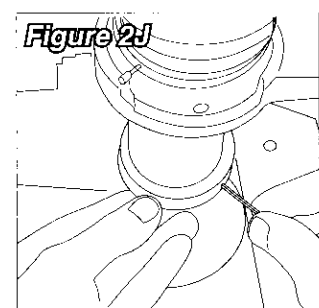
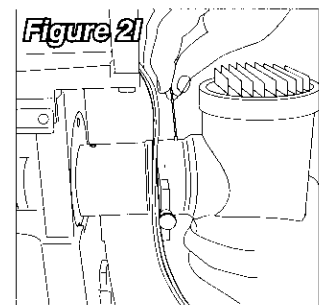
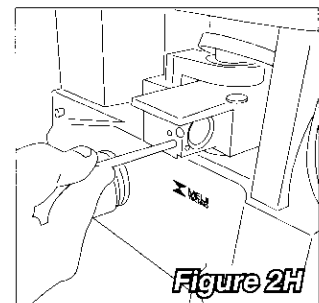
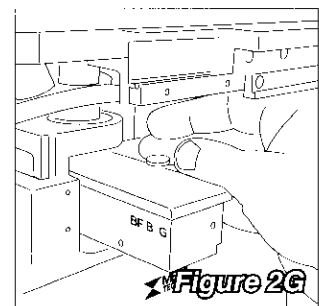
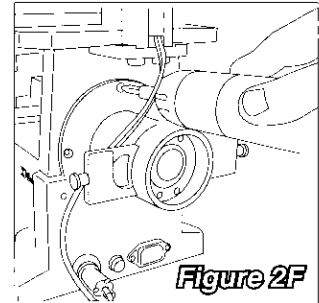


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5. With the nosepiece still racked up in the highest position, move the fluorescence module into the final mounting position and re-install the three Phillips screws that originally were used for the rear cover and tighten them evenly as shown in Figure 2F.
6. Re-install the filter carriage cover and the chrome filter selection knob as shown in Figures 2G and 2H.
7. Un-package the Nobska lamphouse and loosen the three 1.5mm allen screws on its front aperture to allow the lamphouse dovetail to be seated fully into the fluorescence module. Re-tighten them evenly with the 1.5mm allen wrench as shown in Figure 2i.
8. Install the protective UV Cover onto the bottom of the condenser as shown in Figure 2 J using the supplied 2mm allen wrench. The allen screws should not be overly tightened.

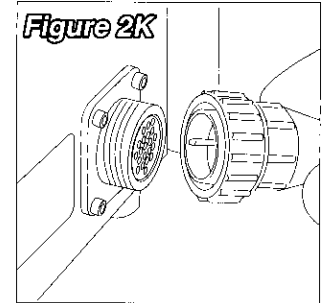
CAUTION OVERTIGHTENING THE SCREWS ON THE PROTECTIVE UV COVER COULD RESULT IN DAMAGING THE CONDENSER OPTICS.



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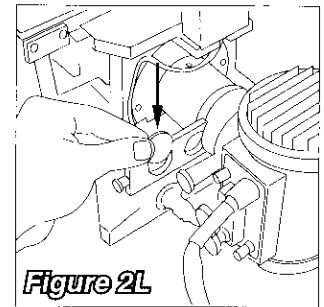
9. Unwrap the Nobska Power Supply and secure the power cable from the lamphouse to the power supply while being careful to orient the connector pins as shown in Figure 2K.



10. The fluorescence module has an integrated filter slider. The TC-5500 and TC-5600 comes standard with the MA196 filter which is a ND50 neutral density filter. It can be placed into the filter carrier as shown in Figure 2L.

Other filters like the MA197 ND13 neutral density filter and the MA860 ND25 neutral density filter are also available separately.

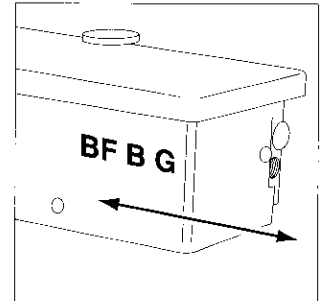
11. Finally, remove the current set of objectives and replace them with the fluorescence objectives.



***NOTE** When installed correctly, the fluorescence filter carriage will slide very easily and click and lock in all three positions.

On the outside of the filter carriage, there are markings indicating the position of the filter carriage in relation to which filter is engaged:

- BF** - Indicates brightfield position (no filter)
- B** - Indicates that the "Blue" filter set is engaged.
- G** - Indicated that the "Green" filter set is engaged.



XWARNING When using the microscope, be careful when switching filter positions when the light source is on. There is a risk of light escaping while switching between filters, so be careful not to directly look at the escaping light.

Inverted Microscope

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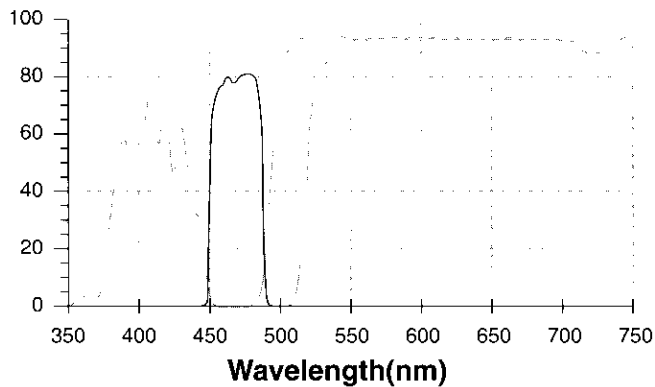
2.6 Fluorescence Filter Information

The epi-fluorescence equipped TC-5500 and TC-5600 include the following filter sets:

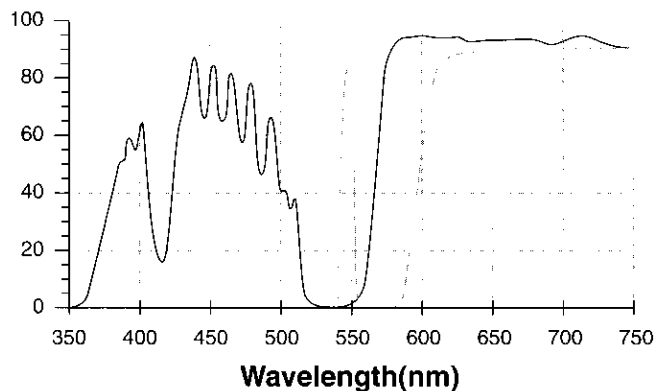
| Excitation Type | Exciter Filter 25mm diameter | Dichroic Mirror 25.7mm X 36mm | Emitter Filter 25mm diameter | Applications |
|--|---------------------------------|----------------------------------|---------------------------------|---|
| Blue Chroma P/N: 11001v 2 | D470/40x | 495DCLP | E515LPv2 | FITC Acridine Orange Auramine EGFP, S65T, RSGFP |
| Green Chroma P/N: 11002v 2 | D546/10x | 565DCLP | E590LPv2 | Rhodamine TRITC Propidium iodine RFP |

Published Chroma Technology Corp. Filter Set Performance Specifications:

11001v2 Blue



11002v2 Green



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2.7 Installing Different Fluorescence Filter Sets

Installing Filters and Mirrors in the Fluorescence Module

The filter block can accommodate two different filter sets with one position "open" for brightfield.

To install filters, remove the filter carriage from the microscope by removing one of the Phillips screws on either end of the carriage. (The head of the screw actually prevents the filter carriage from coming off the "track" completely.)

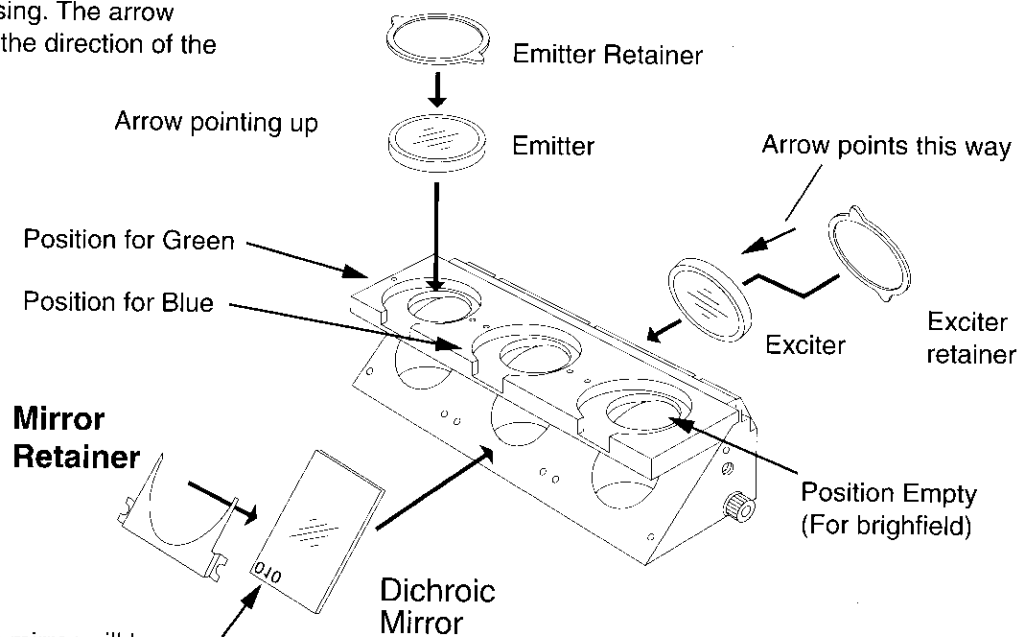
Next, remove the four small Phillips screws that secure the filter carriage cover with a small jewelers Phillips screwdriver.

Install the dichroic mirrors, emitter and exciter filters into the carriage with the arrow markings pointing with the direction of the light path.

Make sure the filters and mirrors are installed in the correct orientation.

Refer to Figure 1 below regarding the orientation of the filter components.

Note: The emitters and the exciter filters have arrows printed on the side casing. The arrow designates the direction of the light path.



Note: The dichroic mirror will have text on one side. Mount the mirror so the text faces out.

Filter Carriage

Figure 1

Inverted Microscope

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3.0 Operation

Once the microscope has been setup in its working location with all of the components correctly installed, it is ready for use.

Your TC-5000 is a precision instrument designed to last a lifetime. Always handle your microscope with care and avoid abrupt motion, vibration and shock.

Do not install any bulb in your instrument other than the ones designated by Meiji Techno:

| | | |
|-------|----------------|---|
| MA326 | 6V 30W Halogen | For Integrated Illuminator TC-5100, TC-5200, TC-5300, TC-5400, TC-5500, TC-5600 |
|-------|----------------|---|

***NOTE** Brightness of light may decrease by exposing to electromagnetic wave.

For the Epi-Fluorescence Lamphouse, the following part numbers are the ONLY recommended replacement bulbs:

| | |
|-------|--|
| BA005 | Replacement Mercury Lamp HBO 100W/2 For TC-5500, TC-5600 Models Only |
| BA013 | Replacement Xenon Lamp XBO 75W/2 For TC-5500, TC-5600 Models Only |

Always disconnect the power cord from the back of the microscope when not being used, when cleaning your instrument or when making any repairs.

!CAUTION Avoid Dismantling

Never attempt to dismantle the instrument. This will void your warranty and could possibly lead to the instrument no longer performing accurately.

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3.1 Basic Set Up For Transmitted Light - Brightfield

1. First, set your interpupillary distance on the microscope eyetubes by pulling them apart or pushing them closer together to fit your eyes.

When set correctly, one will see one uniform round field of view. Make note of the distance setting when adjusted to your liking so you can later repeat the setting.

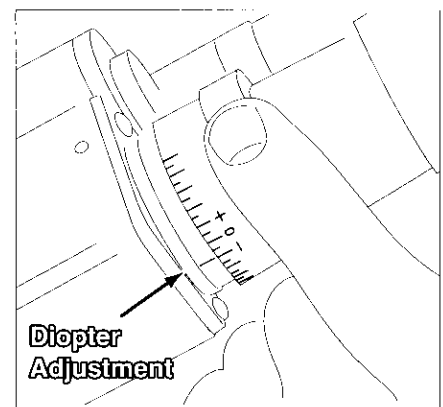
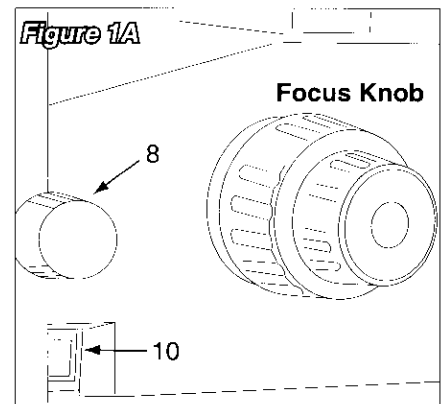
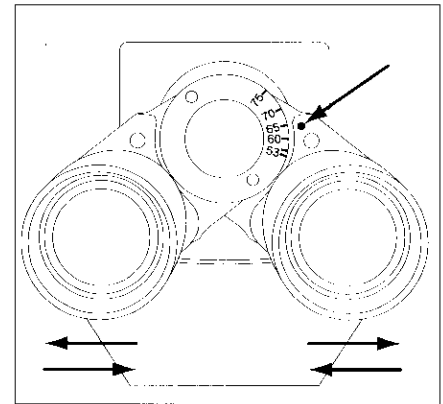
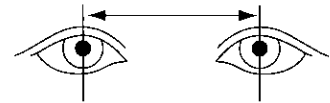
2. Turn on the microscope power switch as shown in Figure 1a marked number 10. Adjust the brightness desired with the variable brightness control knob shown as number 8 in Figure 1a.
3. Make sure the aperture iris diaphragm lever is all the way to the left (maximum opened) to start. Refer to Figure 1B below.
4. We recommend to initially use a specimen that has areas of high and low contrast. Place a specimen on the stage.
5. Select a lower power objective like the 10X to find the area of interest on the specimen quickly. Be sure the objective "clicks" into place when you turn the nosepiece to select an objective.
6. By using the course and fine focus knobs shown in Figure 1a, adjust your specimen into focus with your left eye closed (looking only through the right eyetube). With the specimen in focus, close the right eye and open the left. If the specimen is out of focus for the left eye, adjust the diopter on the eyetube until the focus is correct.

The microscope is now adjusted for this user.

Focusing eyetubes allows us to compensate for individual users eye sight.

If you wear glasses, you may want to fold down the rubber eyeguards out of the way.

interpupillary distance



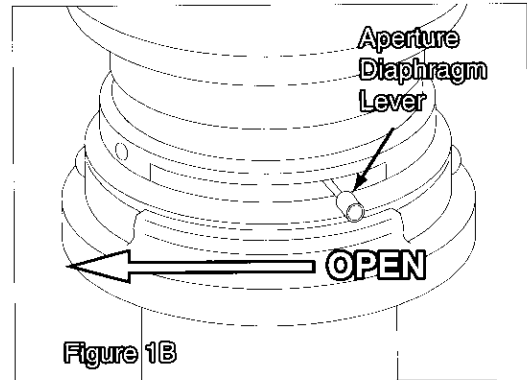
Inverted Microscope

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Never turn the left and right hand focus knobs in the opposite direction as damage to the mechanism may result.

The aperture iris diaphragm located above the condenser and below the integrated illuminator can be "stopped down" or closed somewhat to give the observation of your specimen more contrast or resolving power. Stopping down the diaphragm decreases resolution and brightness but increase image contrast and depth of focus.



For improved performance in brightfield observation mode, an optional condenser with a NA of 0.55 is available part number MA854.

Objectives Information



Depending on which objective is being used, before turning the nosepiece to change magnifications, the nosepiece will need to be lowered with the course focus knob otherwise an objective may crash into the stage if caution is not used.

Possible Brightfield Mode Operational Problems

If normal adjustments are not getting the results you expect, check to see if these conditions exist:

- Incorrect components inadvertently installed
- Dirty or smudged optics

TC-5100 and TC-5200 Brightfield Objectives

| Brightfield Objectives - Planachromat - Infinity Corrected - F = 200mm | |
|--|--|
| MA820 | TC Planachromat 4X objective $\infty/1.0$, NA: 0.13, WD = 17.3mm, F.L.= 50.0 (optional) |
| MA821 | TC Planachromat 10X objective $\infty/1.0$, NA: 0.25, WD = 7.6mm, F.L.= 20.0 (included) |
| MA822 | TC Planachromat 20X, objective $\infty/1.0$ NA: 0.40, WD = 7.0mm, F.L.= 10.0 (included) |
| MA823 | TC Planachromat 40X objective $\infty/1.0$, NA: 0.65, WD = 2.8mm, F.L.= 5.0 (optional) |

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3.2 Transmitted Light Operation - Phase Contrast

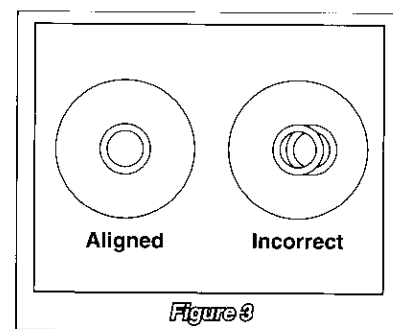
Phase contrast is a very useful technique for high-contrast images of unstained or transparent specimens in petri dishes, cell and tissue culture flasks and multi-well plates.

Meiji Techno's TC5000 Series Phase Contrast Model features a centerable phase contrast slider with a 4X annulus, a 10X-20X-40X annulus and an empty slot for brightfield.

A common phase annulus for the 10X-20X-40X objectives makes operation faster and easier.

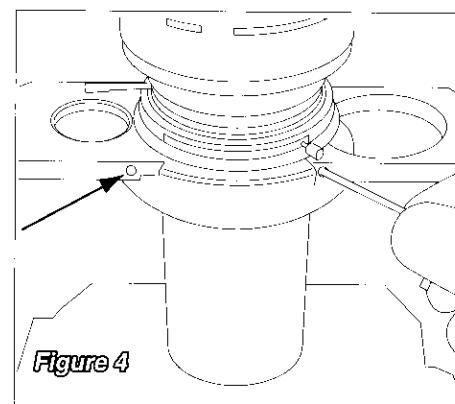
Setting Up Phase Contrast Mode

1. Install the phase contrast objectives into the nosepiece.
2. Select the proper phase slider setting to be used with the proper objective.
3. To check to see if each phase annulus is centered, remove the right hand eyepiece and insert the provided focusing telescope.
4. Focus the telescope until the light and dark rings seen are in sharp focus.
5. The phase annuli are pre-aligned at the factory during manufacturing. If, however, the annuli are not centered as shown in Figure 3, use the supplied 2.5mm allen wrench and adjust the two allen screws until the phase annulus covers the light ring evenly. The location of the phase annulus adjustment screws are shown in Figure 4.
6. Remove the centering telescope and re-install the eyepiece.



The microscope is now properly set for phase contrast observation mode.

***NOTE** Phase images will photograph and appear their best when the green interference filter 546nm (MA861) is placed into the light path since achromatic objectives are spherically corrected for green light and the human eye picks up the green wavelength spectrum the best.



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Possible Phase Contrast Mode Operational Problems

If normal adjustments are not getting the results you expect, check these:

- Wrong phase annulus being used.
- Phase annulus not centered correctly.
- Aperture diaphragm is completely closed.
- Flask or vessel glass too thick on observation side.
- Halos around the outlines of details are optical artifacts which may obscure details of your specimen. This is a known limitation of phase contrast microscopy.
- Since phase annuli limit the numerical aperture of the optical system, image resolution may suffer somewhat.
- If the specimen being observed is too thick, phase shifting can distort image details.

TC-5300 and TC-5400 Phase Contrast Objectives

| Phase Contrast Objectives - Planachromat - Infinity Corrected - F = 200mm | |
|---|--|
| MA825 | TC Planachromat Phase 4X objective $\infty/1.0$, NA: 0.13, WD = 17.3mm, F.L.= 50.0 (optional) |
| MA826 | TC Planachromat Phase 10X objective $\infty/1.0$, NA: 0.25, WD = 7.6mm, F.L.= 20.0 (included) |
| MA827 | TC Planachromat Phase 20X objective $\infty/1.0$, NA: 0.40, WD = 7.0mm, F.L.= 10.0 (included) |
| MA828 | TC Planachromat Phase 40X objective $\infty/1.0$, NA: 0.65, WD = 2.8mm, F.L.= 5.0 (optional) |

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3.3 Incident Light Operation: Epi-Fluorescence

***NOTE** For microscopes with fluorescence option installed only.

For viewing of transparent objects using incident-light fluorescence, we recommend to first make your initial adjustments using brightfield with the integrated transmitted light.

- First, switch on the power supply to the Nobska lamphouse and allow the lamp to achieve operating temperature. (Operating temperature is achieved when the power supply settles on the proper operating voltage. See your Nobska Operations Manual for more details.)
- Remove the objective or nosepiece plug currently in the light path.
- Move the filter block into the "B" position (blue excitation) or the middle of the three positions. This allows the blue filter to enter the light path.
- Open the field iris diaphragm to the maximum (clockwise).
- Place a sheet of white paper on the specimen stage. It is here is where we will observe the alignment of the arc lamp on the sheet of paper. If no image is shown, verify that you have the filter slide in the "open" position.
- Observe if the arc image is clearly projected and centered in the light spot as shown in Figure X. If the image is too bright to manage, insert a ND filter into the filter slider and engage it.
- If the arc image is not centered, use the arc centering knobs on the Nobska lamphouse until the arc is centered.
- Remove the paper and re-install the objective.
- Position the specimen on the stage.
- Using a low power objective, check to see if the image is illuminated evenly. If not, adjust the settings on the Nobska Lamphouse if needed.

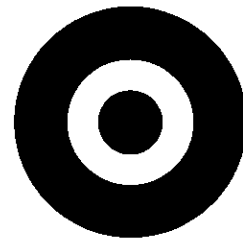


Figure X

Inverted Microscope

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DANGER

The Nobska lamphouse can be outfitted with an optional front surface mirror. Be careful not to project the arc reflection from the mirror on top of the arc electrodes. This will cause an over-heating condition followed by an explosion of the mercury lamp.

Possible Incident Light Fluorescence Operational Problems

If normal adjustments are not getting the results you expect, check these:

- Weak fluorescence or image intensity: specimens improperly stored or too old
- Rapid fading of specimens i.e.: photobleached
- Unspecific or erroneous filter combination
- Numerical aperture of objectives too low
- Eyepiece magnification too high
- Failing or old mercury lamp
- Ambient light or room too bright
- Secondary light due to reflection at condenser
- Low contrast image due to excitation bandwidth too wide
- Unspecified staining
- Fluorescing mounting medium
- Auto-fluorescence of objective or immersion oil
- Dirty optics

TC-5500 and TC-5600 Epi-Fluorescence Objectives

| Epi-Fluorescent Objectives - Planachromat - Infinity Corrected - F = 200mm | |
|--|---|
| MA849 | TC Planachromat F4X objective $\infty/1.0$, NA: 0.13, WD = 17.5mm, F.L.= 50.0 (optional) |
| MA850 | TC Planachromat F10X objective $\infty/1.0$, NA: 0.30, WD = 7.5mm, F.L.= 20.0 (included) |
| MA851 | TC Planachromat F20X objective $\infty/1.0$, NA: 0.40, WD = 7.5mm, F.L.= 10.0 (included) |
| MA852 | TC Planachromat F40X objective $\infty/1.0$, NA: 0.60, WD = 2.9mm, F.L.= 5.0 (optional) |

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3.4 UV Light Safety Considerations

Mercury arc lamps have UV light content in their output. The U.S. National Institute for Occupational Safety and Health (NIOSH) recommends that exposure to UV energy be controlled and limited as much as practically possible.

Exposure to UV radiation even for very brief periods of time can be hazardous. The potential damage depends on exposure time, the type of UV light and the individuals sensitivity to UV.

UV light causes sunburn. Long term exposure can result in loss of skin elasticity initially and carcinoma eventually.

Absorption of UV light by the eyes will cause inflammation of the cornea called photo keratitis. Continued exposure can lead to the formation of cataracts on the eye lens.

Therefore, the following safety considerations should be taken very seriously:

- Limit access to areas where UV light is present.
- Post warning signs in the area where the equipment is installed.
- Always wear protective eyewear and gloves.
- Be sure your arms and neck are covered.
- Never directly look at the light source.
- Close off the light source with the filter slider when not being used.

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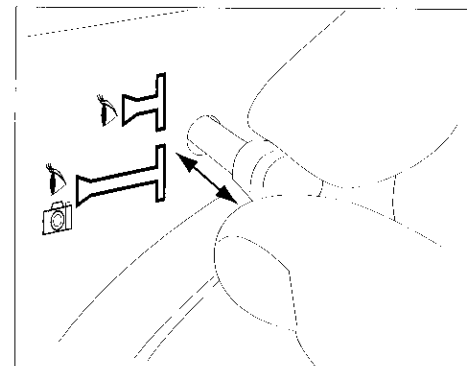
3.5 Photomicrography with 35mm SLR and Digital SLR Cameras

The TC Series of microscopes have a camera port directly in front of the instrument. In order to secure a 35mm SLR camera body to this microscope, an optional camera attachment part number MA869 will need to be attached to the front camera port of the TC with the corresponding T2 Adapter Ring that matches the camera to be used. The table below shows the different cameras and adapter rings that can be used:

| | |
|-------|----------------------------|
| T2-1 | Canon |
| T2-2 | Minolta |
| T2-3 | Pentax K |
| T2-4 | Pentax S (threaded) |
| T2-5 | Nikon |
| T2-6 | Olympus |
| T2-7 | Contax, Yashica |
| T2-8 | Konica |
| T2-9 | Canon EOS |
| T2-10 | Minolta Alpha / Maxim 2000 |

*** NOTE** Magnification at film plane will be 2.23X of the objective that is in use.

To direct the image to the front camera port, the beamsplitter lever will need to be engaged as shown in the illustration on the right.



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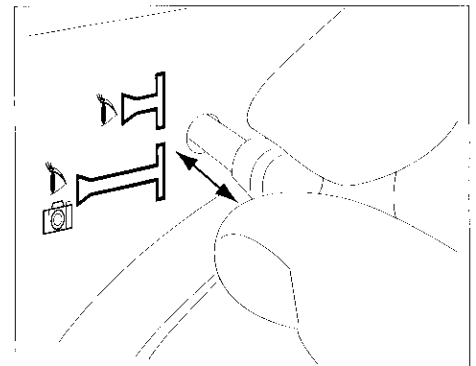
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3.6 Photomicrography with Digital Still Cameras

In order to mount a consumer grade digital camera to this microscope, an optional camera attachment MA868 plus a camera adapter will be needed to attach to the front camera port of the TC. The table below shows the different cameras that can be used and their corresponding DC Series adapter:

| | | | | | |
|-------------------------|--------------------|--------------------|--------------------------|--|--|
| Camera Model | Nikon Coolpix 5000 | Nikon Coolpix 5400 | Nikon Coolpix 5700, 8700 | Olympus Camedia C-2000, C-2020, C-3000, C-3030, C-3040, C-4040, C-3100, C-5050, C-4100 | Olympus Camedia C-700, C-720, C-740, C-750, C-730, C-755, C-760, C-770 |
| Camera Thread Diameter | 46mm | 45mm | 53.4mm | 41mm | 45.6mm |
| Adapter Thread Diameter | 52mm | 52mm | 52mm | 52mm | 52mm |
| Adapter Number | DC-B6 | DC-B13 | DC-B7 | DC-B1 | DC-B5 |

To direct the image to the front camera port, the beamsplitter lever will need to be engaged as shown in the illustration on the right.



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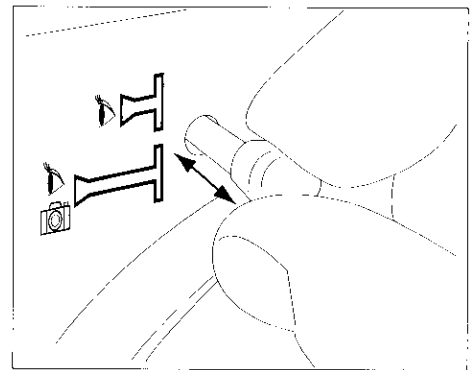
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3.7 Connecting a Video or Other Camera that has a "C" type mount

In order to secure a camera that employs a standard "C" type camera mount to this microscope, an optional camera attachment part number MA877 will need to be attached to the front camera port of the microscope.

***NOTE** Magnification at the image plane will be 0.66X of the objective that is in use.

To direct the image to the front camera port, the beamsplitter lever will need to be engaged as shown in the illustration on the right.



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4.0 Maintenance and Cleaning

⚠WARNING

- Disconnect the power cord on your equipment prior to performing cleaning, maintenance or repair.
- Keep electrical components away from moisture or humidity.
- In warm humid climates, take special care to prevent your equipment from exposure to fungal growth.
- Clean the microscope after each use. Keeping your microscope clean will insure its proper operation over its lifetime.

Dust Protection

Be sure to use the supplied dust cover with your microscope after each work session.

Cleaning

Dust and fibers can cause "background fluorescence" during fluorescence microscopy so keeping your microscope clean can help the overall quality of your work.

Cleaning of Painted Surfaces

Use a soft brush or lint-free cotton cloth to removed dust and loose particles.
Tough dirt can be removed with a water and a mild detergent.

⚠CAUTION NEVER USE ACETONE OR OTHER HARSH CHEMICALS.

Painted or plastic surfaces should not be tarnished or etched with cleaning agents that are too powerful.

To clean painted surfaces, use a moistened lint-free cotton cloth with mild soapy water.

Cleaning the Stage

Use a soft brush or lint-free cotton cloth to removed dust and loose particles.

DO NOT USE ACETONE OR OTHER HARSH CHEMICALS, use a moistened lint-free cotton cloth with a solution of mild soapy water.

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Cleaning of Glass Surfaces

Use a soft brush or lint-free cotton cloth to removed dust and loose particles.

For tough dirt, use a soft lint-free cotton cloth moistened with distilled water.

If that fails, try using medical or reagent grade isopropyl alcohol.

Cleaning the Objectives



Objectives should NEVER be disassembled for cleaning or for any other reason! We do not advise cleaning the inside surfaces of objectives or eyepieces.

Use a soft brush, bellows brush or a soft lint-free cotton cloth to removed dust and loose particles.

For tough dirt, use a soft lint-free cotton cloth moistened with distilled water.

If that fails, carefully try using medical or reagent grade isopropyl alcohol.

Wipe lenses immediately after use.

Over time, water and solvents can dissolve optical cements that hold optics together so NEVER soak objectives with ANY type of fluid.

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5.0 Troubleshooting

Meiji Techno products are manufactured in Japan under ISO9001 manufacturing standards. However, if you ever have any difficulty with any Meiji product, feel free to contact us at:

Meiji Techno America

2186 Bering Drive

San Jose, CA 95131

800.832.0060

408.428.0472 FAX

technicalsupport@meijitechno.com

<http://www.meijitechno.com>

Our technical staff is trained to assist you on mechanical or electrical issues you may have. Problems in regard to specimens, fluorochrome fluorescence, specimen preparation, specimen staining, etc. are beyond the scope of this manual.

Operational Issues

Please refer to the previous "Operations" chapters which coincide with the observation mode that you are using.

The most common operational problems include the improper positioning of contrast accessories, the improper adjustment of right rings or the incorrect condenser installed.

If you are unable to obtain the desired image from the microscope, please refer to the corresponding chapters of this manual under the proper operation mode: brightfield, phase contrast, etc.

Electrical Problems

Electrical problems can include:

- The lamp on the microscope is not working.
- No voltage is present.

Check the following probable causes:

- Check that all power cords are properly connected to the right spots.
- Make sure power is actually present at the wall outlet.
- Check to see if there is a fuse is blown.

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5.1 Replacing the mains fuse on the microscope

CAUTION

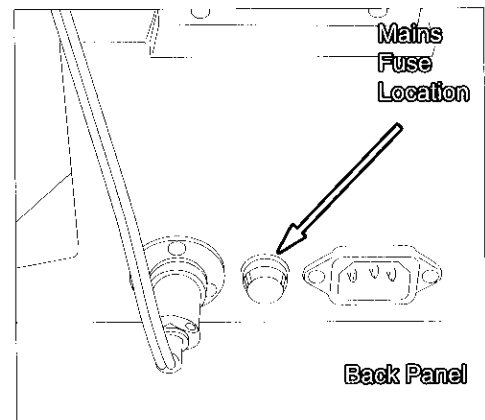
ALWAYS DISCONNECT YOUR EQUIPMENT BEFORE DOING ANY REPAIR.

Location of Mains Fuse

The mains fuse of the TC Series Inverted Microscopes is located on the back panel of the microscope as shown.

Instructions to replace the mains fuse:

- Turn the power switch to the off position.
- Unplug the microscope from the wall outlet.
- Loosen the fuse cap from the fuse holder.
- Remove the blown fuse from the fuse cap.
- Replace the fuse with the CORRECT type and rating which is: IEC Standard 5 X 20mm 3amp Fast-Acting such as Littelfuse 217 Series or Bussmann GDB Series
- Reinstall the fuse holder with the new fuse installed.*



DANGER

NEVER USE REPLACEMENT FUSES OF A DIFFERENT RATING.

5.2 Integrated Transmitted Light does not work

- Make sure the plug from the lamp is firmly plugged into the correct socket on the rear panel.
- Check to see if the mains fuse has blown.
- Check to see if the lamp has blown.

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5.3 Replacing the 6V 30W Halogen Light

⚠ CAUTION

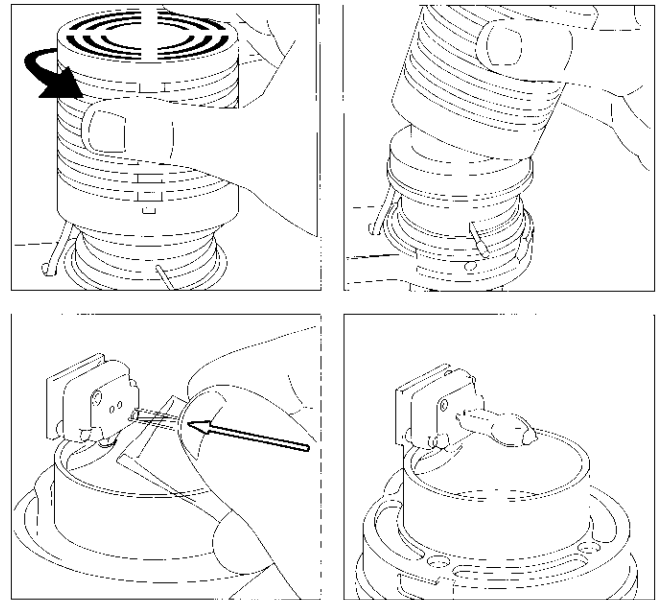
ALWAYS DISCONNECT YOUR EQUIPMENT BEFORE DOING ANY REPAIR.

Do not touch the glass envelope of the lamp during installation. Keep the protective sleeve or bag of the lamp during installation and remove it right after installation.

🔥 HOT!

LAMP AND LAMP HOUSING MAY BE HOT TO THE TOUCH.

- Switch off the microscope.
- Disconnect the power cord.
- Wait until the housing and bulb have cooled sufficiently.
- Simply turn the illuminator cover counterclockwise and lift to remove.
- Remove the defective lamp.
- Place a new lamp into the socket while avoiding touching the glass. Notice the bulb is wrapped in plastic to avoid touching the glass envelope.
- Be sure the bulb is pushed in as far as possible thereby aligning the filament in the illuminator.
- Reinstall the lamp housing making sure the notches on the housing and the cover are lined up.
- Reconnect the power cord and switch on the microscope to verify proper illuminator operation.



5.4 Fluorescence Lamp does not work



LAMP HOUSE IS HOT TO THE TOUCH !

Do not touch the glass envelope of the lamp at any time. Keep the protective sleeve or bag of the lamp during installation and remove it right after installation.

- Before making any attempt to change the lamp, be absolutely certain that the lamp has had sufficient time to cool down ~20 minutes.
- Make sure that all cable connections between the lamp house, power unit and mains are all properly established.
- Check if the lamp house power unit main fuse is intact.
- Check the logged hours of the lamp for an excess of 400 hours.
- Refer to the companion "Nobska Lamphouse Manual" for more information.

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5.5 Replacing the Fluorescence Lamp



ATTENTION

Refer to the companion manual of the Nobska Lamphouse for more on troubleshooting and replacement of the 100W Mercury Lamp.

A newly installed mercury lamp needs to run for at least two hours before being turned off. During that time, the arc will need to be aligned. Once the arc is aligned, it will stay in alignment for the life of the bulb.

Remember that the total life of the bulb is a product of both how long the bulb is lit and how many times the bulb is turned off and on. So it is a good idea to plan the future use of the bulb over the course of the day before deciding to shut down the system. Hence, if the bulb is shut off, allow 20 minutes or so for the bulb to cool down completely before turning it on again.

Replacing the mercury HBO lamp within the Nobska housing is not very complex but there is a followed procedure that will make the process easier and less dangerous.



DANGER

If the glass envelope of the mercury bulb happens to break or is exploded open, you and the immediate environment could be exposed to mercury which is a known biohazard.

Please refer to the manual which came with your Nobska Lamp House for information and instructions for replacing, adjusting and burning in your new mercury lamp.

Safety Considerations for Handling Mercury Arc Lamps

- Do not handle a bare arc lamp without wearing safety goggles and adequate protective clothing for areas of exposed skin; i.e. forearms, arms, neck, etc.
- Do not apply torque, stress or scratch the lamp envelope during installation or removal as an explosion could result.
- Do not touch the glass lamp envelope. Fingerprint oils and other contaminants left on the lamp envelope will result in deterioration of the envelope and may lead to violent lamp explosion.
- Do clean any dirt, oil or lint from a cold lamp with reagent or medical grade alcohol and a lint-free cloth PRIOR to operation.
- Mercury lamps do contain mercury so their disposal must be in accordance to local, state and federal guidelines. Contact your waste management authority for proper disposal information.

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6.0 Storage

Protect your microscope from dust after each use by covering your instrument with the protective dust cover that came with your microscope.

Store your microscope in a cabinet that has a stable temperature and low humidity.

If you live in an area that has high humidity, consider storing your microscope in a sealed container along with a desiccant such as silica gel.

It is also recommended that the objective and eyepieces be stored in a separate air tight container with desiccant.

7.0 Packing and Transport

Whenever the microscope is going to be moved, ship or transport the microscope and the accessories in its original packing.

It is advisable to keep a copy of all necessary information: copy of the original invoice, the operations manual, etc. included with the microscope when shipping.

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8.0 Accessories and Replacements Parts

Part numbers and product descriptions for accessories and parts for TC Series Inverted Microscopes can be found listed below. Accessories and replacement parts for all Meiji Techno products are available through our dealer network.

Feel free to contact us a call so we may direct you to the closest authorized Meiji Techno Dealer in your area.

Call us toll free (800) 832-0060 Monday through Friday 9am - 5pm PST.

TC Series Components & Accessories

| Viewing Heads | |
|---|--|
| Part Number | Description |
| MA814 | Siedentopf type binocular head, 30° inclined, 30mm I.D. eyetubes (included with TC-5100, TC-5300 & TC-5500) |
| MA816 | Siedentopf type trinocular head, 30° inclined, 30mm I.D. eyetubes (included with TC-5200, TC-5400 & TC-5600) |
| Eyepieces | |
| Part Number | Description |
| MA817 | SWH10X Super Widefield High Eyepoint eyepiece, FN22 (standard) (accepts 25mm reticle) |
| MA818 | SWH15X Super Widefield High Eyepoint eyepiece, FN16 (optional) (accepts 19mm reticle) |
| MA819 | SWH20X Super Widefield High Eyepoint eyepiece, FN12 (optional) (accepts 19mm reticle) |
| MA859 | SWH10X-F Super Widefield High Eyepoint focusing, FN22 (optional) (accepts 25mm reticle) |
| Brightfield Objectives - Planachromat - Infinity Corrected - F = 200mm | |
| MA820 | TC Planachromat 4X objective $\infty/1.0$, NA: 0.13, WD = 17.3mm, F.L.= 50.0 (optional) |
| MA821 | TC Planachromat 10X objective $\infty/1.0$, NA: 0.25, WD = 7.6mm, F.L.= 20.0 (included) |
| MA822 | TC Planachromat 20X, objective $\infty/1.0$ NA: 0.40, WD = 7.0mm, F.L.= 10.0 (included) |
| MA823 | TC Planachromat 40X objective $\infty/1.0$, NA: 0.65, WD = 2.8mm, F.L.= 5.0 (optional) |
| Phase Contrast Objectives - Planachromat - Infinity Corrected - F = 200mm | |
| MA825 | TC Planachromat Phase 4X objective $\infty/1.0$, NA: 0.13, WD = 17.3mm, F.L.= 50.0 (optional) |
| MA826 | TC Planachromat Phase 10X objective $\infty/1.0$, NA: 0.25, WD = 7.6mm, F.L.= 20.0 (included) |
| MA827 | TC Planachromat Phase 20X objective $\infty/1.0$, NA: 0.40, WD = 7.0mm, F.L.= 10.0 (included) |
| MA828 | TC Planachromat Phase 40X objective $\infty/1.0$, NA: 0.65, WD = 2.8mm, F.L.= 5.0 (optional) |

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| Epi-Fluorescent Objectives - Planachromat - Infinity Corrected - F = 200mm | |
|---|---|
| MA849 | TC Planachromat F4X objective $\infty/1.0$, NA: 0.13, WD = 17.5mm, F.L.= 50.0 (optional) |
| MA850 | TC Planachromat F10X objective $\infty/1.0$, NA: 0.30, WD = 7.5mm, F.L.= 20.0 (included) |
| MA851 | TC Planachromat F20X objective $\infty/1.0$, NA: 0.40, WD = 7.5mm, F.L.= 10.0 (included) |
| MA852 | TC Planachromat F40X objective $\infty/1.0$, NA: 0.60, WD = 2.9mm, F.L.= 5.0 (optional) |
| Condensers | |
| MA853 | TC Condenser, N.A. 0.30, working distance 73mm (included) |
| MA854 | TC Condenser, N.A. 0.55, working distance 20.5mm (optional) |
| Filters | |
| MA861 | Green interference filter in 51mm mount, 546nm (optional) |
| MA863 | Cobalt clear filter in 51mm mount (included) |
| MA856 | Blue filter, LB100, in 51mm mount (optional) |
| MA857 | Green filter, G533, in 51mm mount, 533nm (optional) |
| MA858 | ND25 Neutral density filter, in 51mm mount (transmission: 25%)(optional) |
| Specimen Holders | |
| MA382 | Glass Slide Holder for 1" X 3" slides |
| MA383 | Chamber holder |
| MA864 | Terasaki plate holder |
| MA384 | Petri Dish Holder for 35mm diameter dishes |
| MA385 | Petri Dish Holder for 55mm diameter dishes |
| MA387 | Petri Dish Holder for 65mm diameter dishes |
| MA378 | Hemacytometer holder |
| Miscellaneous Parts & Accessories | |
| MA380/05 | Mechanical Stage, movement: 112mm(X) x 72mm(Y) with drop down coaxial controls. |
| MA809 | Replacement AC Power cord with plug |
| MA855 | Phase Slider |
| MA458/05 | Centering Telescope for phase contrast, O.D.= 30.0mm |
| Epi-Fluorescent Parts & Accessories | |
| TC-FL | Fluorescent Illuminator Attachment includes UV Exciter Filter Set |
| TC-LH | Lamphouse for 100W Mercury Lamp |

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| | |
|--------------|--|
| FL-PW | Power supply for Lamphouse |
| BA005 | Replacement Mercury Lamp HBO 100W/2 |
| BA013 | Replacement Xenon Lamp XBO 75W/2 |
| MA865 | Basic Blue Excitation Filter set |
| MA866 | Basic Green Excitation Filter set |
| MA196 | ND50 Neutral density filter for epi-illuminator (optional) |
| MA197 | ND13 Neutral density filter for epi-illuminator (optional) |
| MA860 | ND25 Neutral density filter for epi-illuminator (included with TC5500, TC5600) |

Inverted Microscope

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9.0 Technical Descriptions

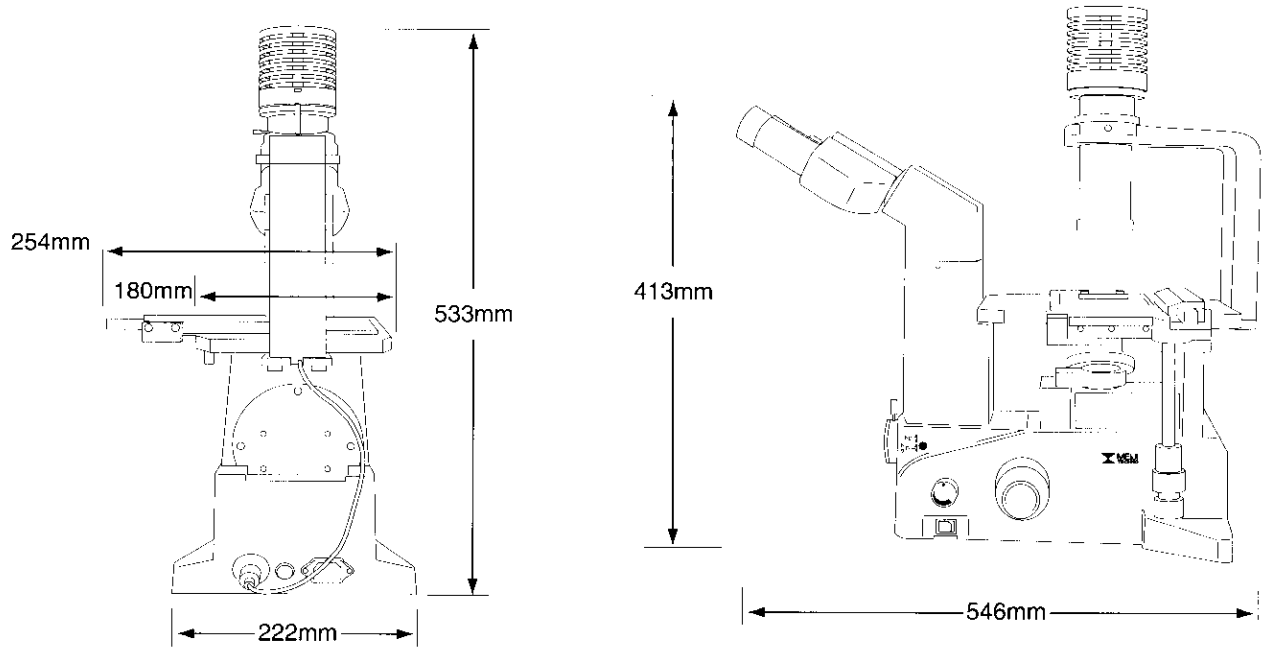
Filters and Applications

| Filter | Application |
|--------------------|---|
| ND25 | Neutral Filter or ND Filter. Grey filters or neutral density filters are used to attenuate all frequencies of light equally resulting in preservation of color temperature. The ND25 filter would indicate a reduction of light transmission by 75 percent or a passage of light of 25 percent. |
| ND13 | The ND13 filter would indicate a reduction of light transmission by 87 percent or a passage of light of 13 percent. |
| Green Interference | Provides maximum contrast enhancement for specimens with little or no color during phase contrast observation mode. |
| LB100 | Color Temperature Blue Filter. Suppresses red wavelengths in fluorescence applications. Provides a mired shift of -100. |
| G533 | Green Filter. Provide contrast enhancement of complimentary colors of blue and red on black & white or tungsten-balanced color transparency films. |
| Cobalt Blue | Blue cobalt glass filter protects delicate specimens from heat of microscope illumination systems. |

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10.0 Physical Dimensions





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