INSTRUCTIONS

AHBS3
RESEARCH PHOTOMICROGRAPHIC MICROSCOPE SYSTEM
AUTOMATIC VERSION

VANOX

OBSERVATION/PHOTOMICROGRAPHY INSTRUCTIONS

WARNING
This instruction manual has been prepared for use with the Olympus Research Photomicrographic Microscope Model AHBS3. Before putting the microscope into operation, it is recommended that you read this manual carefully and familiarize yourself with the use of this microscope in order to obtain the optimum performance. For assembly procedures, read the assembly instructions specially prepared for setting up this microscope and preparations for observation.

OLYMPUS®
HOW TO USE THE LIGHT EXCLUDING SHUTTER

The unique light excluding shutter is designed to prevent extraneous light from entering the eyepieces thereby affecting long photomicrographic exposures. This feature is especially useful with overhead fluorescent illumination.

**Operation of the shutter**

The shutter switch ① is located on the right side of the observation tube. (Fig. 1)

A. Push the switch upward (to the ● position) during photography, then press the shutter release • button on the control panel. No ambient light will enter through the eyepieces. Conversely, the microscopic image cannot be observed while the light excluding shutter is engaged.

B. If the switch is moved downward (to the ○ position), the shutter is disengaged, and the microscopic image can be observed during exposure.

Fig. 1
BEFORE USE

1 Operation

1. Since this microscope is a precision instrument, always handle it with the care it deserves and avoid abrupt motions and shocks.

2. Moving the microscope
   a) On a bench

   The microscope can be moved on a benchtop by lifting the front of the base, and sliding it along the benchtop on its plastic feet.

   b) Over a distance

   Two people should carry the microscope, with one person holding the front, and another person holding the rear section.

3. Avoid installation and use of the microscope in the following places:
   a) Near the vents of an air conditioner.
   b) An area subject to excessive vibration and temperature changes.
   c) An area near a noise generator (electrical).
   d) An area exposed to direct sunlight.
   e) An area subject to dust, cigarette smoke, high temperature and humidity.

4. Be sure to ground the microscope properly.

2 Maintenance

1. Lens surfaces must always be kept clean. Fine dust on lens surfaces should be wiped off gently with gauze pads. Carefully wipe off oil or fingerprints on the lens surfaces with a gauze pad moistened with a small amount of xylene, or a 3:7 mixture of alcohol and ether.

2. Do not use organic solutions to wipe the surfaces of various components. Plastic parts, especially, should be cleaned with a neutral detergent.

3. Do not attempt to disassemble the microscope. Never disassemble the microscope for repair. Only authorized Olympus service personnel should make repairs.

4. When not in use, the microscope should be covered with the vinyl dust cover provided.
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## SPECIFICATIONS

<table>
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<tr>
<th>Item</th>
<th>Description</th>
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<tr>
<td>Observation tube</td>
<td>Binocular tube with constant tube length adjustment, tube inclination 30°; interpupillary distance adjustment with scale range from 56 mm to 75 mm, diopter adjustment range from -8 to +2 diptor. Standard eyepieces: Super widefield eyepiece 10X, field number 26.5.</td>
</tr>
<tr>
<td>Revolving nosepiece</td>
<td>Sextuple, motorized for objective magnification change, with manual override.</td>
</tr>
<tr>
<td>Stage</td>
<td>Mechanical square stage with right-hand low coaxial controls.</td>
</tr>
<tr>
<td>Total magnification</td>
<td>For observation: 10X (objective 1X, eyepiece 10X) to 100X (objective 100X, eyepiece 10X)</td>
</tr>
<tr>
<td></td>
<td>For photomicrography: 2.5X – 500X (35 mm)</td>
</tr>
<tr>
<td></td>
<td>7.5X – 1500X (large format)</td>
</tr>
<tr>
<td>Illumination</td>
<td>Light source: Long life halogen bulb 12V, 100W (HALL, life time 2,000 hrs.), pre-centered.</td>
</tr>
<tr>
<td></td>
<td>Condenser: Kohler illumination for 1X to 100X objectives. Automatically adjusted for each objective magnification change. Manual override possible.</td>
</tr>
<tr>
<td></td>
<td>Iris diaphragms: Aperture and field iris diaphragms automatically controlled for each objective magnification change. Manual override possible.</td>
</tr>
<tr>
<td></td>
<td>Filters: Light balancing filters (built-in for daylight and tungsten type film), and three contrast filters.</td>
</tr>
<tr>
<td></td>
<td>Light intensity: Automatic or manual control by means of built-in ND filters with constant color temperature.</td>
</tr>
<tr>
<td>Photomicrographic equipment</td>
<td>Provisions for mounting two 35 mm camera backs, a large format camera back and a TV camera, with automatic light path selection.</td>
</tr>
<tr>
<td></td>
<td>Four photo eyepieces (2.5X, 3.3X, 4X and 5X) mounted motor driven turret.</td>
</tr>
<tr>
<td></td>
<td>Automatic exposure control system built-in (manual exposure is also possible.)</td>
</tr>
<tr>
<td></td>
<td>Exposure measurement selection between 30% integrated area and 1% spot area; real-time measuring method; automatic compensation for reciprocity failure; automatic adjustment of exposure time for specimen distribution or contrast; exposure time display (for estimated, memory recall and remaining times); multiple exposures; automatic exposure time lock; frame counter; warming indication for over or underexposure; film speed setting range from ISO/ASA 6 to 6400 for 35 mm camera backs, and from ISO/ASA 64 to 6400 for large format camera backs; automatic film advance.</td>
</tr>
<tr>
<td></td>
<td>Half frame exposure: 35 mm frame divided in two by means of the half-frame exposure slider (option).</td>
</tr>
<tr>
<td>Scale imprint</td>
<td>Micrometer insertion into the light path; 5 scales optionally available 9AH2-SLM10, 20, 40, 50, 100.</td>
</tr>
<tr>
<td>Focusing</td>
<td>Automatic focusing adjustment for medium magnifications (as mentioned below), manual adjustment for high magnifications.</td>
</tr>
<tr>
<td>Auto Focus (AF) system</td>
<td>Compatible with transmitted light brightfield illumination for biological use. Standard range of objective magnification: SPlan: 1X – 40X SPlan Apo: 4X – 40X</td>
</tr>
<tr>
<td></td>
<td>Focusing accuracy: Within the focal depth of each objective Specimen requirements: 1. Specimen slide thickness: 0.8 – 1.4 mm 2. Specimen size: 20 μm min. (with 1X objective) 0.5 μm min. (with 40X objective) 3. Density and contrast: Transmittance of specimen in brightfield should exceed 3% and contrast should exceed 25% in terms of brightness difference. 4. Pattern: Regularity should not exist in a specimen image (e.g. micrometer, rulings) 5. Color: Spectrum range between 460 and 650 nm.</td>
</tr>
</tbody>
</table>
2 IDENTIFICATION AND FUNCTION OF VARIOUS COMPONENTS

The picture below illustrates the nomenclature of the primary operating components for observation. (Descriptions of the photomicrographic components are given in Section 3-2 "Photomicrography" on page 9.)

- Interpupillary distance adjustment knobs
- 100%-light-to-camera knob
- Low voltage selector buttons
- Objective magnification button
- Condenser turret
- LBD filter holder knob
- Additional filter holder knobs
- Stage rotation clamping knob
- Power switch
- Objective magnification button

1. 100%-light-to-camera knob: When pulled out all the way, 100% of light is directed to a camera.
2. LBD filter holder knob: Push in the knob to engage the LBD filter.
3. Additional filter holder knobs: Various filters (both standard and optional) can be mounted as desired.
4. Low voltage selector buttons: 3 positions: OFF, PHOTO (9V), MAX (12V). Normally set to "PHOTO".
5. Condenser turret: 3 positions: 100X to 40X, 20X to 10X, 4X to 1X (Automatically coupled with nosepiece rotation).
6. Objective magnification button: Press this button to change objective magnification.
Port for large format camera back

Bulb socket
12V 100W HAL-L

Fine focus adjustment knob

Interpupillary distance adjustment knobs
Turn either the right or left knob to adjust interpupillary distance.

Motorized nosepiece (sextuple)
Objectives mounted on the nosepiece can be changed by pressing the objective button on the control panel or rotating the nosepiece manually.

A through H: for mounting various attachments:
A: Nomarski differential interference contrast attachment/analyzer
B: Nomarski differential interference contrast attachment/polarizer/darkfield condenser
C: Light annulus unit for phase contrast
D: Port for attachment of Mercury burner/Xenon light sources
E: Jack for hand switch (optional)
F: X sync. contact (for Olympus Recordata Back 2, or for the sync cord (UYKK25) from the camera back in conjunction with the Recordata Back 4)
G: Reticle or half-size frame exposure slide
H: TV camera/light measurement port
Control Box

1. Field iris diaphragm button (F. STOP)........... Permits manual adjustment of the field iris diaphragm diameter.
2. Aperture iris diaphragm button (A. STOP)........... Permits manual adjustment of the aperture iris diaphragm diameter.
3. Intensity control button (INTENSITY)................. Permits manual adjustment of light intensity in the field of view.
4. Photo eyepiece selector button (PHOTO LENS)..............
5. Coarse and fine adjustment button (COARSE/FINE FOCUS)...........
6. Stage lowering button (STAGE).............
7. Auto focus button (AF).................. Press this button to bring the specimen into focus.
8. Objective magnification indicator LED...........
9. Objective magnification selector button (Ob. MAG)...........
10. Objective type indication lights...............
11. Objective type selector button (TYPE).............
12. Set button (SET)..................... Press this button to lower the stage all the way. Press the button again to bring the stage back to the starting position. This is convenient when changing the specimen or immersing the objective in oil.
13. Camera back selector buttons (35L/35R)...........
14. Light path selector button (DF, FL/BF/TV, DO)........
15. Objective magnification selector button (OBJECTIVE)...........

[Diagram of control box with labels for each function]
3 OPERATING THE MICROSCOPE

3-1 Observation

A. Summary Flowchart of Observation Procedure

1. Switch on the light source.
2. Select the light path.
3. Place a specimen on the stage.
4. Engage the 10X objective.
5. Press the AF button.
6. Swing in the desired objective.
7. Engage the filters according to the purpose.
8. Focusing
   - Disengage the filters except LBD.
   - Press the AF button.
   - Re-engage the filters.
   - Adjustment of aperture and field iris diaphragms, if necessary.

Legend:
A. Low voltage selector button
B. Control box (Light path selector button)
C. Specimen holder
D. Objective magnification button
E. Control box (AF button)
F. Objective button
G. Control box (Coarse and fine adjustment button)
H. Fine focus adjustment knob
I. Additional filter holder knobs
J. Control box (AF button)
K. Additional filter holder knobs
L. Aperture iris diaphragm button
M. Field iris diaphragm button

Page dimensions: 618.2x847.7
1 **Switching on the Light Source**

1. Turn on the power switch ①. (Fig. 1)
2. Press the low voltage selector button ‘PHOTO’ ②. (Fig. 1)

<table>
<thead>
<tr>
<th>Low voltage selector button</th>
<th>Application</th>
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<tr>
<td>MAX (12V)</td>
<td>Dark specimen in phase contrast, etc.</td>
</tr>
<tr>
<td>PHOTO (9V)</td>
<td>Normal observation and photomicrography</td>
</tr>
<tr>
<td>OFF</td>
<td>Fluorescence observation</td>
</tr>
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</table>

3. Adjust light intensity to an optimum level by pressing the intensity control button ①. (Fig. 2)
   - Intensity can be reduced by 50% in each of total of 11 steps down from 100% to 0.1%.
   - Intensity is automatically adjusted to keep at a constant level even when the objective magnification is changed.

2 **Light Path Selection**

1. For normal observation, press the light path selector button ③. (Fig. 3)
2. For light path selections, follow the illustrations provided on the light path selector buttons, as follows:
   - DF FL, DF Darkfield/fluorescence
   - BF Brightfield
   - TV, DO TV camera/light measurement

3 **Filter Selection**

1. Each filter is engaged or disengaged by means of the push-pull filter holder knobs ①. For normal observation, engage the LBD filter by pushing in the LBD filter holder knob ②. (Fig. 4)
4 Placing of the Specimen on the Stage

1. Place the specimen ① in the specimen holder. (Fig. 5)
   - Be sure to release the spring-loaded finger gently after the specimen slide is placed. A sudden release of the finger may cause damage to the slide. If fragments of the specimen slide fall onto the sliding surfaces of the stage or the condenser, malfunctions may occur.

5 Engaging the 10X Objective

1. Push the OBJECTIVE button ① (on the control box or microscope) until the 10X objective is engaged. (Fig. 6)

6 Focusing

1. Focus roughly by pressing the "COARSE" side of the coarse and fine adjustment (COARSE/FINE FOCUS) button ① on the control box, taking care to prevent the objective from hitting the specimen. (Fig. 7)
2. Press the "FINE" side of the coarse and fine adjustment button ① or manually rotate the fine focus adjustment knobs to bring the specimen into precise focus. (Fig. 7)

   Use of auto focus (AF) button
   With 40X or lower power objectives, pressing the AF button ② will automatically adjust focus. (Fig. 7)
   - In case the specimen is not suitable for automatic focusing (i.e. low contrast or dark specimens with regular spacings such as graticule, etc.), use manual focusing.

7 Interpupillary Distance and Diopter Adjustments

1. Press the camera back selector button ③, ④ or ⑤, as required. (Fig. 8)
   - Details about the LED indicator lights on the control panel will be discussed in Section 3-2 "Photomicrography" on page 9.

   Although photo eyepieces of any magnification can be used for the adjustment (by pressing the photo eyepiece selector (PHOTO LENS) button ②), a 2.5X photo eyepiece is preferable for the adjustments that follow because of its wider field of view. (Fig. 9)
2. Adjust the interpupillary distance.
   Rotate the right or left interpupillary distance adjustment knob ① until
   perfect binocular vision is obtained. (Fig. 10)
   ◆ If you know your interpupillary distance, read it on the convenient scale ④ located between the eyepiece tube.

3. Adjust the diopter setting.
   Rotate the diopter adjustment ring ⑤ on each eyepiece until the double cross reticle lines are sharply in focus and clearly distinguishable as two separate lines. (below and Fig. 11)

Repeat the diopter adjustment on the other eyepiece.

8 Engaging the Desired Objective

1. Press the OBJECTIVE button ① until the desired objective is engaged. (Fig. 12)
   ◆ Objectives with inscription "oil" are called "immersion objectives." To make maximum use of the numerical aperture of an immersion objective, the objective, specimen and condenser should be immersed in immersion oil.
   It is convenient to use the stage lowering (STAGE) button ② when immersing the objective in oil. (Fig. 12)

9 Aperture and Field Iris Diaphragm Adjustments

The aperture and field iris diaphragms are automatically adjusted for Koehler illumination each time the objectives are changed in the automatic mode, so that the aperture iris diaphragm is stopped down to 85% of the objective numerical aperture (N.A.) and the field iris diaphragm circumscribes the field of view.

Manual adjustment

The automatic diaphragm adjustments can be manually overridden by means of the control box.

1. Aperture iris diaphragm
   Use the aperture iris diaphragm [A STOP] button ① to adjust the aperture iris diaphragm manually, while looking at the image contrast through the eyepieces. (Fig. 13)

2. Field iris diaphragm
   Use the field iris diaphragm [F STOP] button ② to adjust the field iris diaphragm opening to the desired diameter, while looking at the image through the eyepieces. (Fig. 13)
   ◆ In the manual adjustment, both diaphragms can be changed proportionally when the objectives are changed.
   ◆ When the power switch is turned off, the manual mode reverts to the automatic mode.
3-2 Photomicrography

Identification and Function of Various Controls on the Control Panel

1. Indication Panel
   This panel lights up only when the camera back selector button 35R, L, or 35L is pressed, indicating photomicrography is possible.

   ![Indication Panel Diagram]

① Camera back indicator lights
   Indicate the camera back in use.
   35L: Left-hand side 35 mm camera back
   L: Large format camera back
   35R: Right-hand side 35 mm camera back

② Frame counter (FRAME)
   Indicates the number of frames exposed.

③ Film speed (ISO/ASA)
   Indicates the speed of the film in the camera back in use.

④ Reciprocity failure compensation (RECI PRO)
   Compensates for the reciprocity failure characteristics of the film in use.

⑤ Exposure adjustment (EXPOSURE ADJ.)
   Exposure time can be adjusted manually between 0.5X and 4X, according to the distribution or contrast of the specimen.

⑥ Exposure time (EXPOSURE TIME)
   Indicates estimated exposure time in hours, minutes or seconds.
2. Control Panel

1. Power indicator light (POWER)
   Lights up when power is switched on.

2. Intensity indicator light (LAMP)
   - MAX (yellow): Maximum intensity, for dark specimens.
   - PHOTO (green): Normal intensity used for observation and photomicrography.
   These lamps are interlocked with the low voltage selector switches.

3. SAFETY indicator light
   - Green: Correct exposure
   - Red (solid): Underexposure (with continuous warning beep for 3 sec.)
   - Red (flashing): Overexposure (with intermittent warning beep for 3 sec.)

4. WORK light
   Lights up while the shutter is open.

5. RESET button
   Push this button to reset the frame counter to "1" after loading a film.

6. Film speed (ISO/ASA) button
   Press this button to change the film speed indication. Pressing on the mark → reduces the film speed from 6400 to 6 in steps, while pressing on the mark ← increases the speed from 6 to 6,400 (with 35 mm film).
   After selecting a film speed different from the one stored in memory, press the SET button while the film speed (ISO/ASA) light is flashing, to store the new film speed in memory. Unless the SET button is pressed, the film speed indicator lamp will flash for 10 seconds, a warning beep will sound, and the film speed will automatically reset to the previous selection.

7. Reciprocity failure compensation (RECIPRO) button
   Compensates for the reciprocity failure characteristics of the film in use. The indicator ranges from 0 to 7, in increments of 1. Press the SET button when the desired value is displayed.
8 SET button
By pressing the SET button while the film speed or reciprocity failure compensation indicator is flashing, the displayed value can be programmed into memory. If this button is not pressed, flashing will continue for 10 seconds, then a warning beep will sound, and the setting will automatically revert to the previously selected values.

9 Exposure adjustment button
Exposure time can be adjusted manually according to the distribution or contrast of the specimen. Read page 28 for further details.

★ As the setting of this button cannot be programmed into memory, it returns to 1X when the power is turned OFF.

10 Shutter release button (EXPOSE)
Activates the shutter. At the end of the exposure with a large format camera back or in the NO WINDING mode, a warning beep will sound.

11 Objective magnification button (OBJECTIVE)
Rotates the nosepiece in the direction of ARROW.
Other Control Buttons for Special Applications

A Manual button (MANUAL)
Press this button for manual exposure mode. As the shutter release (EXPOSE) button is pressed, the shutter is opened and the actual exposure time is displayed. To close the shutter, press the film advance (TIME OFF/WINDING) button (B).

B Film advance button (TIME OFF/WINDING)
Closes the shutter and advances the film. If the shutter is already closed, only the film advances. After loading the film, use this button to wind 2 or 3 frames for blind shots. If you press this button in manual exposure mode, the shutter closes and the film is advanced.

C Multiple exposure button (NO WINDING)
Pressing this button closes the shutter without advancing the film. Use this button for multiple exposure which can be employed in full-frame or half-frame photography. If you press this button twice, the multiple mode will be released and automatic film advance will be resumed.

D Spot measurement button (SPOT)
The spot measurement covers 1% of the center area of the 35 mm film plane, which is ideal for darkfield photography or for specimens with large brightness differences, such as fluorescence.

E Automatic exposure lock button (LOCK)
Used to take multiple exposures with constant exposure time.

F Time recall button (RECALL)
Recalls and displays the previous exposure time.
B. Summary Flowchart of 35 mm Photomicrography

- Light path selection
- Camera back selection
- Film loading
- Film data input
- Filter selection
- Framing
- Focusing
- Exposure
- End of film roll
- Rewind

(Relevant part) (Page)
Control box (Light path selector buttons) (14)
Control box (Camera back selector buttons) (16)
35 mm camera back (14, 15)
Control panel (16)
Filter tray (17)
Low voltage selector button (6)
(25)
Control box (Coarse and fine adjustment buttons) (17)
Filter holder knobs (17)
Control box (AF button) (18)
Filter holder knobs (17)
Control box (Aperture and field iris diaphragm buttons) (8)

With color film:
Ensure that the low voltage selector button 'PHOTO' is depressed.
1 Light Path Selection

1. Press the camera back selector button or (Fig. 14)
2. The format frame reticle appears in the field of view.
   * Read the section "Framing" on page 17 for details on format sizes.

2 35 mm Film Loading

![Diagram of camera parts]

- **Exposure counter**
- **Film advance indicator light**
- **Rewind button**
- **Rewind crank**
- **Back cover release/rewind knob**
- **Positioning index dot**
- **PM-250AD mounting socket**
- **Guide pin hole**
- **Motor drive socket cap**
- **Sync. socket** (Accepts the sync cord from the Recordata Back.)
1. Lift up the back cover release/rewind knob ①. A slight resistance may be felt before the back cover (hinged) pops partially open. (Fig. 15)

Fig. 15

2. Put film cartridge ① in the film chamber and push the back cover release/rewind knob back in. (Fig. 16)

Fig. 16

3. Insert the film leader into the slit on the take-up spool ②. (Fig. 16)
   * If the film is loaded with the camera back detached, mount the camera back on the microscope. Keep the camera back cover open.

4. Press the film advance (TIME OFF/WINDING) button ① on the control panel (Fig. 17) and advance the film until the film perforations engage the sprockets ③ on both sides. (Fig. 18)
   It is advisable to lightly place your finger tip on the sprocket gear. The film is advanced by one frame whenever the film advance button is pressed.

Fig. 17

5. Close the camera back cover and press until a click is heard.

6. Press the film advance (TIME OFF/WINDING) button again to advance the film (2 or 3 frames) until the number "1" appears in the exposure counter (A).

7. It is advisable to insert the end flap of the 35 mm film package into the memo holder provided on the camera back cover as a reminder of the size and type of film in use.

8. Press the RESET button ② on the control panel and the frame counter will indicate "1". (Fig. 17)
3 Film Data Input

The film data including ISO/ASA film speed, film characteristics, etc. are entered into the control panel.

1. Select the right or left 35 mm camera back by pressing the camera back selector button "35L" or "35R" ①. (Fig. 19)
   - Since film data are stored into memory for each camera back, be careful to remember for which side camera back the data are entered.

2. Input the film speed.
   - Press the film speed button ② until the film speed appears on the indication panel. (Fig. 20)
   - Stop the flashing of the film speed indicator by pressing the SET button ③. (Fig. 20)
   - Unless the SET button is pressed, the flashing will continue for 10 seconds, then a warning beep will sound, and the film speed indicator will return to the previous selection.
   - The range of film speed indication: 6 - 6,400.

3. Press the RECIPRO button ① to indicate the exposure adjustment value on the indication panel. (Fig. 21) See the reference tables provided separately.
   - As the exposure adjustment indicator flashes similarly to the film speed indicator, press the SET button ② to stop the flashing. (Fig. 21)
   - Data of frequently used films are printed on the slide-out panel ① provided beneath the control panel. (Fig. 22)

Note: Data programmed into the memory are backed up by built-in batteries to remain in memory for about 7 years, after switching off the power or during power failures.
**Filter Selection**

Model AHBS3 Research Photomicrographic Microscope is designed to render optimum color temperature illumination for daylight type color film when the LBD filter ② is engaged, with the low voltage selector button "PHOTO" ③ depressed. (Fig. 23)

1. With daylight-type color film
   Ensure that the LBD filter ② is pushed in and other filters ③ are pulled out. (Fig. 23)

2. With tungsten-type color film
   ① Pull out the LBD filter ②.
   ② Mount the LBT filter (optional) into one of the additional filter holders ③ and engage. (Fig. 23)
   * See page 8 of Assembly Instructions for mounting the filters.

3. With B&W film
   ① Pull out the LBD filter ②.
   ② Mount the IF550 filter into one of the additional filter holders ③ and engage. (Fig. 23)
   * See page 8 of Assembly Instructions for mounting the filters.

**Framing**

Place the specimen image inside the 35 mm frame reticle.

![Reticle](image)

1. To change the magnification on the film plane, press the photo eyepiece selector knob ① on the control box or change the objective magnification. (Fig. 24)
   * Magnification on film plane = Objective magnification \times Photo eyepiece magnification

2. To change the orientation of a specimen image, rotate the stage.

**Focusing**

1. Rotate the dipter adjustment rings ① on both eyepieces, until the cross lines in the center of the field of view are clearly visible as two separate lines. (Fig. 25)

   ![Dipter Adjustment](image)

   Make sure to adjust both eyepieces.

2. Make sure that images of the reticles and the specimen are in sharp focus simultaneously by adjusting the coarse and fine adjustment buttons, or fine focus adjustment knobs.
Use of Auto Focus (AF) Button

The AF button ① is used for automatic focusing with 40X or lower power objectives. (Fig. 26)
- In case the specimen is not suitable for auto focusing (i.e. low contrast and dark specimens, or specimens with regular spacings such as graticule, etc.), use manual focusing.

Exposure

1. Ensure that the green SAFETY light ① is illuminated. (Fig. 27)
   - Red (flashes) ........ Reduce intensity with the intensity control button.
   - Red (solid) .......... Increase intensity with the intensity control button.
   - Off .................. Manual exposure or auto exposure lock is engaged. Disengage.

2. Set the exposure adjustment button ② according to the distribution of the specimen.
   - If highly transparent objects are spread evenly throughout a bright field, set the button to "1". (Fig. 27)
   - If the objects are unevenly distributed, refer to page 28.

3. Pull the 100%-light-to-camera knob ③ for dark objects or fluorescent light photomicrography. (Fig. 28)

4. Make sure that all of the following functions for special applications are disengaged. (Fig. 27):
   ③ MANUAL  ④ SPOT MEAS.
   ⑤ AE LOCK  ⑥ NO WINDING

5. Press the shutter release (EXPOSE) button ⑦. The WORK light is on while the shutter is open, and goes out when the exposure is completed. The film is advanced by one frame immediately after. (Fig. 27)

End of Film Roll

1. As soon as the film reaches the end of the spool, the film advance motor stops and the frame counter indicator flashes, giving a warning beep for 3 seconds.

2. Press the rewind button ① on top of the camera. (Fig. 29)

3. Unfold the rewind crank ② and wind it slowly in the direction of ARROW (clockwise) to rewind the film. (Fig. 29)
   While rewinding, you will feel tension. When the tension stops and the crank turns freely, the film has been completely rewound into the cartridge.
   - The rewind button ① will automatically return to its original position once the film is completely rewound.
**C. Summary Flowchart of Large Format Photomicrography**

- **Attaching a large format camera back**
  - Adapter for large format camera backs
  - (Relevant part) (Page)
  - (As per each respective film loading instructions)

- **Film loading**
  - Control box
    - (Light path selector button)

- **Light path selection**
  - Ensure that the camera back selector switch "L" is pressed.
  - Filter tray
    - (Low voltage selector button)

- **Film data input**
  - Film speed (ISO/ASA)
  - Film reciprocity failure characteristics
  - Control panel
    - (Page)

- **Filter selection**
  - With color film:
    - Ensure that the low voltage selector button "PHOTO" is depressed.
  - Low voltage selector button
    - (Page)

- **Framing**
  - With 40x or lower
  - Control box
    - (Coarse and fine adjustment buttons)
  - Filter holder knobs
    - (Page)

- **Focusing**
  - With 60x or higher
  - Control box
    - (AF button)
  - Filter holder knobs
    - (Page)

- **Manual adjustment of aperture and field iris diaphragms, if necessary**
  - Control box
    - (Aperture and field iris diaphragm buttons)

- **Exposure**
  - Pull out the light excluding slide.
  - Re-insert the light excluding slide.

- **End of film roll**
  - a) Fuji instant camera
  - b) 3-1/4" x 4-1/4" Polaroid® back
  - c) 120 x 220 Mamiya roll film holder
  - d) 4" x 5" film holder
  - (As per each respective post-exposure procedures)

- **Rewind**
Large Format Camera Backs

- Adapter for large format camera backs
  This adapter is required for all types of large format camera backs.

Mount for large format camera backs

Clamping lever
Clamps a large format camera back to the adapter.

Clamping ring
Connects the adapter to the microscope.

Relay lens
Screw-in type. Removable by unscrewing, convenient for cleaning the lens surface.

a) Fuji Instant Camera Back (PM-CF1)

Film counter

Film advance button

Filmm exit

Remote release jack

Clamping flange

Back cover release button/film back window
An orange dot indicates the film is loaded.

Battery chamber
4 batteries, size "AA"

6V DC jack
Commercially available

Light excluding slide
b) Polaroid® 3-1/4" x 4-1/4" Camera Back (PM-CP)

Camera back
Clamping flange
Cover locking latch

Back cover
Yellow tab slot
White (black) tab slot
Light excluding slide

---

c) 120 x 220 Mamiya roll film holder (PM-CMH)

Rewind lever
Winding lever
Clamping flange

Film counter
Light excluding slide

Film speed scale (ISO/ASA)
Film indication window

---

d) Adapter for 4" x 5" film holders (PM-C4 x 5)

Seat for sheet film holder
Lock button

Clamping device
Alignment groove
Clamping flange

---

* Be sure to use film holders that comply with the international standards for 4" x 5" film holders.
1 Film Loading

a) Fuji instant camera back
- Film used: Fuji instant color film Fl-10 (ISO/ASA160)
- Picture size: 97 mm x 102 mm

- Insert the batteries.
  1. Insert four size "AA" 1.5V alkaline-manganese batteries into the battery chamber. Follow the directions given inside the charger for battery polarity.
  2. Manganese or Ni-Cd batteries of the same rating can also be used.

- Load the film.
  1. Open the new film case and take out the film pack.
  2. Push the cover release button (f) to the "OPEN" position, and open the cover. (Fig. 30)
  3. Align the orange line of the film pack with that of the camera back, and push the film pack into the camera back until it snaps into position.
  4. As you press the film advance button (g) of the camera back, the light excluding cover of the camera back will be automatically ejected. The camera back is now ready for taking pictures.

b) Polaroid® 3-1/4" x 4-1/4" camera back
- Film used: Polaroid® type 668 (Color, ISO/ASA 75)
- Picture size: 3-1/4" x 4-1/4" (73 mm x 95 mm)

- Load the film
  Read the instructions inserted in the film pack first before taking the following steps:
  1. Open the new film box and take out the film pack.
  2. Push the cover locking latch (h) upwards with both hands. (Fig. 30)
  3. Fully open the camera back cover.

  * Handle with care so as not to break the cover.

- Roller cleaning
  It is essential to keep the rollers clean, since dirty rollers will produce irregularities on the picture.
  1. To clean the rollers, lift the roller unit (i) upwards in the direction of the ARROW and remove. (Fig. 32)
  2. Wipe the rollers first with a damp cloth and then with a dry cloth.
  3. After cleaning, return the roller unit to its original position.

  * Do not scratch the roller surface with finger nails or sharp metal objects.
4. Hold the film pack only by edges, so that the safety cover, bearing the legend "SAFETY COVER .......... THIS SIDE FACES LENS," faces the camera, and push the film pack ① against the spring beneath the back cover. (Fig. 33)

5. Push the film pack until it snaps into place.
   ★ Make sure that the white tabs are not caught between the pack and the camera body.

6. Close the camera back cover by pressing both sides of the cover equally. The black tab of the safety cover should protrude from the small slot. If not, open the back cover once again and make sure that the black tab is sticking out.

7. Grip the black tab (safety cover) and pull out the cover. A white tab should emerge from the slot. Pull this white tab only after having made an exposure.

This concludes the preparation for photography.

c) 210 x 220 Mamiya roll film holder
   - Film used: Brownie film 120 (6 frames); 220 (16 frames)
   - Image size: 60 mm x 90 mm (2.4" x 3.5")
   - Insert the film pack into the film holder according to the instructions provided with the film pack.

d) Adapter for 4" x 5" holders
   - Film used: 4" x 5" sheet film
   - Image size: 4" x 5" (100 mm x 125 mm)
   - Attach the film holder.
     1. Slide the lock buttons (both sides) on the adapter in the direction opposite to the "LOCK". Once their arrival stops, press the buttons further, to lift up the clamping flange. (Fig. 34)
        ★ This procedure varies depending on the type of film holder used. (Fig. 35)
     2. Insert the film holder all the way. This will engage a projection on the film holder with an alignment groove on the adapter.
     3. Slide the lock buttons to lock and clamp the film holder.

☆ To detach the holder
   1. Slide the lock buttons (both sides) in the direction opposite to "LOCK".
   2. Pull the holder out while lifting it up with the right edge. The holder can be detached easily this way. (Fig. 36)

- Load the film.
   Follow the instructions provided with each film holder which complies with the international standards for 4" x 5" film holders.
2 Light Path Selection

1. Press the camera back selector button "L" ①. (Fig. 37)

2. Looking through the eyepieces, you can see the frame reticle can be seen. Refer to Section 5 "Framing" on page 25.

3 Film Data Input (common to all large format camera backs)

1. Press the camera back selector button "L" ①. (Fig. 37)

2. Enter the film speed. (Fig. 38)
   Press the film speed button ② until the desired film speed appears on the display panel. (Fig. 38) While the film speed indicator is flashing, press the SET button ③ to store the film speed into memory. (Fig. 39)
   * Unless the SET button is pressed, a warning beep sounds after 10 seconds of flashing, and the indication returns to the previously selected film speed.
   * The range of film speeds that can be displayed is ISO/ASA 64 to 6400.

3. Film adjustment data input (Fig. 39)
   - Press the reciprocity failure compensation button ① to display the adjustment value, according to Tables 1 and 2 provided separately. (Fig. 39)
   - While the adjustment value indication is flashing, press the SET button ② to store the value into memory. (Fig. 39)

Data of frequently used films are provided on the slide-out panel ① beneath the control panel. (Fig. 40)

Note: Data stored into the memory are backed up by built-in batteries to it remain in the memory for about 7 years after switching off the power, or during power failures.
4 Filter Selection

When the low voltage selector button "PHOTO" is pressed, and the LBD filter is engaged, the microscope is designed to render optimum color temperature illumination for daylight color film. (Fig. 41)

1. With daylight color film
   Ensure that the LBD filter is pushed in and other filters are pulled out. (Fig. 41)

2. With tungsten color film
   ① Pull out the LBD filter.
   ② Mount the LBT filter into one of the additional filter holders and engage it by pushing it in. (Fig. 41)
   * See page 00 of Assembly Instructions for mounting the filters.

3. With B&W film
   ① Pull out the LBD filter.
   ② Mount the IF550 contrast filter into one of the additional filter holders and engage it by pushing it in. (Fig. 41)
   * See page 8 of Assembly Instructions for mounting the filters.

5 Framing

Bring the portion of the specimen to be photographed into the frame reticle of the camera back in use.

1. If the image magnification of the specimen is not as desired, adjust by pressing the photo eyepiece selector button or the OBJECTIVE button. (Fig. 42)
   * Image magnification = Objective magnification x Photo eyepiece magnification x 3

2. If it is necessary to change the orientation of the specimen, rotate the stage.

6 Focusing

1. Turn the diopeter adjustment ring of both eyepieces in such a manner that the double cross lines within the frame reticle in the field of view can be clearly distinguished as two separate lines. (Fig. 43)

Repeat this procedure for the other eyepiece.

2. Since the double cross lines and the film plane are in the same focal plane, the image focused through the eyepieces and the image on the film plane should be sharply visible at the same time. Therefore, use the fine focus adjustment knobs of the microscope or the coarse and fine adjustment buttons to bring the specimen into focus. Check again if both the double cross lines and the specimen are equally in focus.
Use of Auto Focus (AF) Button

The AF button ① is used for automatic focusing with 40X or lower power objectives. (Fig. 44)

- In case the specimen is not suitable for auto focusing (i.e. low contrast and dark specimens, or specimens with regular spacings such as graticule, etc.), use manual focusing.

7 Exposure

1. Ensure that the green SAFETY light ① is ON. (Fig. 45)
   - Red (flashes) ...... Reduce intensity with the intensity control button.
   - Red (solid)......... Increase intensity with the intensity control button.
   - Off .................. Manual exposure or auto exposure lock is engaged. Disengage.

2. Set the exposure adjustment button ② according to the distribution and contrast of the specimen.
   - If highly transparent objects are spread evenly throughout the brightfield, set the button to “1” position. (Fig. 45)
   - If these objects are unevenly distributed, refer to page 28.

3. Pull out the 100%-light-to-camera knob ③ for dark objects or fluorescent light photomicrography. (Fig. 46)

4. Make sure that all of the following buttons for special applications are disengaged. (Fig. 45):
   ③ MANUAL  ④ SPOT MEAS.
   ⑤ AE LOCK  ⑥ NO WINDING

5. Press the shutter release (EXPOSE) button ⑦. The WORK light is on while the shutter is open, and goes out when the exposure is completed. (Fig. 45)

8 Procedure after Exposure

a) Fuji instant camera back

1. Press the film advance button of the camera back to expel the exposed film.

2. Normally, the picture image appears in about 15 seconds, and stabilizes in about 1 minute.

3. After the film pack is completely exposed (10 sheets), replace the film pack.
   - When the camera back is clamped properly, its film counter will be positioned upside down.
   - Pull out the film, with care not to touch the picture area, holding only the edges.

Attention:
The film has a tendency to take on a pink tint if the exposure time exceeds 0.1 second. A compensating filter (CC-10G – CC-30G) is recommended. The CC filter should be inserted above the aperture iris diaphragm (in the direction of ARROW). (Fig. 47)
b) Polaroid® 3-1/4" x 4-1/4" camera back

1. After exposure, grasp the white tab emerging from the camera with thumb and index finger and pull it out completely in one motion. A yellow tab will appear.
   * If the yellow tab is already in view, do not pull the white tab. Pulling out the white tab does not commence the development; it is a preparatory step for pulling the yellow tab.
2. Hold the center of the yellow tab and pull it out quickly from the camera in one motion. Development commences from the moment the yellow tab has been completely removed.
   * If numerous white spots appear on the film, repeat the exposure and remove the yellow tab slightly less quickly.

c) 120 x 220 Mamiya roll film holder

1. After pushing the film winding lever to the right, wind the film.
2. After the entire roll of film is exposed, rewind the film with the rewind lever completely, then open the back cover and replace the film.

d) 4" x 5" film holder

Follow the instructions provided with each holder.

**LARGE FORMAT PHOTOMICROGRAPHY AT FILM SPEED SETTING LOWER THAN ISO/ASA 64**

The Research Photomicrographic Microscope Model AHBS3 principally permits film speed settings as low as ISO/ASA 64 for large format photomicroscopy. However, the speed can be lowered to ISO/ASA 6 by means of manual exposure adjustment and by use of the built-in ND filters.

1. In case of Film Speed Settings at ISO/ASA 50, 40 and 32
   These low film speeds can be obtained by setting the exposure adjustment button as follows:
   Press the film speed button to ISO/ASA 64, and then press the exposure adjustment button to manually set the exposure adjustment value corresponding to the desired film speed as given in Table 2.

2. In case of Film Speed Settings at ISO/ASA 25, 12 and 6
   These even lower speeds can be obtained by the following 2 methods: (A) by use of the built-in ND filter, or (B) by means of manual exposure adjustment.

A. By the Built-in ND Filters

1. Use the exposure adjustment method, described above in 1, and set the ISO speed to 50.
2. Press the AE (automatic exposure) LOCK button.
3. Adjust the light intensity control knob to obtain the ND filter settings (Table 2) corresponding to the film speed.

B. Manual Exposure Adjustment

1. Use the exposure adjustment method, described above in 1, and set the ISO speed to 50.
2. Press the MANUAL button in the following manner:
   Read out the estimated exposure time displayed on the panel before switching to manual mode; then multiply the estimated exposure time by the exposure factor corresponding to the film speed (Table 3), and take the photograph in the manual mode.
   * In general, large format photomicrography involves a lens-to-film distance longer than that 35 mm photomicrography, which reduces the amount of light that reaches the film plane. However, it is possible to obtain a sharp photograph using large format. Accordingly, it is recommended to use a film with as high a film speed as possible for large format photomicrography.

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Table 2</th>
<th>Table 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Film speed</td>
<td>Exposure adjustment setting</td>
<td>Film speed</td>
</tr>
<tr>
<td>ISO50</td>
<td>0.80</td>
<td>ISO25</td>
</tr>
<tr>
<td>ISO40</td>
<td>0.64</td>
<td>ISO12</td>
</tr>
<tr>
<td>ISO32</td>
<td>0.50</td>
<td>ISO 6</td>
</tr>
</tbody>
</table>
D. Special Applications

The special applications introduced below can help improve photomicrographs under certain conditions.

1 Using the Exposure Adjustment Button According to the Specimen

Exposure can be adjusted using the exposure adjustment button "0" for a wide range of specimen contrast patterns; for example, when only small portions of the specimen exhibit intense brightness such as darkfield or fluorescence illumination, or low contrast chromosomes in brightfield illumination.

### Exposure conditions and exposure control with ISO/ASA 100 film

<table>
<thead>
<tr>
<th>Specimen conditions</th>
<th>Position of EXPOSURE ADJ</th>
<th>ISO/ASA rating</th>
<th>Exposure variation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objects are densely spread in brightfield</td>
<td>0.5</td>
<td>50</td>
<td>1 full stop over</td>
</tr>
<tr>
<td>Objects are evenly spread throughout the field</td>
<td>1</td>
<td>100</td>
<td>Normal</td>
</tr>
<tr>
<td>Objects are evenly spread in darkfield</td>
<td>2</td>
<td>200</td>
<td>1 full stop under</td>
</tr>
<tr>
<td>Objects are scattered thinly in darkfield</td>
<td>*4</td>
<td>400</td>
<td>2 full stops under</td>
</tr>
</tbody>
</table>

* The exposure adjustment button is adjustable in increments of 1/3 stops.
* If the entire adjustment range of the exposure adjustment is insufficient, use the film speed button for additional correction.

![Exposure adjustment position "0.5"]

![Exposure adjustment position "1"]

![Exposure adjustment position "4"]

* Average exposure measurement is performed in the central integrated measurement area (18 mm diameter) on the 35 mm film plane.

2 Spot Exposure Measurement

1. Press the spot measurement button "0" and verify that the WORK indicator light flashes. (Fig. 49)
2. Bring the portion of the specimen to be measured into the spot measurement area.
   * If the specimen detail to be measured cannot be photographed inside the central measurement area, move it in the center for exposure measurement only, engage the AE lock button, return the specimen detail to its original position and initiate the exposure (EXPOSE button). (See page 30 on how to use the AE lock feature.)
3. Set the exposure adjustment (EXPOSURE ADJ.) button, according to the distribution of the specimen.

- Manual exposure adjustment is necessary even in spot measurement mode, unless the spot area is completely filled with the specimen. Refer to the table below as guideline.

<table>
<thead>
<tr>
<th>Photomicrography</th>
<th>Film speed adjustment factor</th>
<th>Reciprocity compensation factor</th>
<th>Exposure adjustment for distribution of specimen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluorescence</td>
<td>4X (Ex: 400 for ISO/ASA 100)</td>
<td>2X</td>
<td>Set the RECIPRO. button as designated in the Instruction Sheet. Standard setting: 4X</td>
</tr>
<tr>
<td>General</td>
<td>1X</td>
<td>1X</td>
<td>Object area in the circle inscribed in the reticule</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>EXPOSURE ADJ. setting*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Darkfield</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Over 100%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- About 50%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- About 25%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Under 25%</td>
</tr>
</tbody>
</table>

*Darkfield represents the specimen condition where the background is dark and the specimen is bright, and brightfield indicates the condition where the background is bright and the specimen is dark.

- Range of automatic light measuring capacity

Model AHBS3 has the same light measuring range for both spot and average measurements.

The minimum exposure time is 0.01 seconds, but the maximum exposure time varies depending on the RECIPRO. button setting and the ISO/ASA rating of the film in use. Using an exposure time of 0.01 – 0.05 seconds, the RECIPRO button can be set to any position.

- If the exposure time required for a particular specimen exceeds the max. limit, expose in the manual mode.

- If the microscope is installed in a place subject to excessive vibration or temperature change, the image may sometimes blur even if the exposure falls within the automatic light measuring capacity range. If that is the case, reinstall the microscope in a place subjected to less vibration or temperature change.

- For photomicrography at a total magnification of 200X or higher, it is necessary to wait for over 30 minutes after the light is turned on before commencing the photomicrographic procedures.

### Manual Exposure Mode

Exposure time can be selected manually, bypassing the automatic exposure system. This enables you to choose exposure time, including long exposures beyond the limits of the auto exposure range.

1. Press the MANUAL button (1) and make sure that the WORK light is on. (Fig. 50)

2. Press the shutter release (EXPOSE) button. The shutter will open and the elapsed exposure time is displayed on the indication panel (2), counting upwards. (Fig. 50)

3. When the required exposure time is displayed on the indication panel, press the TIME OFF/WINDING button (3) to close the shutter. (Fig. 50)
4 Use of the Automatic Exposure Lock (AE LOCK) Button

In the automatic mode, pressing this button enables the user to lock the exposure time (estimated exposure time or actual exposure time) as shown on the LED display. As the LOCK button is pressed, the red indicator light above the LOCK button flashes, indicating that the exposure time is locked, and that the film will be exposed in the semi-automatic mode using the stored exposure time. Pressing the button again will release the lock mode.

1. Panorama photography
   If the same specimen is exposed repeatedly in different positions or adjacent specimen areas are photographed and mounted to obtain panorama photographs, it is recommended to assure constant background rendition and specimen contrast of each frame by shooting at constant exposure time. Select the area where the specimen details are evenly spread, and engage the LOCK.

2. Combined use of the AE LOCK and spot measurement
   If the portion of the specimen subject to spot measurement, is not in the center of the field because of your desired framing and composition, engage the AE LOCK with the portion of the specimen to be photographed positioned at the center, then reframe it as initially desired. (Fig. 51)

3. Photomicrography at max. or close-to-max. exposure time
   If the specimen requires the maximum or close-to-maximum exposure time e.g. in auto-mode fluorescence photomicrography, the LED display may sometimes show underexposure during photomicrography and the shutter may not close. To avoid this phenomenon, use of the AE LOCK is recommended.

5 Multiple Exposure of 35 mm Film

Multiple exposures of the same frame can be made by disengaging the automatic film advance system in the following manner:

1. Press the multiple exposure (NO WINDING) button ① and verify that the WORK light flashes. (Fig. 52)

2. Release the shutter for multiple exposures as many times as you wish without advancing film.
   ★ It is recommended to set the film speed at a higher level and/or reduce the exposure time so that overexposure may be avoided.

3. To advance the film, press the multiple exposure (NO WINDING) button again after multiple exposures are completed. (Fig. 52)
Color Reproduction of Transparency Slides (positive film)

- Commercially available color compensation filters (CC filter) can be used to slightly improve color rendition. They are roughly categorized into 3 groups as follows:

![Venn Diagram](image)

- Cyan: CC-C filter
- Magenta: CC-M filter
- Yellow: CC-Y filter

Each filter absorbs its complementary color:

- Cyan -> Red
- Magenta -> Green
- Yellow -> Blue

- The color density of a CC filter is indicated by the filter number. The higher the number, the higher the density. In magenta filters, CC-M5, CC-M10, CC-M15, etc. are available. For photomicrography, numbers 5 – 15 are recommended. When there is a color which you wish to eliminate while examining the incorrectly exposed transparency, use an appropriate CC filter. To select the filter, you can approximate the results by placing a CC filter over the slide on a light box. Then you can take a picture with a suitable CC filter, using the same conditions as for the original slide.

- Even with the same brand of film, color reproduction characteristics may differ depending on the emulsion numbers. Therefore, it is convenient to stock many films of the same brand, type and lot in a refrigerator so that you can use film of the same lot number every time you take photographs. (Before use, the film must be brought to room temperature.)

- Insert the filter as shown by ARROW in Fig. 53.
7 Use of Monochrome Contrast Filters

Monochrome contrast filters should be selected according to the specimen staining method. Suitable filters are listed below:

- Contrast filters compatible with various stains

<table>
<thead>
<tr>
<th>Stain</th>
<th>Contrast filter</th>
<th>Green 431F550-W45</th>
<th>Orange 450-560*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orange G</td>
<td></td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Azocarmine G</td>
<td></td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Eosin</td>
<td></td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Acid fuchsin</td>
<td></td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Aniline blue</td>
<td></td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Hematoxylin</td>
<td></td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Methylene blue</td>
<td></td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Light green SF</td>
<td></td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>

*Optional accessory

- Contrast filters compatible with various staining methods

<table>
<thead>
<tr>
<th>Stain</th>
<th>Contrast filter</th>
<th>Green 431F550-W45</th>
<th>Orange 450-560*</th>
</tr>
</thead>
<tbody>
<tr>
<td>H.E.</td>
<td></td>
<td>O</td>
<td>X</td>
</tr>
<tr>
<td>Giemsa</td>
<td></td>
<td>O</td>
<td>X</td>
</tr>
<tr>
<td>Azan</td>
<td></td>
<td>O</td>
<td>Δ*</td>
</tr>
<tr>
<td>M.G.</td>
<td></td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Papanicolaou</td>
<td>Δ*</td>
<td></td>
<td>Δ*</td>
</tr>
</tbody>
</table>

* : Not compatible  O : Fully compatible  Δ: Compatible depending on purpose
* * Optional accessory

Notes:

Δ1: Aniline blue becomes darker for collagen fibers, mucus, and vitrina, while azocarmine G and orange G become lighter for red blood cells, cytoplasm and nuclei.

Δ2: Since staining methods vary depending on the cell type, different filters should be used according to the situation.
The design of the product is under constant review and whilst every effort is made to keep this manual up to date, the right is reserved to change specifications and equipment at any time without prior notice.