

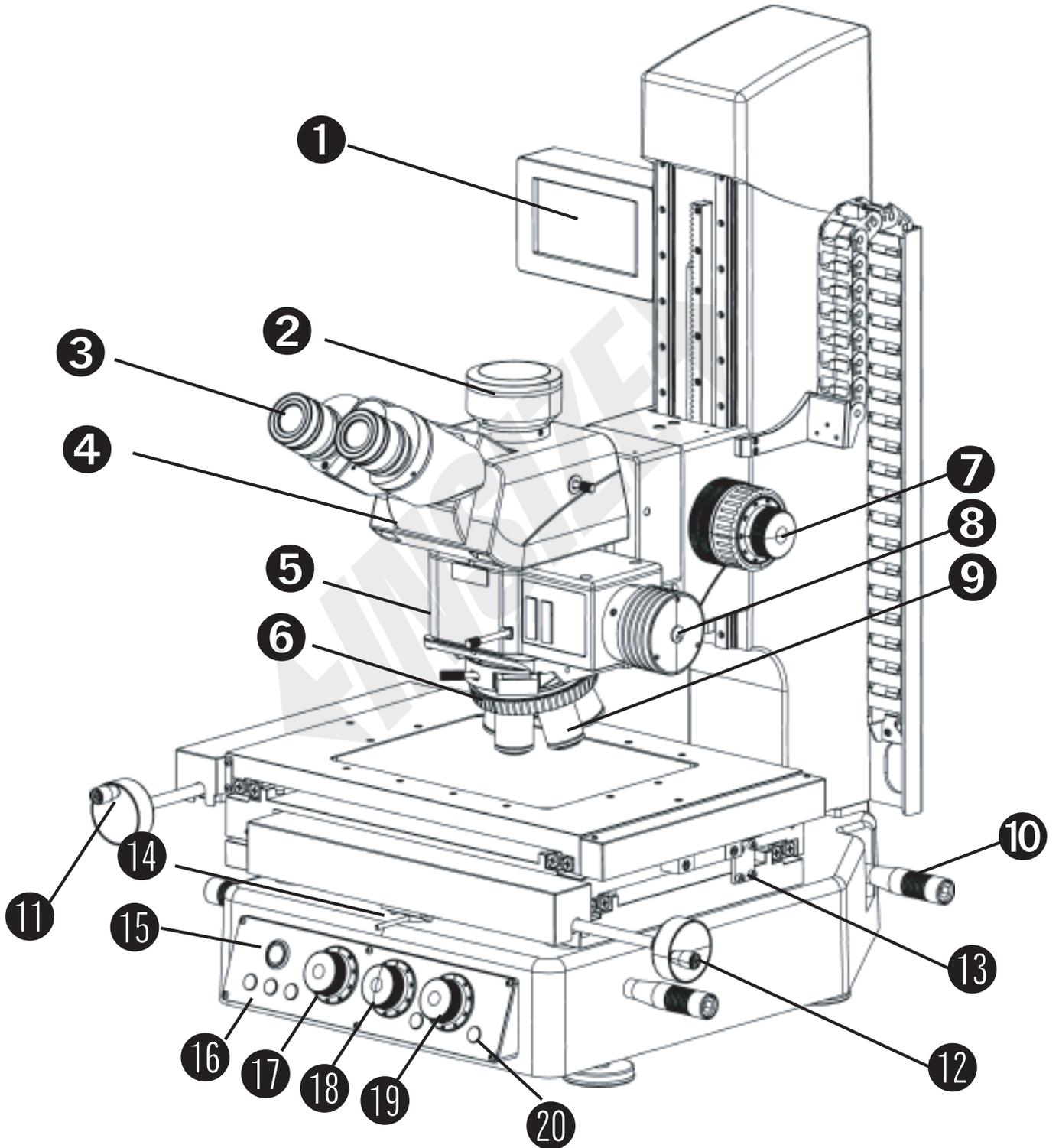
INSTRUCTION MANUAL

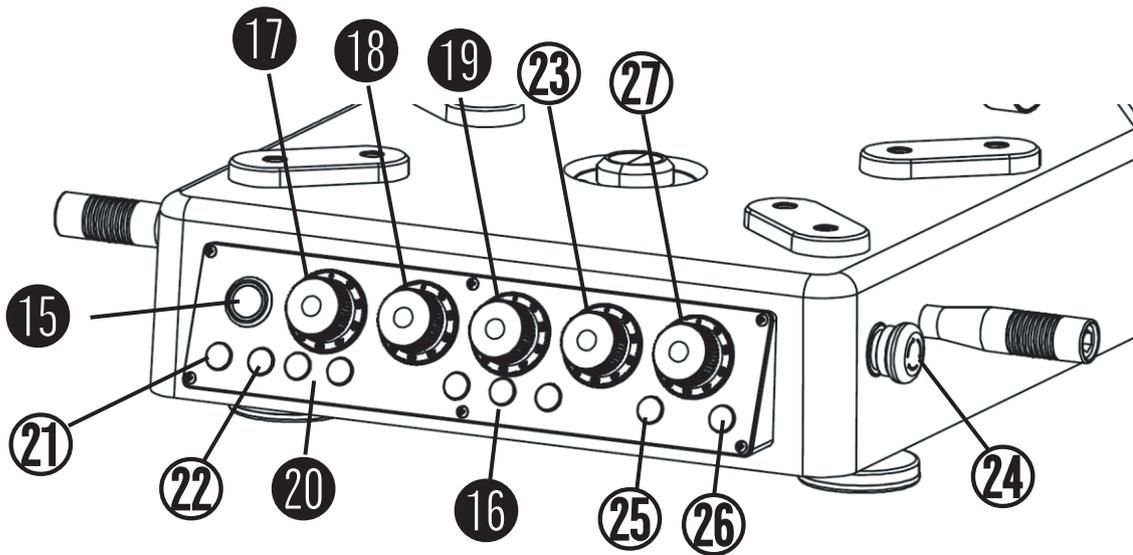
MEASURING MICROSCOPE

1、 Part names for each functional module

1.1 Functional module

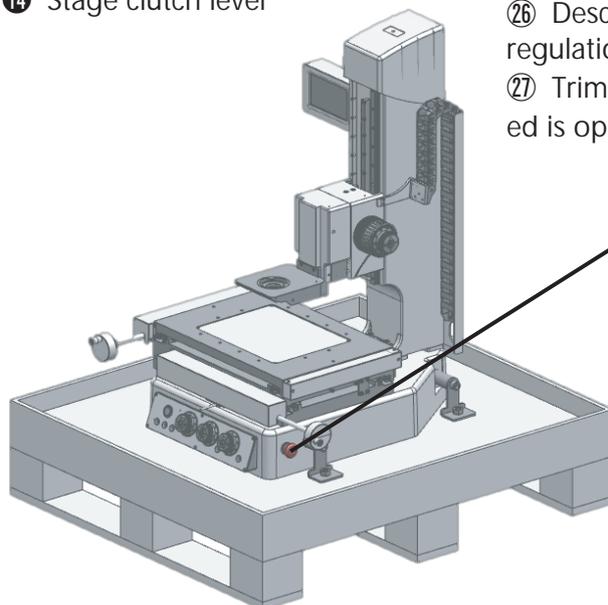
Product side view





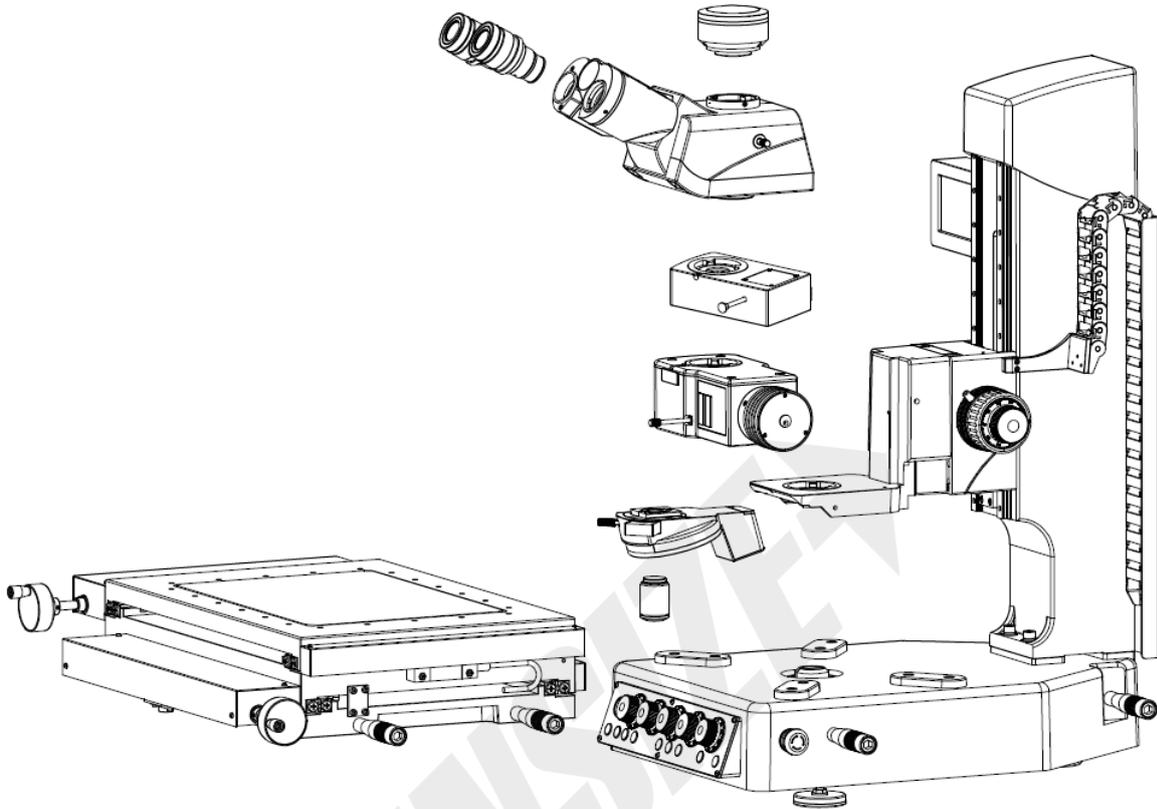
1.2 Function Module Name

- | | |
|----------------------------------|---|
| ① Readout display | ⑮ Main power button |
| ② Camera and Interface | ⑯ XYZ Data reset button |
| ③ Eyepiece | ⑰ Light dimming knob |
| ④ Three way observation tube | ⑱ Bottom light dimming knob |
| ⑤ Vertical illuminator | ⑲ Split image focus navigator dimming knob |
| ⑥ Objective wheel | ⑳ Manage LIM/SET button before light |
| ⑦ Manual focus knob | ㉑ Objective forward switching |
| ⑧ Reflective lighting box | ㉒ Objective reversal switch |
| ⑨ Objective lens | ㉓ Focus speed adjustment gear switch |
| ⑩ Handling handle | ㉔ Scram button |
| ⑪ X axis knob | ㉕ Accelerate quickly(Coarse regulation) |
| ⑫ Y axis knob | ㉖ Descend rapidly(Coarse regulation) |
| ⑬ Stage transport locking screws | ㉗ Trimming knob (Focus speed is optional) |
| ⑭ Stage clutch lever | |



Scram button

1.3. Sequence diagram of component assembly steps



- ① remove the packing
- ② Remove locking pin
- ③ Mounting handling handle
- ④ Install the stage
- ⑤ Install the objective wheel (If needed)
- ⑥ Mounting objective
- ⑦ Install vertical illuminator
- ⑧ Install split-image focus navigator (if any)
- ⑨ Install the triocular canister
- ⑩ Mounting eyepiece
- ⑪ Install the camera interface camera
- ⑫ Connect the XY ruler cable
- ⑬ Connect the illuminator cable
- ⑭ Connecting Camera cables
- ⑮ Connect the reading panel cable
- ⑯ Connect the objective turntable cable
- ⑰ Connecting PC Cables (If needed)
- ⑱ Connect the DV24V power supply plug
- ⑲ Remove stage X transport locking screws
- ⑳ Remove stage Y transport locking screws
- ㉑ Power on self test
- ㉒ "dee dee dee- dee dee-dee dee" indicates that the self-test passed
- ㉓ XY platform moves to center (Do not pinch your hands during movement)
- ㉔ XY clutch lever set to "working"
- ㉕ Open the imaging measurement software (Need to be preloaded)
- ㉖ Calibration objective
- ㉗ Initialize the parameters corresponding to the objective, export save
- ㉘ Start measuring

2、Preparation before use

Before using the device, you need to have a comprehensive understanding and confirmation of the name, function and running status of each part of the device. Please check the device item by item in the following order to ensure that the device is running in the best condition.

2.1 Turn on the power

Attention! : Before turning on the power, please confirm the following.

- 1、Verify that the connection cables and power cables of the power device are correctly connected.
- 2、Ensure that all cables at the rear of the fuselage are properly connected.
- 3、Check the emergency stop button, make sure it is in the spin path state, if the emergency stop button is in the open state (Be pressed), please reset it.

2.2 Reading display X/Y/Z

After being powered up, The fuselage will undergo a self-inspection process, at the same time, the buzzer will emit a "dee dee dee- dee dee-dee dee dee" self-check through the beep.

The XYZ reading screen starts to display data, the format is:

X:0.0000

Y:0.0000

Z:0.0000

If the data is not 0, manually reset the reset button.

2.3 Focusing device

2.3.1 Focusing operation

Take the right focusing device as an example, when turning the coarse focus knob or fine-tuning focus knob clockwise, objective lens away from sample; When turning the coarse focus knob or fine-tuning focus knob counterclockwise, the objective is close to the sample.

2.3.2 Adjust coarse focus knob tension

Take the right focusing device as an example, The coarse focus knob tension is adjustable. Turn the tension adjusting ring counterclockwise to reduce the knob tension, Turning clockwise increases the tension. If the focusing device slips under its own weight, Or use the fine focus knob to focus quickly out of focus, The tension setting is too low. In this case, To increase the tension, turn the coarse focus knob tension adjusting ring in a clockwise direction.

2.3.3 Speed selection knob and fast up and fast down button

Switch this knob by rotating it, Five different speed focusing operations can be achieved, The first gear is the slowest, Fifth gear fastest

When you press the fast up or fast down button, The objective lens will move quickly to focus, On approach, It is recommended to lower the speed control gear, Or use the fine-tuning knob and manual fine-tuning for focusing operations, Prevent the objective from hitting the sample. Height measurement is required, Please take the measurement reading after the reset operation after each operation of the manual focus knob, To ensure a high degree of data authenticity.

2.3.4 Electric trimming button

By turning this knob, Low speed accurate focusing operation is possible, The speed has a preset relationship with the magnification (hole position) of the objective, among, The 5x hole is the fastest, 100 times the hole speed is the slowest.

2.4. Lighting installation

There are three independent dimming knobs on the operating panel, The upper light source, the bottom light source and the split image focus navigator light source can be controlled respectively.

Press the knob, The light source can be turned on and off.

Rotary knob, Brightness can be increased clockwise, Counterclockwise dimming.

Use the light intensity management function: long search the LIM key for two seconds to enter the set state, rotate the dimming knob to the appropriate brightness value, and search the SET key to save the corresponding brightness of the current objective lens. After ij search key switch objective (electric version) or manually rotate the switch objective (manual version), continue to rotate the knob to the appropriate brightness value, search SET key to save the brightness value corresponding to the current objective, until the high objective brightness value is set, short search LIM key can save the exit setting mode. Search the L I M and SET keys for two seconds to empty the Settings and restore the factory Settings.

2.5. Viewing device

Distance adjustment: Look directly at the eyepiece sleeve, hold the eyepiece barrel with both hands, and move the distance up and down so that the field of vision of the two eyes coincide.

Diopter adjustment: First set the eyepiece diopter to 0 "scale, operate the focusing knob, first make the field of view of one eye to the clearest state, and then rotate the diopter adjustment ring of the eyepiece of the other eye, so that the image in the field of view is also adjusted to the clearest state

Use an eye mask: When the indoor light is strong, you can fold the rubber edge of the eyepiece eye mask 180 degrees to stand up, and use the eye mask to block some light directly into the eyepiece.

Switch optical path: Pull the optical splitter rod on the right side of the observation tube to select optical path chapters. Fully push in means 100% light for human eye observation, and fully pull out means 100% light enters the camera for video observation.

When using an upright viewing tube with adjustable tilt Angle, the viewing tube can be bent up and down to adjust the height of the eyepiece according to the sitting position and the height of the table top to suit the observer.

2.6. Vertical illuminator

Switch between bright field and dark field:

Open field observation can be performed when the switch rod is at its shortest (fully pushed in).

Dark field observation can be performed when the switch rod is at its longest (fully pulled out state).

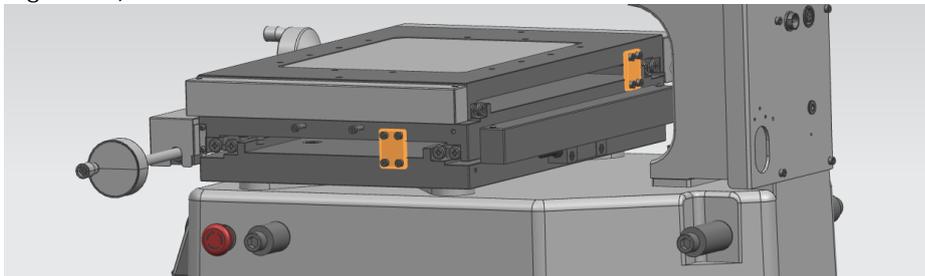
Use polarized light to observe:

Insert the polarizing mirror into the slot near the light box (vertical slot)

Insert the 360-degree rotatable polarizing mirror into the slot (horizontal slot) at the bottom of the three-eye viewing cylinder.

2.7. objective table

Before using the stage for the first time, please ensure that all XY transport locking screws are removed (total of 8 screws and 2 gaskets).



When the operating clutch lever is set to the "M unlock" state, push the stage to the center position, and then set it to the "M working" state, and shake the XY knob to achieve movement and measurement.

Attention! : Do not operate the clutch control lever while the stage is moving. Otherwise, accuracy may be reduced or equipment may be damaged.

Attention! : Do not touch any real part other than the stage knobs X uranium or Y uranium knobs.

Attention! : After use, reset the stage to the center position, lock the clutch, and do not place heavy objects on the stage.

3、 Observation and image measurement

3.1 Observation - Bright Field(BF)

Setting the selection lever of the vertical illuminator to the shortest state of the pull lever can be used to observe the reflected light in the bright field.

3.2 Observation - Dark field(DF)

The selection lever of the vertical illuminator is set to (longest pull lever) for dark field reflection light observation.

3.3 Observation - Differential interference(DIC)

When observing differential interference, the following accessories are required:

*polarizer

*analyzer

*Differential interference prism

Installation and usage are as follows: See 【2.6】

Insert the polarizing mirror into the slot near the light box (vertical slot), with the model sign facing towards the pull rod. Insert the 360-degree rotatable polarizing mirror into the slot (horizontal slot) below the triocular viewing cylinder, with the model mark facing upward.

Insert DIC into the DIC slot of the objective turntable and lock the fixing screws.

A sample with high reflectivity, such as a mirror, is placed on the stage and roughly focused. While looking through the eyepiece, rotate the deflector dial to find the darkest part of the field of view.

When the white dot on the turntable is turned outside, the approximate orthogonal position is obtained. Carefully turn the dial around this point to find the darkest spot in the field of view.转动

The DIC prism is rotated to move the adjusting lever, and the background interference color continues to change from gray sensitive color to magenta sensitive color (from -100 to 600nm). According to the sample, the interference color is set to the optimal contrast.

⊙ Due to the high sensitivity of the gray sensitive color, the gray background color is selected for high-contrast 3D observation.

⊙ When the magenta background color is selected, very small phase transitions can be observed

Attention!

Replace the polarizer after about 2000 hours of continuous use. Due to prolonged exposure to light, the performance of the polarizing mirror will be reduced.

For transmitted light observation, move the polarizer out of the light path first. Otherwise, glare may appear in the field of view.

3.4 Observation-Simple polarized light(POL)

When observing simple polarized light, the following accessories are required:

*polarizer

* analyzer

Installation and usage are as follows: See 【2.6】

Insert the polarizing mirror into the slot near the light box (vertical slot), with the model sign facing towards the pull rod. Insert the 360° rotatable polarizing mirror into the slot (horizontal slot) below the triocular viewing cylinder, with the model mark facing upward

Attention! :

Replace the polarizer after about 2000 hours of continuous use. Due to prolonged exposure to light, the performance of the polarizing mirror will be reduced.

For transmitted light observation, move the polarizer out of the light path first. Otherwise, glare may appear in the field of view.

3.5 Observation - Selection of light source(R/T)

Transmitted light illumination: allows silhouette observation of the sample's contours.

Reflected light illumination: allows observation of the sample surface, especially when using non-transparent samples.

Simultaneous use of transmitted and reflected light: contours and surfaces of the sample can be viewed simultaneously.

3.6 Focus

Accurate focusing on the microscope is the key to getting good accurate measurements and the reason why all errors occur. Please follow the steps below to implement focusing correctly

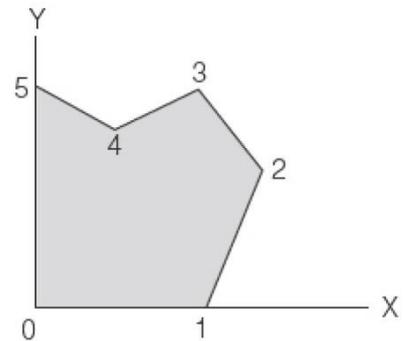
- 1、 Use the coarse focus knob or motorised focus button on the microscope focusing unit to move the reflector arm up and down to focus on the sample. Use the fine focus knob for more precise focusing.
- 2、 Use the coarse focus knob or motorised focus button on the microscope focusing unit to move the reflector arm up and down to focus on the sample. Use the fine focus knob for more precise focusing.
- 3、 Check for parallax to ensure that the above eye adjustment is in focus. Look straight into the eyepiece barrel and move your eye in all directions, forward/backward/left/right. Assuming that the crosshairs are fixed, if the image moves in the direction of eye movement, bring the objective lens closer to the sample. If the image moves in the opposite direction of the eye movement, lift the objective lens away from the sample.

3.7、 Measurement

3.7.1 Cartesian Coordinate Measurement

- 1、 Place the sample in the centre of the glass plate of the carrier table.
- 2、 Determine the origin, X-axis, and Y-axis of the sample and align the direction of travel of the stage with the axes. For example, to measure a thin plate, set a straight line for the X-axis and a straight line for the Y-axis, as shown in the figure to the right.

3、 Move the stage so that the sample is just below the objective lens and then focus the sample as outlined in Focusing on the previous page. Alternately rotate the sample (or manipulate the rotary stage) or move the sample to align a straight line with the horizontal crosshairs, and then align a straight line with the vertical crosshairs by moving the sample. If the sample tends to move with the carrier stage, use oiled clay, etc., to hold the sample in place. In this position, the origin 0 of the sample should be aligned with the intersection of the eyepiece crosshairs, and the counter coordinates should read X_0 and Y_0 . Now press the X Reset and Y Reset buttons.



4、 Next, move the stage to align the intersection of the crosshairs with points 1, 2 and 3 and read the values X_1' , Y_1' , X_2' , Y_2' The difference between these readings and the values X_0 and Y_0 represents the right-angle coordinates of the sample profile with respect to origin 0.

3.7.2 Height measurement

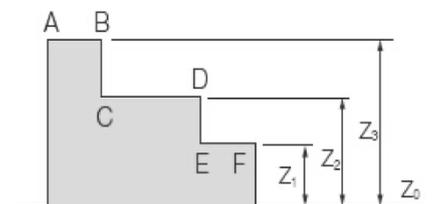
1、 Place the sample on the platform glass plate. If, in addition to the height measurement, you want to measure the rectangular coordinates, place the sample as outlined in subsection 2-2 above.

- 2、 Use 10× or higher magnification objective lens.
- 3、 Focus on Z_0 (on the surface of the glass plate of the carrier). Then search the Z zero button.

When focusing on the surface of the glass plate, be careful not to let the objective lens hit the sample or the glass plate of the carrier.

4、 Raise the reflected light illuminator arm using the micro/coarse focus knob on the focusing unit or the motorised focus button. Focus planes E-F and read the counter display. This reading is the value of Z_1' .

5、 Focus planes C-D, then focus A-B, please read Z_1' , Z_2' and Z_n' readings. The difference between these values and the Z_0 value indicates the height of the respective point.



3.7.3 Measuring cylinders round rods and screws

To measure cylinders, rods, or screws, place the item to be measured directly on the glass plate of the carrier or use an optional V-Bracket.

【Measure a cylinder, bar or screw】

1、 To take a measurement, align the axis of the measurement item with either direction of movement of the platform (usually the X-axis).

Take the length from the selected direction and the diameter from the reading in the other direction.

2、 When fixing the measurement item securely to the platform, place the item as close as possible to the centre of the platform so that the busbar is approximately parallel to the direction of travel of either platform, and then focus on this item.

3、 Rotate the measurement item (or turn the rotary carrier) and adjust the Y-axis knob to align the horizontal eyepiece crosshairs with the image of the busbar.

4、 Move the stage in a left-right direction until the busbar image is exactly parallel to the horizontal eyepiece crosshairs.

5、 Perform the same steps for the other bus.

6、 When the two contour lines are aligned with the horizontal crosshairs of the eyepiece, adjust the Y-axis knob and read the respective values. The difference between the two readings is the diameter.

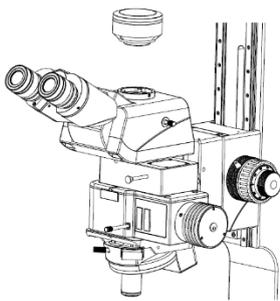
7、 To measure length, align the axis of the measurement item with the horizontal crosshairs of the eyepiece and adjust the X-axis knob.

【Measure a screw】

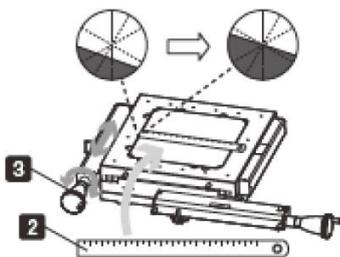
The outside diameter and slot diameter of a screw can be measured using the same procedure as above.

3.8、 Measurement with software

Before measuring with the software, the camera needs to be calibrated for horizontal orientation, as follows:

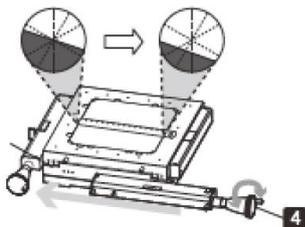


1、 Attach the digital camera to the camera connector with the logo side facing forward.



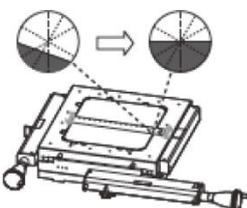
2、 Place the measurement object on the carrier table so that it is parallel to the X-axis.

3、 Use the right eye to look directly into the eyepiece with the crosshairs and move the carrier so that the left end of the measurement object comes into the field of view. Then adjust the Y-axis so that the edge of the measurement object comes to the centre of the crosshair.

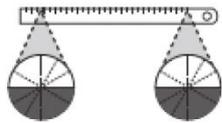


4、 Move the X-axis to the opposite end.

@ Since to some extent the carrier and the measurement object are not parallel to each other, the observed image is shifted as shown in the figure on the left!

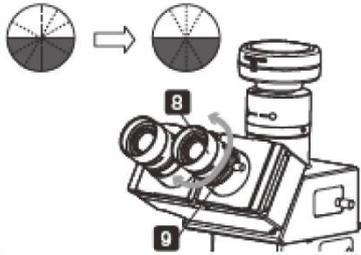


5、 Change the angle of the measurement object so that the edge of the measurement object comes to the centre of the crosshairs.



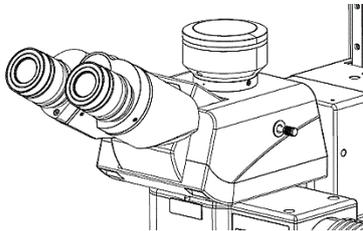
6. Move the X-axis to the right and left ends.

7. Repeat [3] to [6] until the edge of the measurement object is always in the centre of the crosshairs.

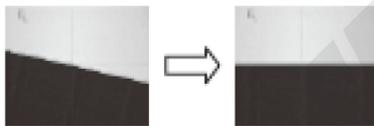


8. Rotate the eyepiece barrel along the edge of the objective lens

9. Fixed eyepieces with crosshairs



10. Toggle the light path selector knob to the pull-out position. 100% video/photo at light path.



11. While observing the live image on the display, rotate the camera so that the crosshairs match the edges.

12. Use a hexagonal screwdriver to tighten the fixing screws and secure the camera orientation.

4、 Cleaning, maintenance and servicing

4.1、 Cleaning

caution! : The surface of the lens should not be touched by hand, try blowing dust particles off its surface first with a blow-up balloon. Next, gently wipe the lens with a lint-free mirror paper wipe or a professional lens cleaning cloth, and use only approved lens cleaning solutions. Its surface can be disinfected by wiping it with 75% ethanol on a trial basis.

caution! : Do not open the device case.

4.2、 maintenance and servicing

(1) The instrument should be used and placed in a cool, dry, dust-free, shock-proof and free from acidic and alkaline vapours and any corrosive gases.

(2) Normal working conditions of the instrument: Room temperature: 0°C ~ 40°C Maximum relative humidity: 85%

(3) When the instrument is not working, it should be cut off the power supply, covered with dust-proof cover and placed in a dry and cool place.

(4) Regularly check the instruments.

(5) Discontinue use of the equipment due to maintenance or handling.

(6) Any parts may be inspected or supplied only by the manufacturer or his agent.