◀INSIZE▶

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**ISM-DL400
SMART MICROSCOPE
OPERATION MAUNAL**

◀INSIZE▶

Attention

◆ To avoid danger or damage incurred to the lens, do not touch the lens or sensor directly with your fingers.

◆ To avoid failure or electric shock hazard and so on, do not disassemble or modify the internal structure of the device.

◆ Do not plug in or unplug the anything port when hands are wet.

◆ If the lens or sensor is dirty or damp, you should better use dry and non-linen fabric or professional lens tissue to wipe them. To avoid scratches on the surface, do not touch the lens with your fingers. Wipe the lens or sensor lightly.

◆ The products are not specifically designed for an outdoor use. Do not expose it to outdoor environment without any protection. Excessive temperature and humidity will damage the lens. Please avoid using the product under the following environment: high temperature or high humidity environment, places with direct sunlight, dirt or vibration and places near heat source.

◆ Please use and store in the following environment:
Operating temperature ：0°C~ 40°C
Storage temperature：-20°C~ 60°C
Operating Humidity：30~80%RH
Storage Humidity：10~60%RH

◆ If any foreign matter, water or liquid enter into the device by accident, disconnect the power cable immediately. Please send it to the maintenance center and do not use the hair dryer to dry it by yourself.

◆ To avoid electric shock by accident, please power off microscope before you move your computer or laptop.

◆ The cleanliness of the device lens will directly affect clarity degree of contents from the computer screen during preview. Problems like various circles or spots on the screen may mostly be incurred by dirt on the lens. When cleaning, please use professional lens tissue or other professional detergent to clear the dirt on the lens.

◆ The sensor switch is not sensitive to black objects. Do not use black objects to trigger detection.

Structure

1 Name：
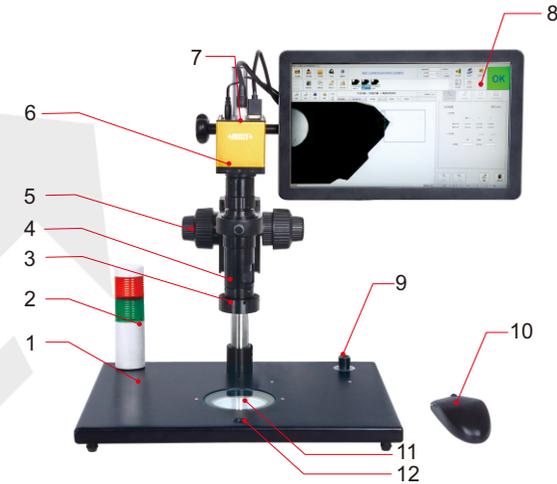
1.Stand;
2. Alarm light；
3. LED illumination
4. Zoom lens: 0.75X- 5X;
5. Focus hand wheel；
6. Camera:CMOS sensor, Pixel 2M
7. IO port；
8. High-definition screen: 13.3"LCD;
9. Contour illumination brightness adjustment;
10.Mouse；
11. Contour illumination;
12. Sensor switch.

❷ Camera：

power — DC 12V

HDMI port — HDMI OUT

USB port — USB

IO port — I/O

Camera Top

◆ The microscope has the function of taking pictures, The workpiece that is used for observation can be captured in real time. Pictures will be saved in the USB flash disk. You can reading the USB flash disk by computer.

◆ Camera can transmit the video signal for screen by the HDMI port and HDMI cable. The display is in real time.

◆ Microscope can be connected the controller by mouse.

◆ Power port connecting a power adapter.

❸ Software：
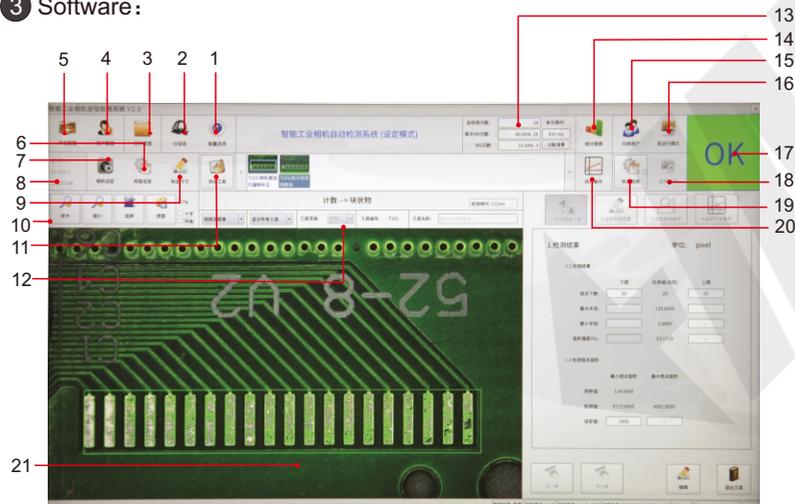
1. Configuration : including system upgrades, network settings, data backup, language settings, basic information settings, and more.

2. I0 setting: Set the relevant parameters of the signal output.

3. File management: Manage system files, copy and delete files.

4. User Management: Manage system user related information and password settings.

5. Product Management: New, open, and save product settings.

6. Motherboard settings: Standard product registration.

7. Camera settings: Set camera parameters such as exposure time, white balance, brightness, color, wide dynamics and other parameters.

8. Camera selection: The system supports multiple cameras, select the current operation

9. Calibration Size: Set the proportional relationship under the current lens magnification.

10. Image zooming: zoom in or out of an image.

11. Add tool: Add a new detection tool.

12. Display mode: Displays the current check information.

13. Statistics: Count the number of good and bad products since the last time the data was cleared.

14. User management: User rights can be managed.

15. Statistical Report: Statistical results can be viewed and exported to EXCEL file.

16. Operation mode switching: divided into running mode and setting mode.

17. Test results: show that OK/NG display of test results

18. Continuous detection: Automatically and continuously detect the product.

19. Execute the test: Each time you press the test.

20. Execution conditions: Set the detection conditions for each inspection tool.

21. Image display area: The current product image display area.

Operation

1 Adjust camera parameters：

1. Video frame rate, the frame rate has 50 frames/sec and 60 frames/sec, adjust the frame rate to meet the needs of different displays.
2. AE is the automatic exposure adjustment. Click the camera to adjust to the optimal value according to the current brightness value. If you need manual adjustment, you can choose the appropriate exposure value, the value is in milliseconds. Under normal circumstances, set to 2-20ms can meet the requirements.
3. AWB is an automatic white balance button. A white paper or other white object can be placed under the current lens. Clicking this button will automatically adjust the color to the appropriate color value. If there is a value, the brightness of the light source can be changed or an object can be placed. The color of the RGB channel can be adjusted as needed to change the color of the image to obtain a color balance suitable for highlighting features.
4. Image optimization can change the quality of image effects.
   Contrast: The value is small and the image is softer. When the value is larger, the image is black and white, and the visual effect is clear.
   HDR (Wide Dynamic): Suppresses glare and boosts the brightness of darker parts. SE (sharpening): Enhances edge shading to make image features more visible. But if it is too large, it will introduce a lot of noise.
5. Gain adjustment: used to adjust the overall color amplitude of the image and enhance the brightness of the image. It can be saved after the settings are completed. If you do not wish to adjust these parameter values at will, press the lock button.

2 Calibration：
The calibration is a way to pre-calibrate the magnification of the current lens when the measurement tool operation is required. The specific operation is as follows：

1. Place the calibration plate under the lens to adjust the focal length and magnification until you are satisfied.
2. Click the "Re-screen" button, the system will capture and freeze the currently adjusted image in the image display area.
3. The user can select the "automatic circle finding" tool to select the circular object in the calibration plate. First, draw a green circle by selecting 3 points inside the circle (black part), then drag the mouse out of the circle to draw a second green circle. The system will automatically find the outer edge of the black standard garden according to the two green circles. ;
   note:If the outer edge part of the black standard garden is not found correctly, you can select the current selection method by selecting ①. from inside to outside ②. from outside to inside ③. from light to dark ④. From dark to bright.
   For example: the standard garden is a black circle, then if you choose to go from outside to inside, then the corresponding choice should also be from light to dark. Because the direction is from the outside to the inside, we can see that the outside of the standard garden is a bright area and the inside is a darker black area.

4. If the outer edge of the standard circle can be found correctly, if the match is correct, then we can drill the current lens magnification into the calibration name. Then enter the standard size (input diameter) of the circle and the calculated value will appear in the calibration result. Press the "Save to List" to save the lens calibration value.
5. "Binding the motherboard" can save the calibration lens and the detection motherboard.
   Note: Be sure to save the motherboard, otherwise the test results will be wrong. This step can be repeated if there is an error in the test result. When the motherboard is bound, the current motherboard and calibration factor will appear in the "Settings".

3 Position offset correction：

When detecting the product object, after the workpiece of the inspection object is misaligned, the position of the workpiece can be corrected by the "position offset correction" tool, and the movement of the workpiece can be tracked by the correction processing. This feature is to automatically find the product for positioning. Note: There are several elements that need to be found in the product to locate the feature area: 1) uniqueness, 2) directionality, 3) clear outline and no extraneous features. This category can be set in three ways:

A. Contour positioning: Positioning by identifying the outline of the product. After selecting the image area, two boxes will appear. The white dotted frame inside is the feature selection box. You can select the desired target by dragging the frame or adjusting the size of the frame. Do not make this box too large or it will reduce the efficiency of the system. The second blue box is the search range box, which means that a certain range needs to be set for finding the target. The purpose is also to improve the efficiency of the system operation. The smaller the range, the faster the system will execute. Set the search object mask type ----- You can mask the unwanted search objects as needed to improve the accuracy and anti-interference of the search object. There are 4 types of choices.

Set the detection conditions:

(1). Select "Pre-process"

(2). Tilt angle----Set the ± angle range when the search object is tilted. The smaller the range of angles, the shorter the processing time. Limiting the angle at which the product is placed is also to improve operational efficiency.

(3). Edge Sensitivity---Remove some edges that are not needed (we try to find products as much as possible) Edge contours do not reflect certain features that are not required or unique to the motherboard, which can result in inaccurate product positioning or lack of positioning.

(4). Search accuracy

(5). The minimum similarity value is the degree of similarity between the target and other products. If the degree of similarity is too high, the matching will be difficult. If the degree of similarity is too low, the matching accuracy will be inaccurate, and the final design can be tested through a certain number of products. Set the appropriate similarity value.

B. Position and Angle of the Line: The tool locates the product by specifying the angle between the two lines.

(1). After selecting the tool, first set the first line, with options such as straight rectangle, rectangle, and rotation rectangle.

(2). After selecting the line search tool, use the mouse to drag out a rectangular frame in the target area. Note that a green direction arrow appears in the center of the frame. The direction of the arrow is the direction of the system detection line segment, which can be corresponding according to the detection direction. The corresponding relationship between line direction and light and dark, the system will automatically draw a blue line on the line segment, if not correctly found can be achieved by adjusting the "edge sensitivity".

(3). The second line segment is carried out as described above. After setting both lines, you can exit the settings.

C. Center: The tool determines the orientation by calculating the center of the circle.

(1). Find the edge of the first circle through the ring

(2). Set the second circle, the system will automatically connect the centers of the two circles.

Note: Using two circles to determine the orientation of the product is more rigorous and cannot exceed the range of the circle drawn.

④ Smudge：

Check if the product is flawed or damaged

(1). First select the position offset tool: If the position offset tool has been set before, you can make a selection association here.

(2). Set the search range: You can use a rectangular frame to select a target, that is, the outline of the product to be judged. Use the mouse to drag the size and position of the inner frame, the green frame is the rubbing target frame, and the blue frame is the search range box. .

(3). Set detection conditions: edge correlation value, setting parameters, filtering area, binarized mask.

(4). Setting determination condition: detecting the upper and lower limits of the total area, and the number of upper and lower limits of the number of blocks.
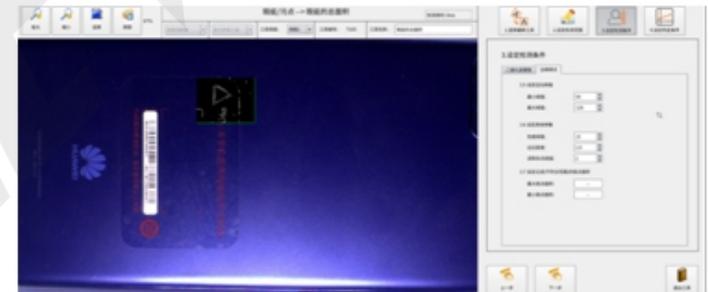
⑤ Measurement：

(1). Point to point measurement: measuring the distance between the point and the point

(2). Distance between point and line: measuring the distance from the point to the line

(3). Distance between two lines: position detection between lines

(4). Distance between point and circle: the distance from point to point on the circle

(5). Distance from the line to the point on the circle: measure the distance between the line and the point where the circle is taken.

(6). Measure the distance between the circle and the circle

(7). Detect straight lines from the edge of the contour

(8). Straight line after two points

(9). The center line of the two lines

(10). The angle between the two lines

⑥ Count tool：

Block count, mainly used to automatically calculate the number of specific smaller products, suitable for the shape of the product is not much different, the same style. Objects can be placed at will, but do not stick and overlap each other.
In the first step, add the block count tool.
In the second step, the detection range is set, and the whole screen is detected under normal conditions. But the larger the range of choice, the longer it will be.
In the third step, the detection conditions are set, the binarization pre-processing values are adjusted, and the detected object and the background can be clearly distinguished, and some other pre-processing functions can be added to meet the processing requirements.
In the fourth step, the determination condition is set, and a range is set according to the size of the detected object, and the number that meets the range is calculated.

⑦ Sorting：

Use color features to sort objects. This function applies online sorting, product color identification sorting, and so on. According to the pre-set order rules, the system will display OK if it is met, or NG if it does not.
Step 1: Add a color sorting tool.
Step 2: set the scope of the search, generally choose a rectangle. Four masked areas can be set.
Step 3: color extraction, the system can extract multiple colors, first select the color range, the default is 4, which means you can extract 4 different colors. In general, a color can be selected to meet the needs. Click [Add] to add a color, then click [Color Extract] to extract the color to be selected on the screen until the desired color is changed to green. If the color extraction is not satisfactory, you can click [Clear] to re-extract. After the extraction is completed, click [Extraction End] to proceed to the following steps.
Step 4: After the color extraction is completed, you can choose to do some necessary preprocessing. This item is generally not required.
Step 5: Auxiliary conditions that allow the customer to set the width of the line, the area to be inspected, and the degree of correlation with the color. The higher the color correlation, the higher the color matching, and the lower the color, the larger the range.
Step 6: Set the judgment judgment condition.

⑧ identification：

Usually used to identify QR codes and barcodes.
(1). First select the position offset tool: If the position offset tool has been set before, you can make a selection association here.
(2). To set the search range, you can use a rectangular frame to select a target, that is, the outline of the product to be judged. With the mouse, you can drag the size and position of the inner frame, the green frame is the target frame, and the blue frame is the search range box.
(3). Selection of bar code type, selection of the number of scan lines.
(4) Set the determination conditions, select the barcode to be detected, and the length of the barcode to be detected.

⑨ Execute detection and output settings：

After setting up various testing tools, we need to let the program run the detection tool to start testing. There are currently three ways to get started.
1 manual detection (execution detection)
2 continuous detection (continuous detection)
3 External trigger detection
These three detection methods can adapt to various needs depending on the environment and requirements.
1. Execution detection is performed every time the left mouse button (external trigger) is pressed, and an OK or NG prompt is given.
2. Continuous detection is to automatically perform the next detection after a delay of 500ms after each execution of the detection.
3. In the execution condition setting, the execution status of each tool can be changed separately. The purpose is to easily switch the detection content and use it in one detection setting.
Always execute: Make the tool always execute, simply check the NG/OK of a single tool
Never execute: Keeps the tool unexecuted and does not run the tool when it is detected.
Depends on other tools: Make the tool depend on the previous tool. The running status depends on the OK/NG of the previous tool. After the current tool NG, the tool is automatically checked.

Output setting: Usually we set, when the tool A&B&C…, at the same time OK, we choose PIN1 light green light, the active level is active high, the delay time is set according to your own needs; when the tool! A|! B|! C…, when there is an NG, we choose PIN2 red light, the active level is active high, the delay time is set according to your own needs; when the tool! A|! B|! C…, when there is an NG, the PIN3 alarm light will sound, the active level is active high, and the alarm time is set according to individual needs.

Mouse Function

1 CPI adjustment：

This mouse has five CPI adjustments of 800-1200-1600-2000-2400, and the default is 1200cpi when powered onIf you want to switch other speeds, press the CPI key (under the mouse pulley) to switch CPI. You can switch between the five gears until you like the speed. During the switching process, the LED indicator will flash once for 800cpi, twice for 1200cpi, three for 1600CPI, four for 2000cpi, and five for 2400cpi

2 Smart sleep and shutdown:

If you do not use the mouse within 8 minutes, the mouse will enter the intelligent sleep state, so as to save power. To restart the mouse, just press any key at will. If you shut down the instrument or unplug the receiver, just press a key or move the mouse at will, the mouse can enter the sleep shutdown state after 3 seconds. If you restart the mouse, you need to press any key.
Tip: take out the battery when you don't use the mouse for a long time, so as not to corrode the parts

Parameter

1 Specification

Measuring accuracy

Magnification	Measuring accuracy
15X	±8μm
30X	±6μm
50X	±6μm
80X	±4μm
100X	±4μm
>100X	±4μm

Magnification, focus distance and view field

Auxiliary objective	Specification	Camera adapter	
		0. 5X(included)	1X(optional)
0.3X(optional)	Magnification	5~34X	10~68X
	Focus distance	287±2mm	287±2mm
	View field	42×26~6.5×4.5mm	21×13~3.3×2.3mm
1X(included)	Magnification	15~100X	30~200X
	Focus distance	70±2mm	70±2mm
	View field	16×11~2.5×1.6mm	7.8×5.3~1.2×0.8mm
2X(optional)	Magnification	30~200X	60~400X
	Focus distance	29±2mm	29±2mm
	View field	7.8×5.3~1.2×0.8mm	3.8×2.7~0.6×0.4mm

2 Standard delivery：

Main unit	1pc
0. 5X camera adapter	1pc
1X auxiliary objective	1pc
Calibration plate	1pc
16G USB flash disk	1pc
White/black plate	1pc
Mouse	1pc
HDMI cable	1pc
Power adapter	3pc