

WKFI-MAX Series
Fiber End-Face Interferometer
Single-Core Connector Measurement Manual



V251209

This page reserved for binding purposes.

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Please carefully read the following license agreement and declarations before using the instrument. The instrument described in this manual may only be used upon agreement to the following terms.

License Agreement

Any information provided by the company in this manual does not constitute a corresponding authorization for such information.

Any information provided by our company in this manual does not constitute authorization for its use. While our company strives to ensure the accuracy and applicability of the information contained in this manual, we assume no liability for its use, nor any consequential liability. Our company reserves the right to modify all or part of the content of this manual without prior notice.

Important Declarations

- (1) Read this manual carefully to gain a comprehensive understanding of the instrument before use. Pay close attention, as improper operation may damage the instrument.
- (2) Unauthorized modification of the instrument is prohibited. Our company assumes no responsibility for any damage resulting from such modifications.
- (3) This manual is intended for use by the personnel actually operating the instrument. After reading, store it in a place easily accessible to the user.
- (4) Unauthorized reproduction of part or all of this manual is prohibited.
- (5) Modifications to the content stated in this manual due to instrument improvements will be made without separate notice.
- (6) For information on instrument updates, please visit our company website or contact our business representative directly.

Safety instructions

This instrument is designed for stable and reliable performance within its specified operating range. However, avoid improper manual use to prevent unnecessary damage. Observe the following precautions during use.

- (1) The instrument must use the factory-standard power adapter: Input AC100-240V, Output DC24V/1.67A.
- (2) The work platform must be level and vibration-free.
- (3) Recommended environment: Cleanroom grade no less than Class 300,000, temperature range 16-26°C, humidity range 30-60%.
- (4) In case of any unexpected incident during use, immediately disconnect the instrument's power supply.

1. Overview

This instrument is a high-precision, non-contact fiber end face interferometer. Based on the principle of interference, it reconstructs the three-dimensional topography of fiber end faces and calculates various parameters. It is used to measure the end-face performance of common fiber connectors such as SC, FC, and LC. As a key device for ensuring the transmission efficiency of fiber connections, it is widely used in the field of fiber optic communication manufacturing.

The instrument employs a high-power LED light source, enabling quick acquisition of interference images. Standard configurations include 2.5mm and 1.25mm fixtures, as well as dedicated keying adapters for APC connectors (FC/APC, SC/APC, LC/APC).

The measurement software features an intuitive interface and is easy to use. Calibration is performed using the simple "6-point rotation method." Upon completion, the software automatically analyzes hardware deviations. For manual models, users only need to adjust the X/Y-axis angles of the reference mirror according to the prompts. Automatic models require no manual intervention.

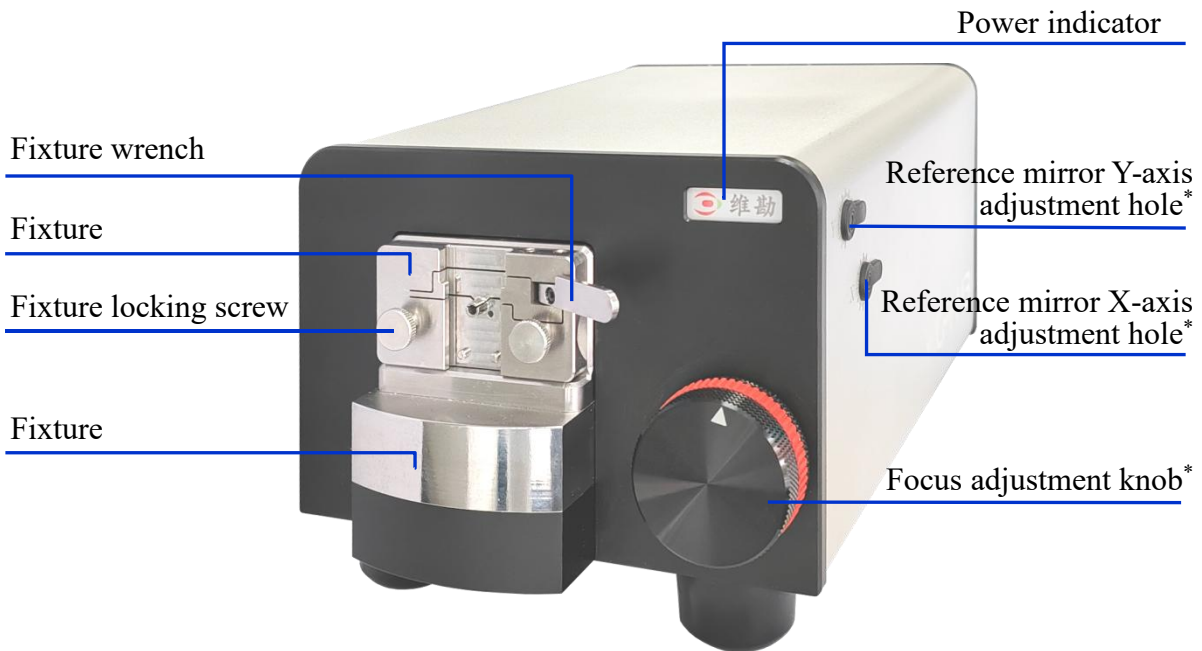
When switching from PC mode to APC mode, there is no need to replace the fixture or recalibrate the instrument. Simply insert the corresponding keying adapter, select and lock the appropriate APC measurement task, and the software will automatically rotate the fixture to the set angle.

After the user clicks the "Measure" button, the software automatically analyzes the data and presents the geometric topography of the end face as a three-dimensional color image.

This interferometer can quickly and accurately measure the radius of curvature, apex offset, and fiber height of fiber connector end faces, as well as the polishing angle and key error of APC connectors. The measurement results exhibit excellent repeatability and reproducibility.

2. Hardware Components

2.1. Front panel



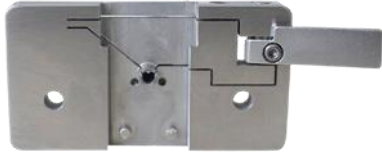
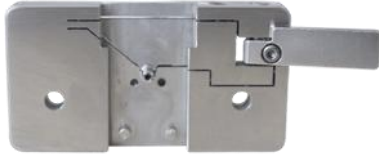
* The "AX" model instrument does not have this option(X=2,3,4,5)

* The "MX" model instrument has this option(X=1,2,3,4,5)



2.2. Rear panel



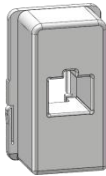
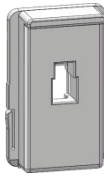

2.3. Fixture

	
2.5mm fixture Corresponding to SC, FC, etc.	1.25mm fixture Corresponding to LC, etc.
Used to clamp connectors. Keep dry, clean the clamping mouth and stopper regularly to ensure no dirt. You can spray a small amount of alcohol and use an air gun to blow it clean, but it is strictly prohibited to immerse it in any solution and use ultrasonic cleaning. After long-term use, the fixture may affect measurement accuracy or even become unusable due to wear and tear, and may need to be replaced if necessary. For other non-standard connectors, corresponding fixtures need to be customized.	

2.4. Calibration kit

	
2.5mm calibration kit Corresponding to 2.5mm fixture	1.25mm calibration kit Corresponding to 1.25mm fixture
Used for calibrating instruments. The instrument can only ensure measurement accuracy after calibration. The 3D parameters of the calibration piece may change after long-term use or storage, and generally do not affect calibration. However, the wear of the outer circle of the calibration piece insert or the dirt and scratches on the end face can seriously affect calibration. It is necessary to protect it and replace it if necessary.	

2.5. Keying adapter

		
SC/APC keying adapter	LC/APC keying adapter	FC/APC keying adapter
To assist in measuring APC connectors, the positioning piece must be installed on the fixture when the fixture platform of the instrument is in PC state, and then the fixture platform can be rotated by changing the measurement task. Due to the inconsistent specifications and dimensions of the materials, the standard positioning pieces may not be suitable for all customer materials and may require customization if necessary.		

2.6. SC/APC reference connector



Used for reference checking of the APC angle of the instrument, however, this component cannot be used to calibrate the instrument. After long-term use or storage, the angle of the component may change, making it impossible to reference. It is essential to protect it and replace it if necessary.

2.7. Fixture locking screw



Used to fix the fixture on the fixture platform. You can use ordinary M3*6 screws instead.

2.8. Hex wrench



2.0mm: Corresponding fixture locking screw
2.5mm: Used to adjust the X, Y axis angle of the reference mirror.

Note: The hardware shape and quantity at the time of actual delivery may be different from this manual. Please refer to the actual situation without prior notice.

3. Measurement Software

3.1. Software Installation Requirements

(1) Minimum Computer Hardware Configuration

CPU: Intel Core i3 (affects measurement speed; higher performance is recommended).

Memory: 16GB

USB: 1 USB 2.0 port

Display: Resolution 1920* 1080

(2) Recommended Computer Software Configuration

Operating system: Windows 10 or 11

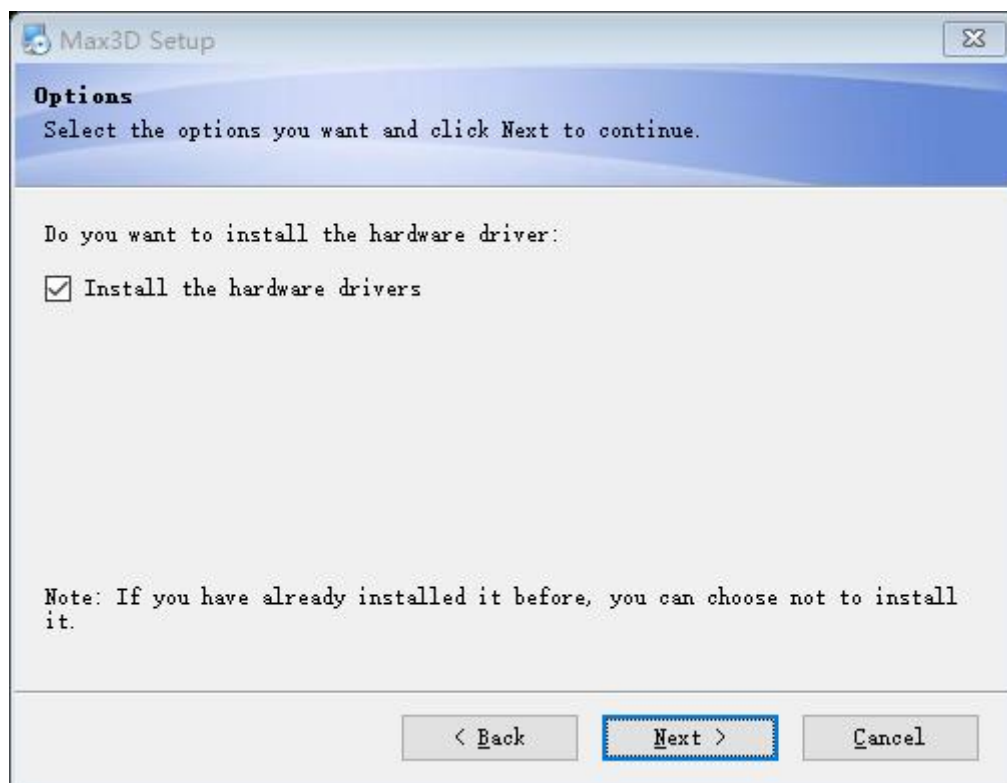
Recommended data/report tool: Windows Edge or equivalent browser (fast, OS included).

Optional data/report tool: EXCEL (slow, requires prior installation).

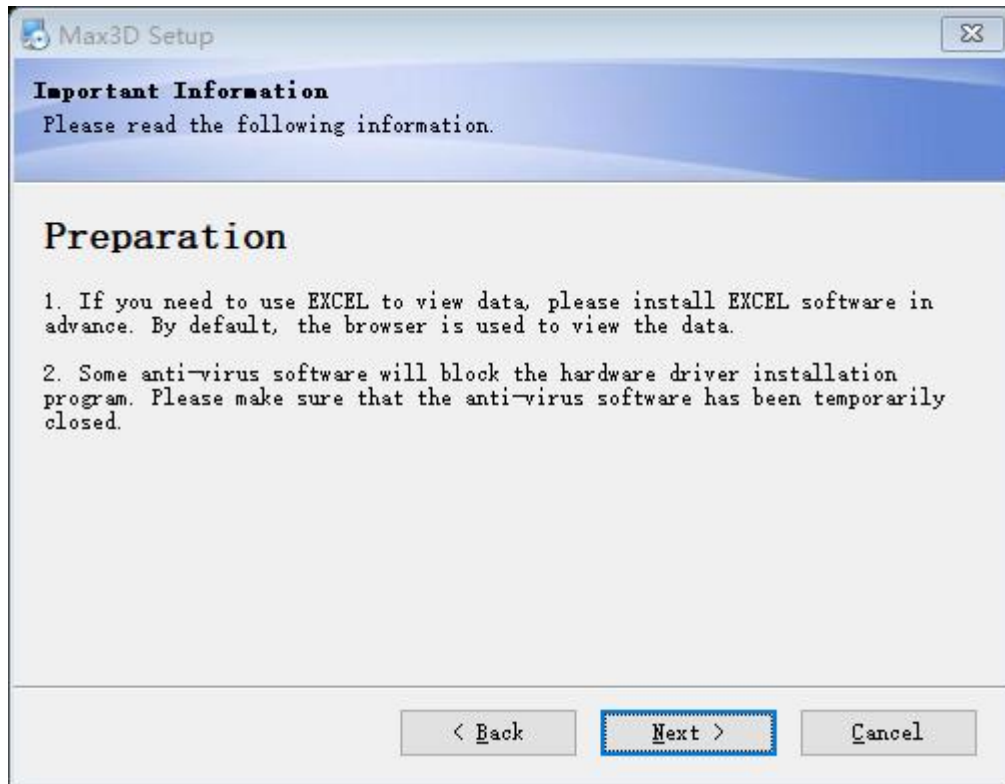
3.2. Software installation

Max3D is a special software for this instrument, installed as follows.

When installing for the first time, be sure to check "Install the hardware drivers". When reinstalling in the future, you can leave it unchecked.

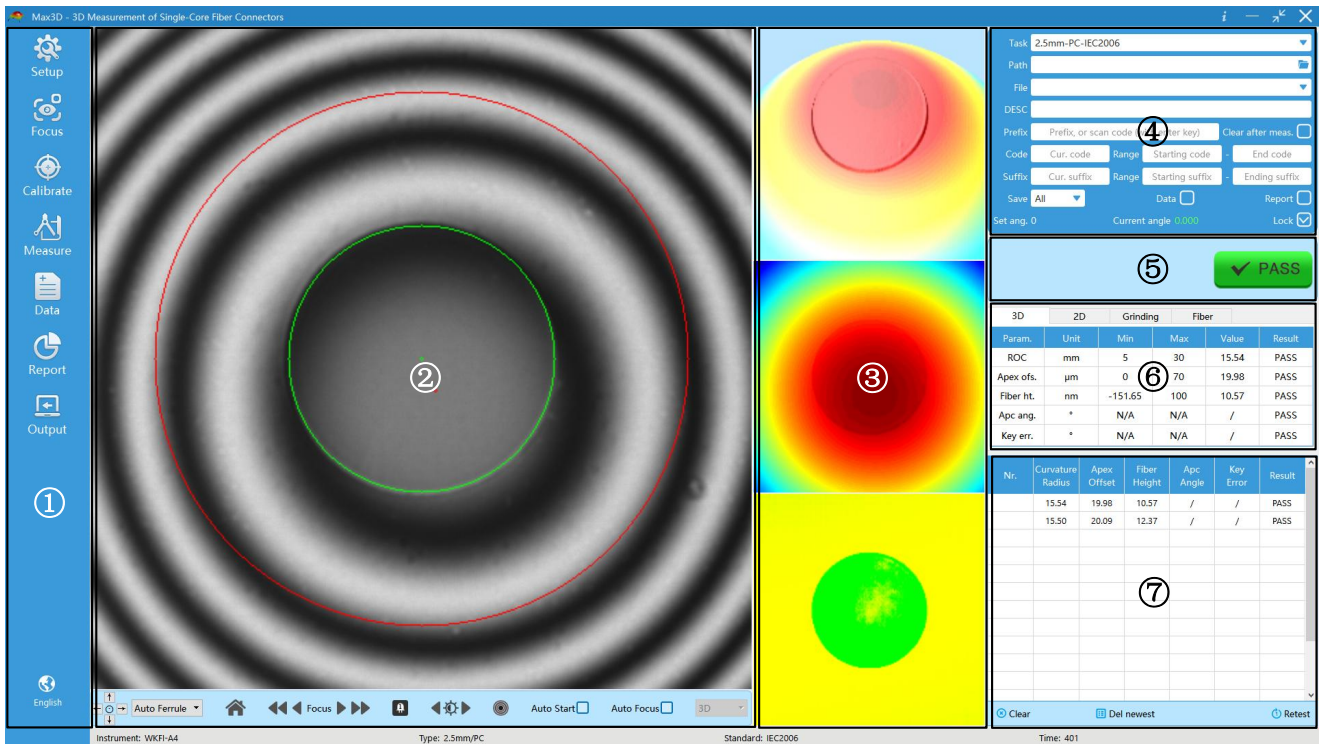


If "Install the hardware drivers" is checked, it is recommended to temporarily disable antivirus software. Re-enable it after software installation is complete. To use EXCEL for viewing data and reports, EXCEL must be installed beforehand. Due to slow data transfer with EXCEL, using HTML for data and report viewing is recommended.



3.3. Main interface

First, connect the instrument to the power supply and connect the USB 2.0 data cable, then double-click the computer desktop application software icon to enter the main interface of the measurement software, as shown in the figure.

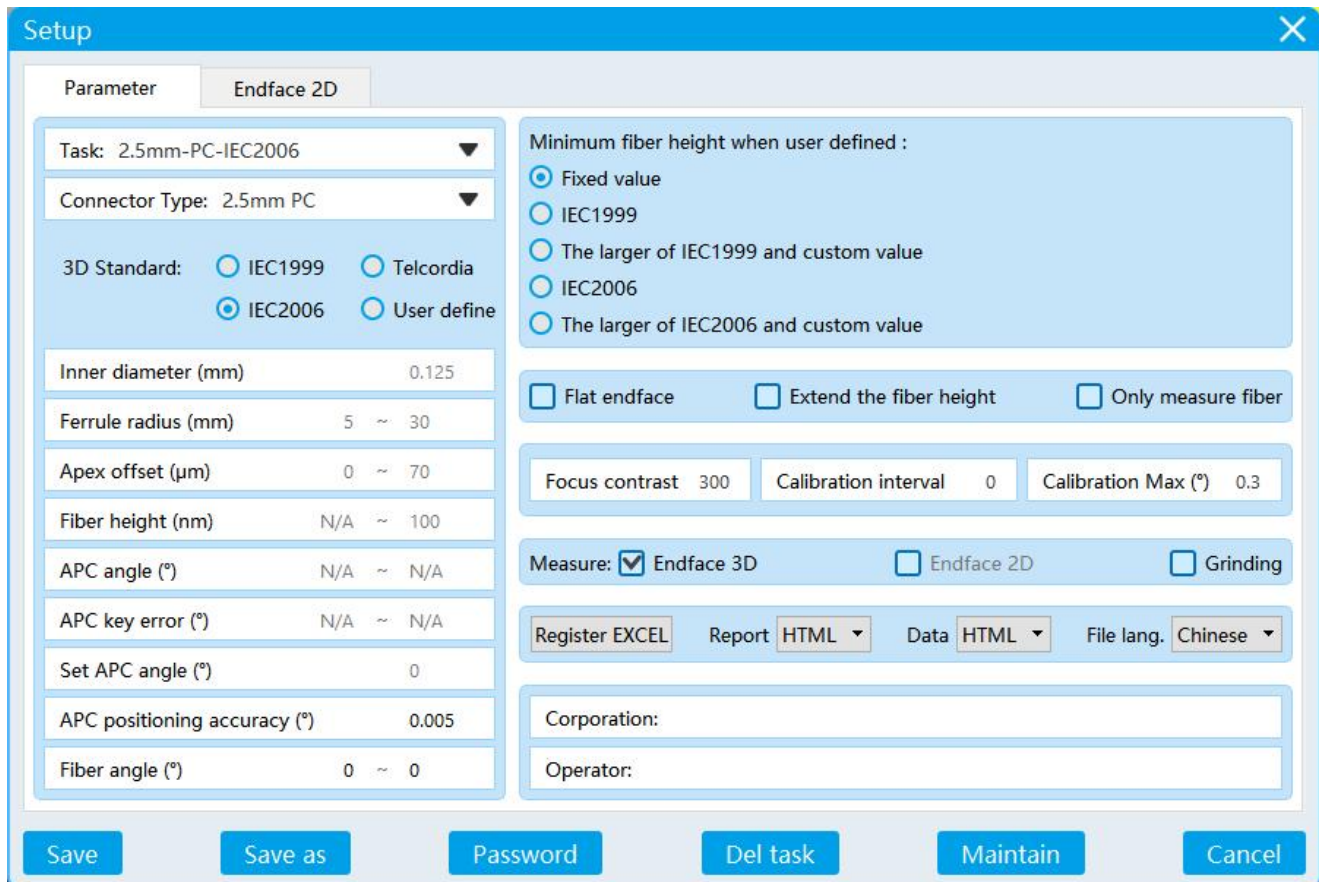


- ①Operation buttons ②Image display and adjustment ③3D image display ④Measurement task
 ⑤Measurement process and results ⑥Current measurement results ⑦History of measurement results

3.4. Operation Button

Setup

Click the "Setup" button on the main interface to pop up the following window.



Tasks:

The software includes four standard tasks:

1.25mm-APC-IEC2006, 1.25mm-PC-IEC2006, 2.5mm-APC-IEC2006, and 2.5mm-PC-IEC2006. Users can select the appropriate task based on the sample being measured. Parameters within standard tasks cannot be modified. However, a task can be saved as a new task, after which its parameters can be adjusted.

Connector Type:

Select PC or APC, and 2.5mm or 1.25mm, according to the type of sample being measured.

3D Standard:

Choose from IEC1999, IEC2006, Telcordia, or "Custom" as needed. In custom mode, the lower and upper limits of standard parameters can be modified according to actual requirements.

Fiber height lower limit:

The lower limit for fiber height is calculated based on other parameters, so it varies with each measurement unless a fixed value is selected in custom mode. In custom mode, this value can be set according to IEC standards or a stricter value between the two options.

APC angle:

When measuring non-standard APC connectors, the APC angle can be customized. For example, if the sample is a 5° APC connector, set this value to 5 and adjust the corresponding upper and lower limits for the APC angle.

Fiber angle:

When "Only measure fiber" is enabled, its angle range can be set.

Flat end face:

If the interference fringes on the end face are parallel rather than circular, this option must be selected.

Extend the fiber height:

This feature is available for instrument models M4, M5, A4, and A5. It allows measurement of fiber heights around 1000nm, as opposed to the conventional 160nm.

Focus contrast:

A higher value indicates stricter requirements for the clarity of interference rings. Focusing can achieve clearer interference rings, thereby improving measurement accuracy, though it may also increase the frequency of focusing.

Calibration interval:

After multiple measurements, slight changes may occur in the fixture or the reference mirror, which can degrade measurement accuracy. Calibration is recommended in such cases. For a new fixture, it is advised to calibrate the instrument every 500 measurements. As the fixture wears, the calibration interval should be shortened. If calibration becomes difficult or measurement accuracy significantly declines, inspect or replace the fixture.

Calibration max:

This refers to the precision of the rotation angle when calibrating the X-axis or Y-axis of the reference mirror. A smaller value yields higher measurement accuracy but may make calibration more challenging, potentially requiring multiple attempts. For MX series instruments, this is typically set to 5; for AX series instruments, it is generally set to 0.3.

Measurement contents:

All instrument models can select "Endface 3D" and "Grinding". Grinding parameters are supplementary and for reference only. For M5 and A5 models, selecting "Endface 2D" enables measurement of end face defects such as spots and scratches.

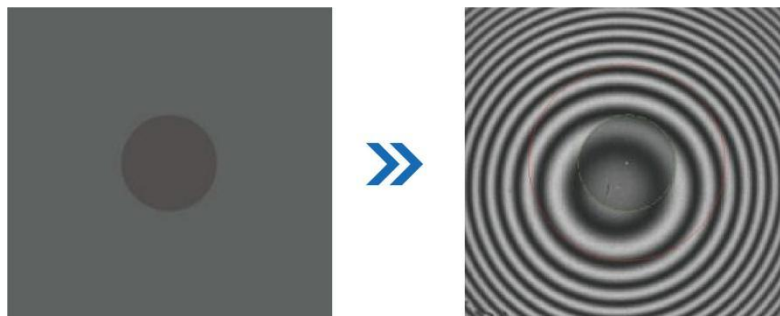
Data or report file format:

Files can be saved in HTML or EXCEL format. If using EXCEL, ensure it is installed beforehand. After measurement, files are saved according to the format specified in the settings. Use the Data or Report buttons on the main interface to view the files.

Focus

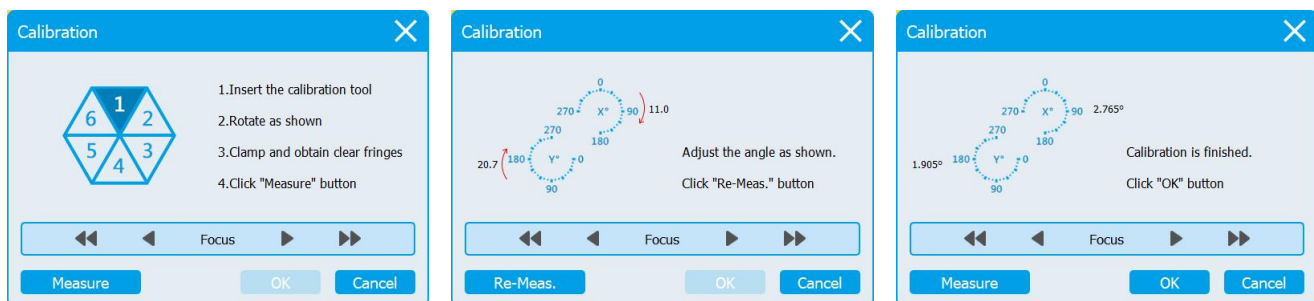
For AX series instruments, the focusing function is used to clarify the end-face image of the sample and bring interference fringes into view, as shown in the image below. If the "Auto Focus" option is enabled, the software will automatically initiate a focusing process during each measurement if no interference fringes appear. However, if the sample is positioned too far from the standard imaging point, auto-focus may fail. In such cases, use the manual focus button below the image to obtain interference fringes. If interference fringes cannot be obtained after repeated attempts, inspect the fixture or consider returning the instrument for service.

For MX series instruments, use the "Focus adjustment knob" located on the front panel of the instrument.



Calibration

Select the PC type measurement task, insert the calibration kit into the fixture, and tighten the fixture wrench. Click the "Calibrate" button, a calibration dialog box pops up, the user can rotate the calibration kit evenly 6 times, measure 6 times according to the software operation prompt, and adjust the X-axis or Y-axis angle of the reference mirror according to the value given by the software until calibration is qualified. For AX models, there is no need to adjust the angle of the reference mirror.



In order to ensure the accuracy of the calibration, the software will calibrate multiple times until the deviation is within a reasonable range. After the calibration is successful, the software will

automatically compensate the remaining angle error, so that the obtained measurement results are accurate.

Calibration considerations:

- (1) Ensure that the outer circle and end face of the ceramic plug of the calibration piece are clean, free of scratches, glue, and vibration in the surrounding environment.
- (2) Each time the calibration kit is rotated by about 60 degrees, a rotation angle that is too large or too small will cause the calibration to fail or bring a larger calibration error.
- (3) When measuring, ensure that the fixture wrench is locked and the interference fringes are clear. If the interference fringes are not clear, you can focus.
- (4) After calibration is completed, it is necessary to verify the reliability of the calibration results. Rotate and measure the calibration piece at any angle, observe the top deviation value of multiple measurement results, and ensure that the jumping is within the range required by the customer (not less than the reproducibility of the instrument). But the jumping will increase with the wear of the fixture or calibration part. At this point, a brand new fixture can be used to inspect the current calibration part or a brand new calibration part can be used to inspect the current fixture, and if necessary, replace worn parts.
- (5) After a certain number of consecutive measurements (such as 500 times), measure the apex offset of the calibration piece once or multiple times. If it exceeds the range required by the customer, proceed to step (4) above.

Measure

The buttons on the front panel, the enter key on the keyboard, and the space bar are equivalent to the measurement start button.

The software will automatically judge the measured data values and the set error range. If the measured sample is qualified, a green "PASS" icon will appear. If the measured sample is unqualified, a red "FAIL" icon will appear with an audio prompt.

Report, Data


Select "Report" in the measurement task area in advance, and after measurement, you can view the measurement report corresponding to the current connector. Select "Data" in advance, and after measurement, you can view the measurement data corresponding to the current batch of connectors.


Output

Connect the 3D measurement computer to the computer receiving the data (referred to as the server) via Ethernet. Configure the server with a static IP address and port. Configure the 3D measurement computer with either a static or dynamic IP address, ensuring it is on the same network segment as the server.

Click the "Data Transmission" button in the 3D measurement software and enter the server's IP address and port, as shown in the figure below. The connection to the server can be established

automatically or manually. Once connected, data will be actively transmitted to the server after each measurement. The content and order of the data are consistent with the local data generated by the 3D measurement software. The data is comma-separated, and a "/" or "N/A" between commas indicates no data for that field. In the figure below, 127.0.0.1 and 8000 are examples only; please use the actual values during operation. The server side can be tested using network tools such as PortHelper.

 Use the drop-down box to switch the display language.

 Software information

3.5. Image display and adjustment



Image fine-tuning button

After the first use or replacement of the fixture, lock the fixture. If the green fiber core collar does not coincide with the actual fiber core, as shown in Figure 1, the position of the fiber core will be automatically captured during measurement, as shown in Figure 2. You can also click on the up, down, left, and right arrows on the icon or press the Ctrl and up, down, left and right arrow keys on the keyboard at the same time to move the image until the fiber core roughly overlaps with the green collar. The location will be saved in the task, and the image will be automatically centered and displayed the next time the program is launched.

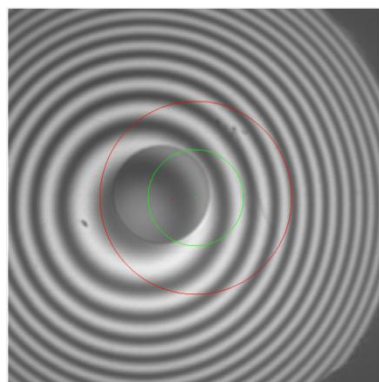


Figure 1, initial.

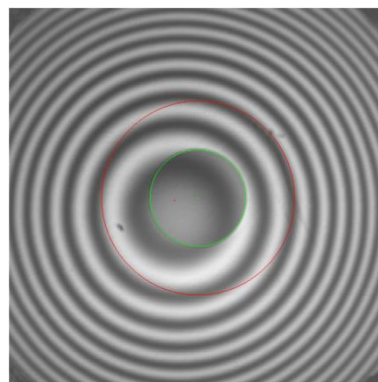


Figure 2, after the center.



Initialize focus button

For AX models, if the end face of the plug shown in the image is very blurry or the plug is not visible at all, you can click this button to quickly move the fixture platform to the factory set position for the coke oven.



Manual focus button

For AX models, you can click the arrow to adjust the fixture platform far or close, causing interference fringes to appear in the image of the plug end face. The more arrows there are, the faster the movement speed and the poorer the focusing accuracy. The shortcut keys corresponding to single arrow operations are the "left" and "right" arrows on the mini keyboard.



Light switch button

For A4, A5, M4, M5 models, it is possible to switch between displaying two light sources. When there is a significant difference in image brightness between the two light sources, it is necessary to contact the manufacturer for instrument maintenance.



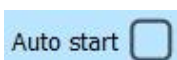
Brightness adjustment button

The brightness of the light source can be adjusted to make the interference fringes have a clear black and white contrast and moderate brightness.

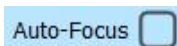


Image zoom buttons

Zooming the image allows you to display the key measurement area or a larger end-face area.



After checking "Auto start", the software can automatically start measurement without operating mouse or keyboard when the clamp wrench is locked in place.



For AX models, if there are no interference fringes or the interference fringes are not clear enough after checking "auto focus", the focusing process will be started automatically.

3.6. Measurement task



Settings-related information is saved to the corresponding measurement task. Tasks can be switched via the drop-down menu in the Measurement Task panel. The "Set ang." is the material reference angle for the current task. The "Current angle" is the actual angle after the fixture platform rotation. For instruments with auto-rotation, switching measurement tasks automatically rotates the platform and updates the current angle value. For instruments with manual rotation, the operator must manually rotate the fixture platform.

To save measurement results, select an existing "Path" on the hard drive and enter a new "Batch" or select an existing one from the drop-down menu. Also enter the Part Number (P/N). The P/N is composed of "Prefix" + "Code" + "Suffix".

Prefix can be omitted or entered via a barcode scanner. If the scanner mode is "Scan content + Enter", scanning automatically initiates one measurement. If the scanner mode does not include Enter, use the "Measure" button or the Enter key to start measurement. If "Clear after meas." is checked, the current prefix is cleared after a scanned measurement to receive the next scan.

Code can be cyclic, defined by "Starting code" and "End code". The current code must be within this range to cycle. Suffix functions similarly to Code.

Example: Prefix=TEST, Code=1, Range=1~5, Suffix=A, Range=A~B, results in P/Ns: TEST-1A, TEST-1B, TEST-2A, TEST-2B ... up to TEST-5B. Similarly, P/Ns like TEST-A1, TEST-A2, TEST-A3, TEST-A4, TEST-A5, TEST-B1, TEST-B2 ... up to TEST-B5 can be generated.

Measurement data is saved in the specified file name. The file format is HTML or XLSX. Important: Open XLSX files must be closed promptly; otherwise, subsequent measurement

data will not be recorded in them. Open HTML files do not block subsequent data saves; click the browser's refresh button to view the latest data. HTML files can also be opened, viewed, or edited in EXCEL or WPS. However, saving directly from these applications prevents further data writes; it is recommended to "Save As" a new file or use a plain text editor (like Notepad) for editing. Measurement data is also saved as a CSV file (without headers or formatting), intended for data transmission with some customers.

Save Results can be set to "All" or "Pass". Unless "All" is selected, only data and report files for "Pass" results are generated; "Fail" results are discarded. This setting does not affect the real-time result display on the interface.

To prevent accidental modification of the above important information, the "Lock" option must be checked to enable measurement.

4. Computer Settings, Maintenance, and Troubleshooting

4.1. Computer Settings

Automatic CPU throttling or power-saving features on some computers can affect measurement speed or prevent measurement. Configure the computer as follows:

- (1) Go to Control Panel\System and Security\Power Options.
- (2) Select or create a custom power plan set to "High Performance".
- (3) Go to Change plan settings\Change advanced power settings.
- (4) Set Hard disk\Turn off hard disk after to 0 minutes.
- (5) Set USB settings\USB selective suspend setting to Disabled.
- (6) Set Processor power management\Minimum processor state to 100%.

4.2. Routine Maintenance

- (1) Ensure the instrument operates in a constant temperature, dry, and clean environment.
- (2) Ensure the instrument is placed on a level, vibration-free platform.
- (3) Handle the instrument gently. When not in use, cover it with a lint-free cloth.
- (4) Regularly remove the measurement fixture for cleaning and keep it dry.
- (5) If unused for an extended period, remove the fixture, spray it with anti-rust oil, and store it sealed.

4.3. Software Troubleshooting

- (1) Communication Error between Computer and Instrument
 - Ensure that the instrument is connected to a 24 VDC power supply.
 - Ensure that the power is turned on.
 - Ensure that the data cable is securely connected to the computer.
- (2) Unable to open the report, data files
 - Install the latest version of your browser software.
 - If necessary, reinstall the measurement software.
- (3) Abnormal software measurement speed
 - Ensure the computer CPU is not throttling (see 4.1).
 - Ensure EXCEL launches normally and is licensed.
 - Reinstall the measurement software if necessary.
- (4) Dirty image background
 - Clean the fixture.
 - Clean the optical lens.
 - Operate in a clean environment.