

**BEIJING JCZ TECHNOLOGY CO LTD**



# **3D calibration**

**Notice: Every time after we input value, It must need to click "Enter" button for enable!**

## Step 1 : Open CalibrationWizard.exe.

### 1. Open the program

|                          |                  |        |           |
|--------------------------|------------------|--------|-----------|
| CalibrationWizard 1.9.12 | 2018-03-08 13:22 | 文件夹    |           |
| CORFILE                  | 2017-09-28 1:43  | 文件夹    |           |
| LANG                     | 2017-12-12 22:06 | 文件夹    |           |
| PARAM                    | 2017-12-18 12:59 | 文件夹    |           |
| RES                      | 2017-12-12 22:06 | 文件夹    |           |
| _LicenseManager.exe      | 2017-11-03 17:17 | 应用程序   | 1,115 KB  |
| CH365DLL64.dll           | 2015-06-15 17:29 | 应用程序扩展 | 25 KB     |
| DfjzhControlerDll64.dll  | 2016-08-12 18:27 | 应用程序扩展 | 871 KB    |
| Ezcad3.exe               | 2018-03-06 17:48 | 应用程序   | 1,314 KB  |
| Ezcad3Kernel.dll         | 2018-03-06 17:48 | 应用程序扩展 | 10,304 KB |
| Ezcad3Motion.dll         | 2017-12-04 20:16 | 应用程序扩展 | 31 KB     |
| QIL.dll                  | 2017-08-16 18:05 | 应用程序扩展 | 4,413 KB  |
| CalibrationFunConfig.ini | 2018-03-08 11:27 | 配置设置   | 1 KB      |
| CalibrationPara.ini      | 2018-03-08 13:32 | 配置设置   | 3 KB      |
| CalibrationSys.ini       | 2018-03-08 13:32 | 配置设置   | 1 KB      |
| CalibrationWizard.exe    | 2018-03-08 13:22 | 应用程序   | 12,870 KB |
| CalibrationWizard.exp    | 2018-03-08 13:22 | EXP 文件 | 10 KB     |
| CalibrationWizard.ilc    | 2018-03-08 13:22 | ILK 文件 | 32,220 KB |
| CalibrationWizard.lib    | 2018-03-08 13:22 | LIB 文件 | 17 KB     |
| CalibrationWizard.pdb    | 2018-03-08 13:22 | PDB 文件 | 32,900 KB |
| CH365DLL64.dll           | 2015-06-15 17:29 | 应用程序扩展 | 25 KB     |
| DfjzhControlerDll64.dll  | 2016-08-12 18:27 | 应用程序扩展 | 871 KB    |
| Lang_ChS.ini             | 2018-03-08 12:03 | 配置设置   | 8 KB      |
| Lang_Enu.ini             | 2018-03-08 12:03 | 配置设置   | 8 KB      |

### 2. Choose Correction System and Set System Parameter

Config Calibration Wizard\_V1.9.12

Choose Correction System

2D XY Correction

3D XYZ Correction(With F-Theta Lens)

2D Dynamic Focus XY Correction(Without F-Theta Lens)

3D Dynamic Focus XYZ Correction(Without F-Theta Lens)

Set System Parameter

Unit Type: mm

Language: English

Confirm/Exit

### 3. Click "Confirm" Button

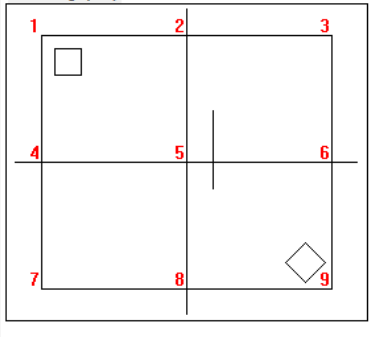
BJCZ CalibrationWizard\_V1.9.15

×

Tabbed interface: **Nine Point Cor** | XY Internal Cor | Z Axis Cor

Test Image Size(%)

Mark Image(3\*3)



Input Coordinate

|  |  |
|--|--|
| P1_X(mm)<br><input type="text" value="0.0"/> | P1_Y(mm)<br><input type="text" value="0.0"/> |
| P2_X(mm)<br><input type="text" value="0.0"/> | P2_Y(mm)<br><input type="text" value="0.0"/> |
| P3_X(mm)<br><input type="text" value="0.0"/> | P3_Y(mm)<br><input type="text" value="0.0"/> |
| P4_X(mm)<br><input type="text" value="0.0"/> | P4_Y(mm)<br><input type="text" value="0.0"/> |
| P5_X(mm)<br><input type="text" value="0.0"/> | P5_Y(mm)<br><input type="text" value="0.0"/> |
| P6_X(mm)<br><input type="text" value="0.0"/> | P6_Y(mm)<br><input type="text" value="0.0"/> |
| P7_X(mm)<br><input type="text" value="0.0"/> | P7_Y(mm)<br><input type="text" value="0.0"/> |
| P8_X(mm)<br><input type="text" value="0.0"/> | P8_Y(mm)<br><input type="text" value="0.0"/> |
| P9_X(mm)<br><input type="text" value="0.0"/> | P9_Y(mm)<br><input type="text" value="0.0"/> |

Buttons:

- Confirm Scanner Para
- Mark Image(3\*3)**
- Build Cor File
- Save Cor File
- Load Cor File
- Set Mark Parameters
- Z Axis Control

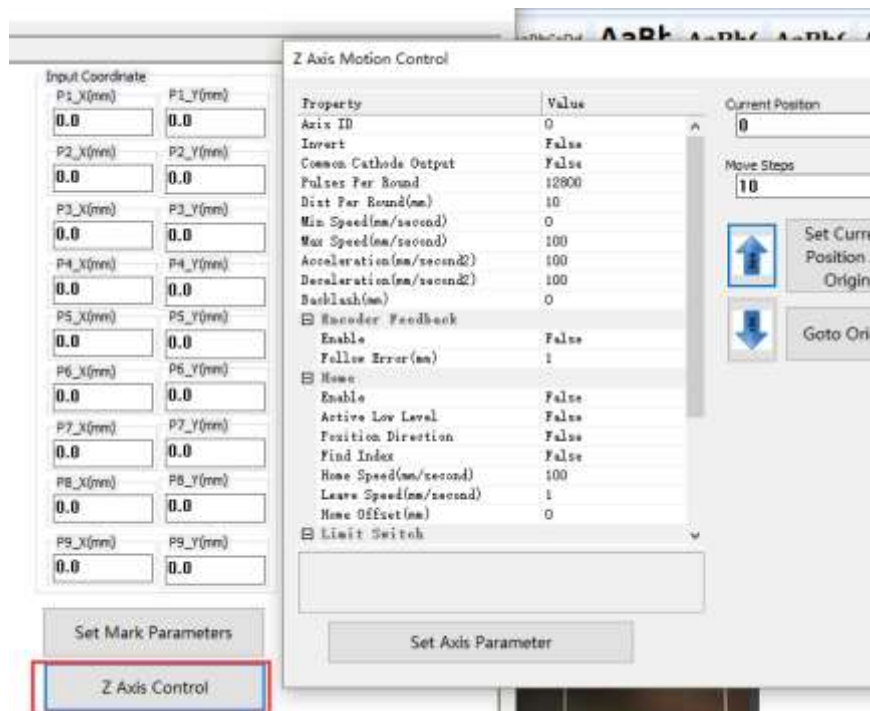
## Step 2 : Set Mark parameters for laser and scanhead.

The screenshot displays the 'BJJ CZ Calibration Wizard\_V1.9.12' software interface. The main window has tabs for 'Nine Point Cor', 'XY Internal Cor', and 'Z Axis Cor'. The 'Test Image Size(%)' field is set to 86.00. The 'Mark Image(3\*3)' shows a 3x3 grid with points 1-9 and a diamond marker at point 9. The 'Input Coordinate' section has 18 fields (P1\_X to P9\_Y) all set to 0.0. A 'Set Mark Parameters' button is highlighted with a red box. The 'Mark Parameters Config' dialog box is open, showing the following settings:

| Set Scanner Type      |           |
|-----------------------|-----------|
| Scanner Bits          | XY2100 16 |
| Set Mark Parameter    |           |
| Mark Speed(mm/s)      | 1000      |
| Set Jump Parameter    |           |
| Jump Speed(mm/s)      | 1000      |
| Min Jump Delay(us)    | 10        |
| Max Jump Delay(us)    | 100       |
| Jump Limit Length(mm) | 10        |
| Set Delay Parameter   |           |
| Laser On Delay(us)    | 0         |
| Laser Off Delay(us)   | 100       |
| Polygon Delay(us)     | 100       |
| MarkEnd Delay(us)     | 100       |
| Set Laser Parameter   |           |
| Laser Mode            | Fiber     |
| Laser Frequency       | 20        |
| Laser Power(%)        | 50        |
| Laser Pulse Width(us) | 20        |
| Continue Mode         | Y         |
| Wave                  | 0         |

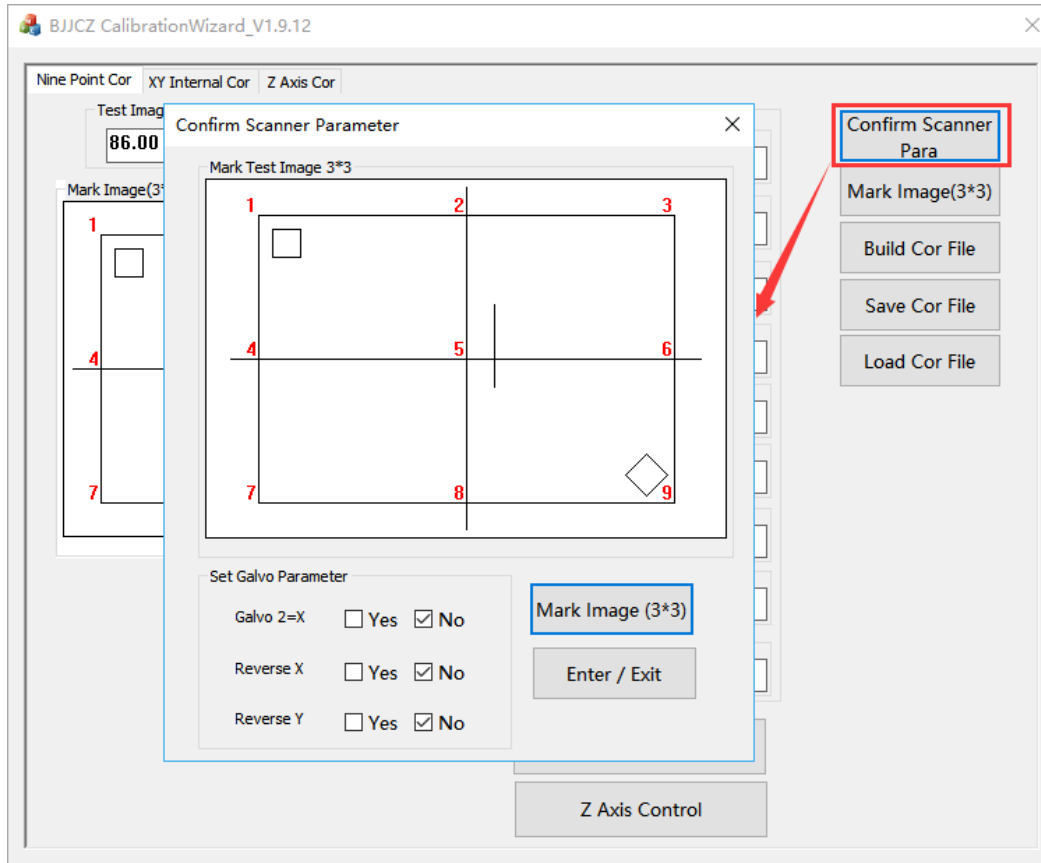
The 'Enter / Exit' button is at the bottom of the dialog box.

### Step 3 : Calibrate motor Z axis (If no Motor Z axis , Don't set it )

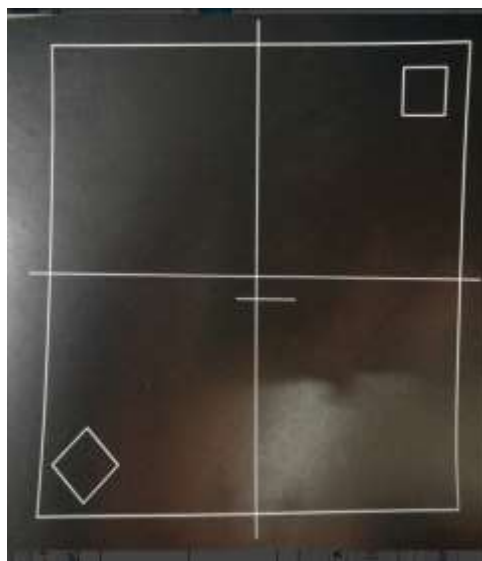


## Step 4 : 3\*3 Scanner calibrate

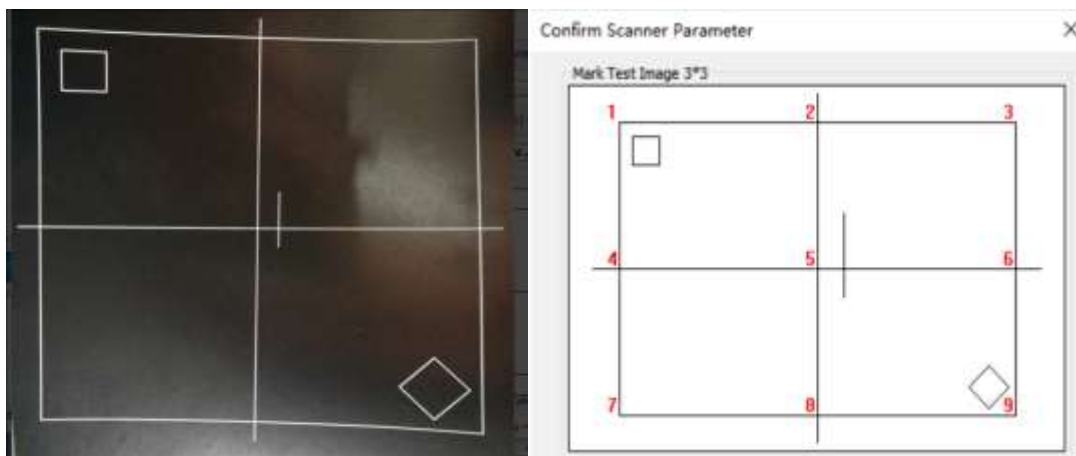
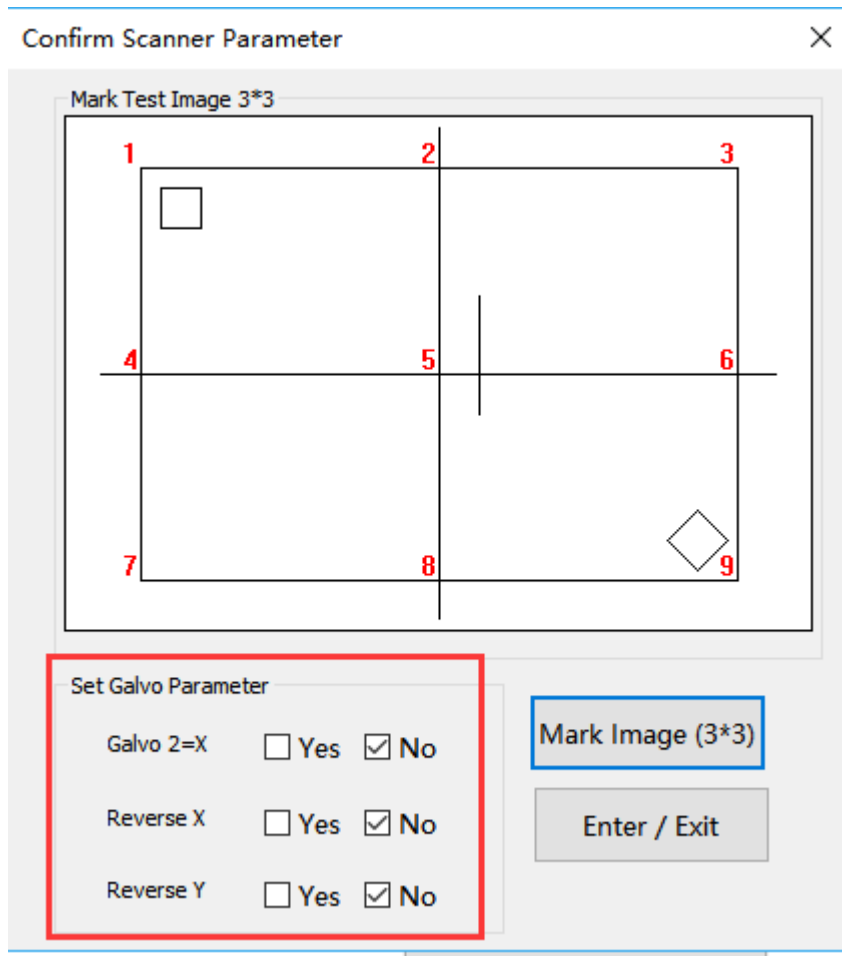
1. Click “confirm scanner para” button, on the pop-up window click “Making Test Image (3\*3)” button



2. Check the marking result

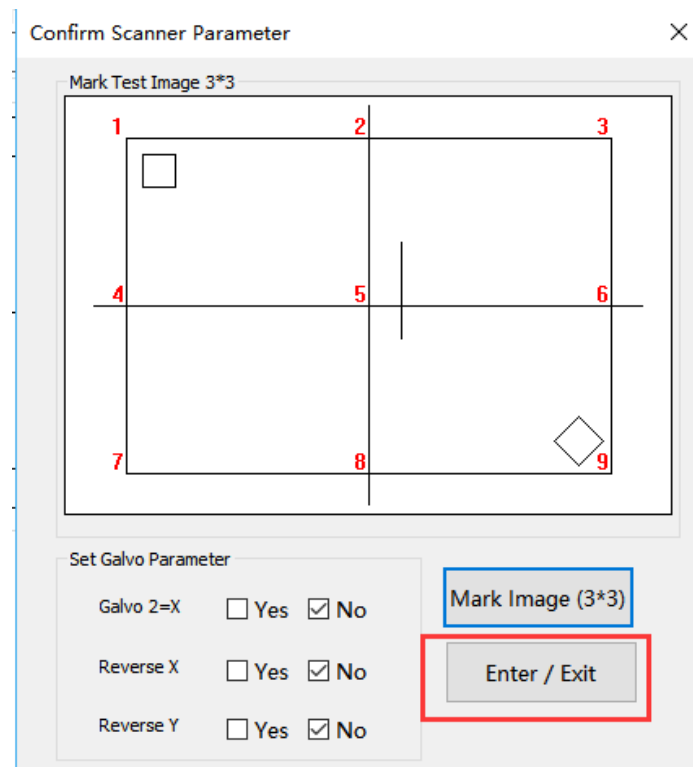


3. Change "Set Galvo Parameter" and "mark Image". Until marking result same as software windows.

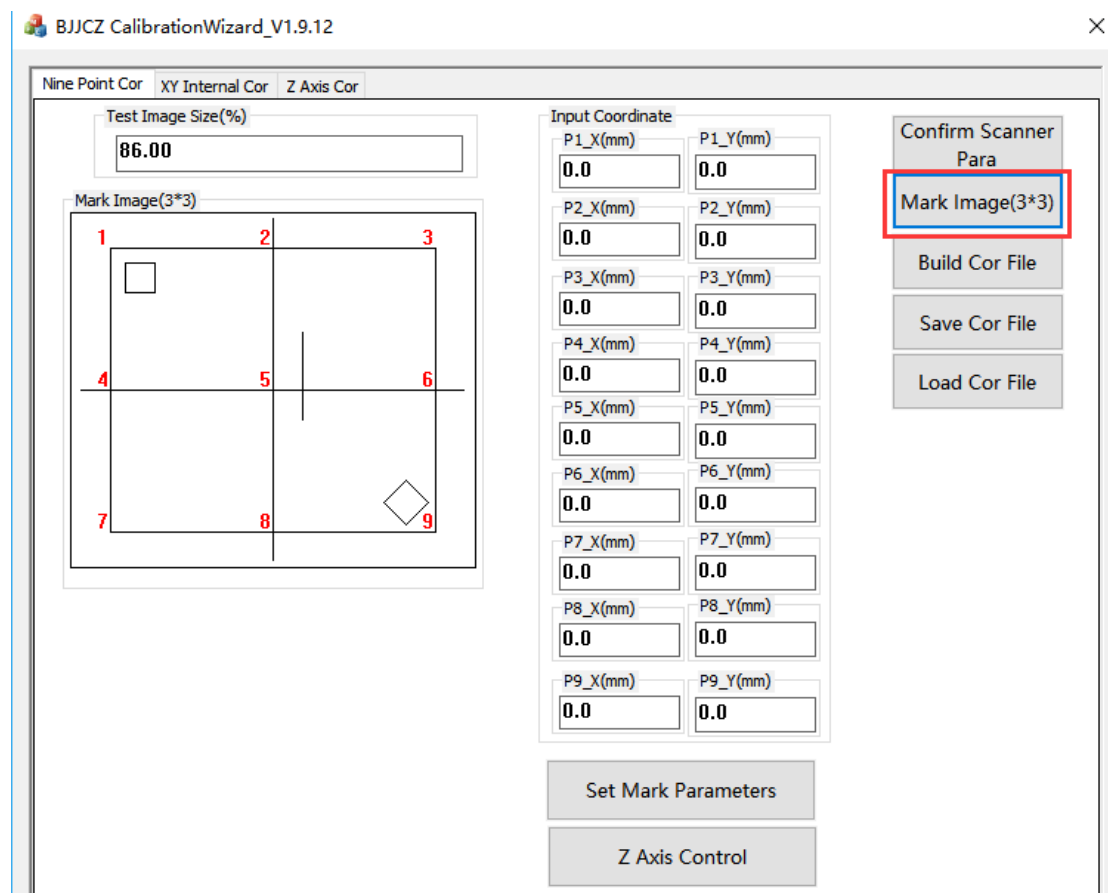


**NOTE: the marking result must show same direction with software.**

4. Click “Enter/Exit” button to confirm. The software will back to first interface.

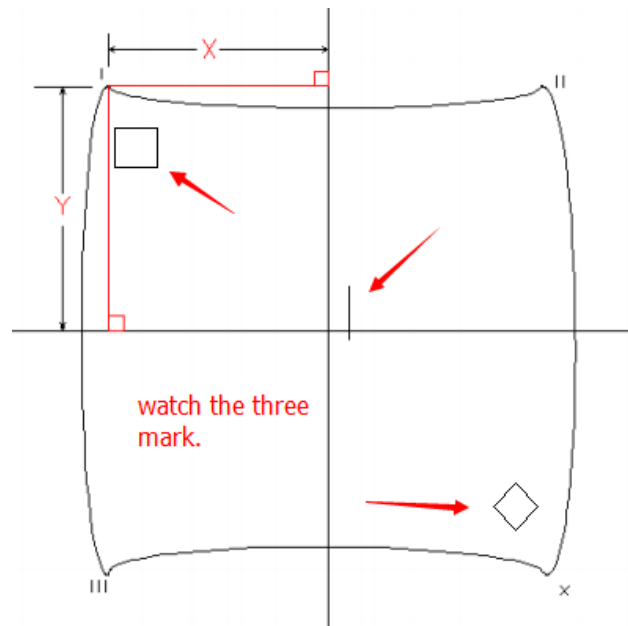


5. Click “Mark Image (3\*3)” button to mark. (now the marking result show will same as software, If not ,please do the last step again.)

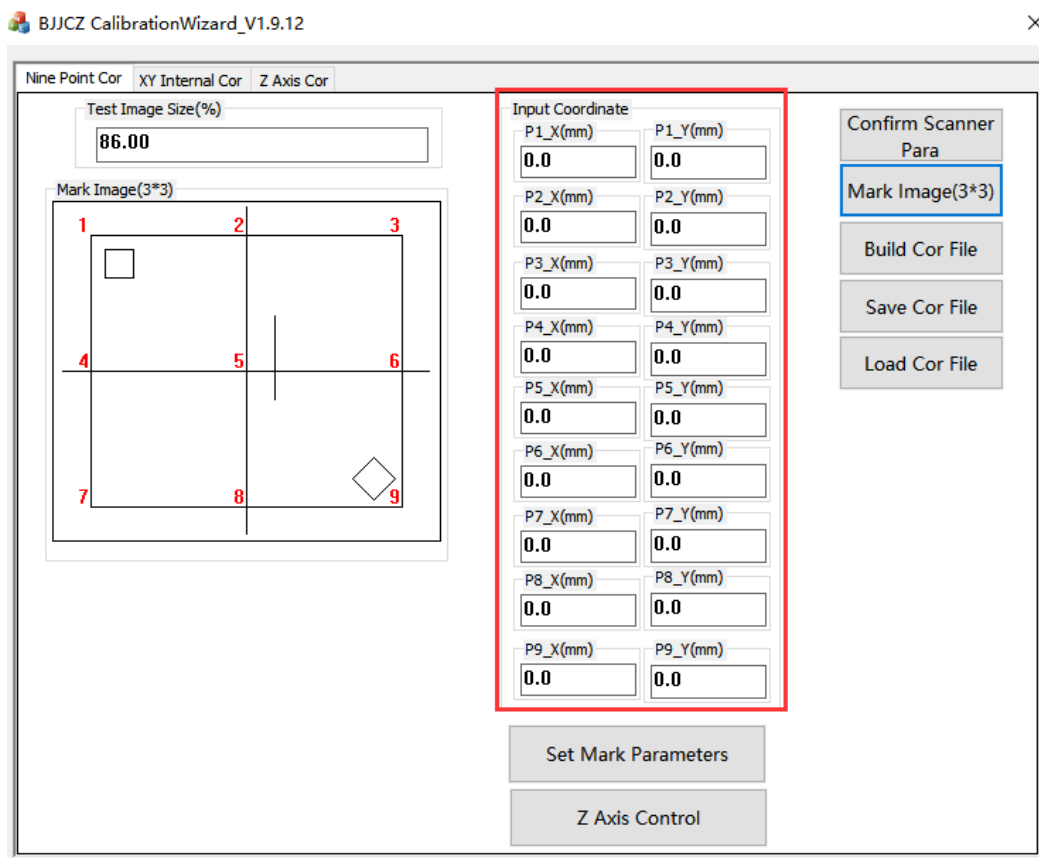


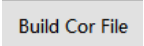



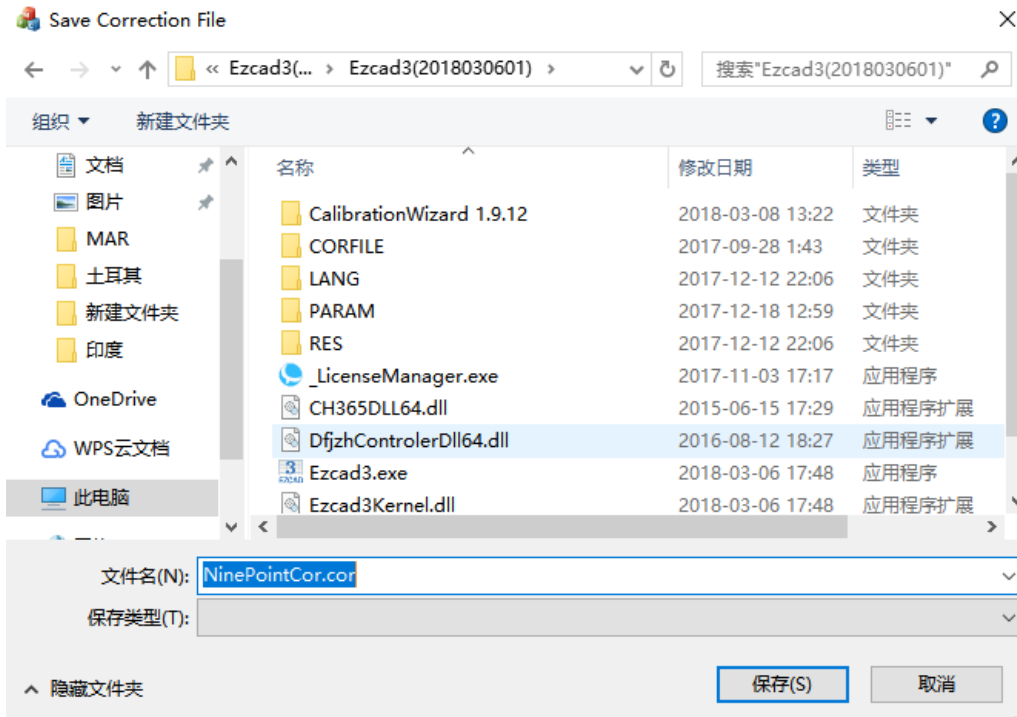
6. Measure the coordinate value of point 1 to point 9



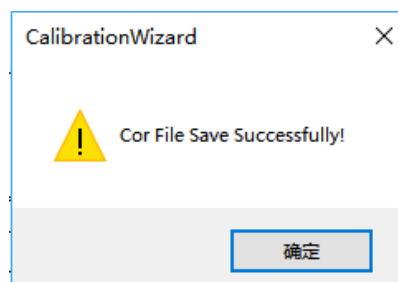
7. Input the value to software (only input the value, no need to input + or -).




8. Check the X and Y coordinates value , if correct, then click  button, then click  button to save the cor file.



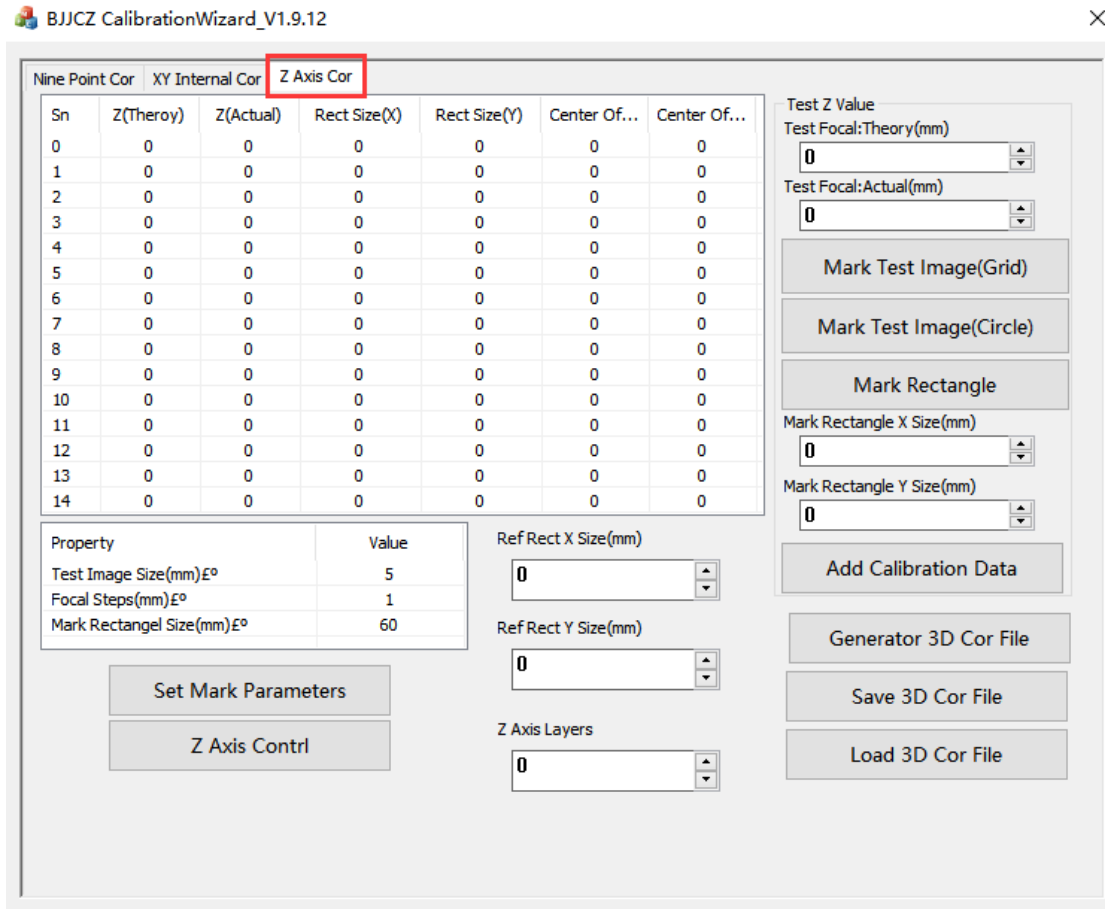
9. After save the .cor files ,the will show Cor files save successfully , click "OK" .



10. Click  button to load the .cor file.

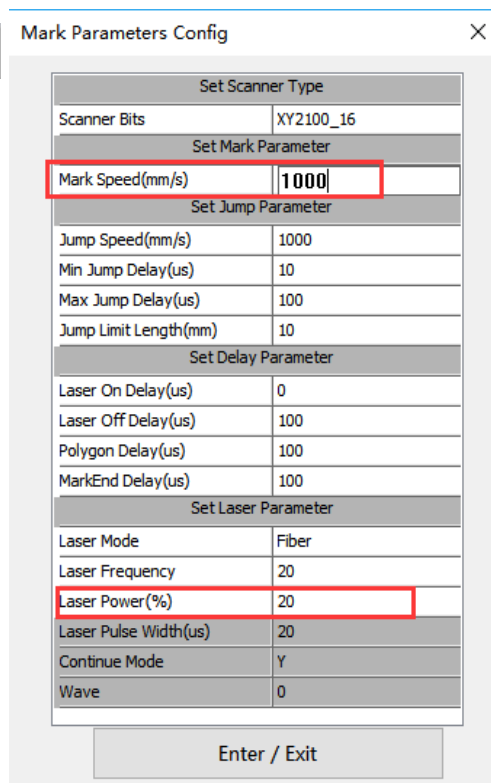
## Step 5 : Z axis calibration

1. Click “Z Axis Cor” button to open z axis calibration page.



2. Click **Set Mark Parameters** button , input the laser power “20%-30%” ,and click **“Enter ” Button on the Keyboard**

3. Click **Enter / Exit** button back to the First page



4. Set the parameter for Property :

| Property                              | Value |
|---------------------------------------|-------|
| Test Image Size(mm)E <sup>o</sup>     | 2     |
| Focal Steps(mm)E <sup>o</sup>         | 2     |
| Mark Rectangel Size(mm)E <sup>o</sup> | 25    |

174-254 lens

| Property                 | Value |
|--------------------------|-------|
| Test Image Size(mm):     | 2     |
| Focal Steps(mm):         | 2     |
| Mark Rectangel Size(mm): | 17    |

112-164

5. Test Z value

Test Z Value

Test Focal:Theory(mm)

0

Test Focal:Actual(mm)

0

Set “Test Focal: Theory(mm)” value = 0,  
“Test Focal: Actual(mm)” value = 0,

6. Click “Mark Test Image” button

Test Z Value

Test Focal:Theory(mm)

0

Test Focal:Actual(mm)

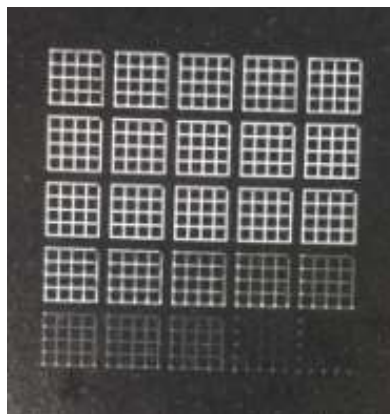
0

Mark Test Image(Grid)

Mark Test Image(Circle)

Mark Rectangle

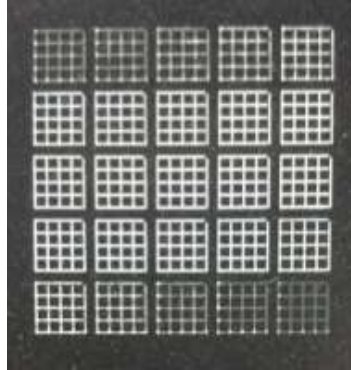
Mark 5x5 grid rectangle image like below picture, each grid rectangle has different focus steps (different z coordinate).



Check the grid rectangles, if the grid rectangles are not symmetrical and clear, adjust

Test Focal:Actual(mm)

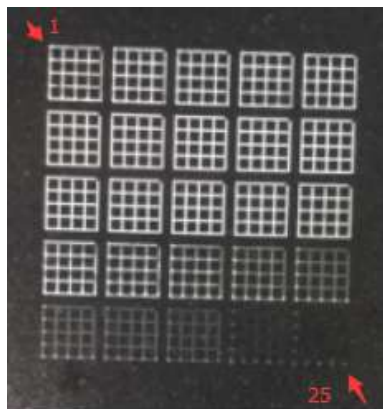
and mark again, until getting a symmetrical grid rectangles. The good result should look like below picture:



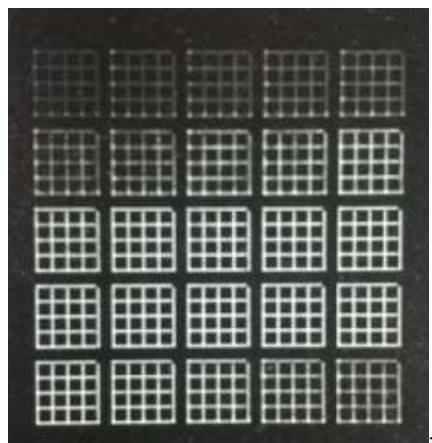
**Noted :**

There are 25 small grids, Group them like this : 1 and 25, 2-24, 3-23, 4-22, 5-21, 6-20, 7-19, 8-18.....every two grids show have same marking result.

**Down the Test Focal:Actual(mm) if marking result like this**



**Up the Test Focal:Theory(mm) if marking result like this,**



Test Focal:Actual(mm)

0

Change until get a good result.

- Click “Mark Rectangle” button

Software will mark a rectangle measure this rectangle’s size (average size of length and width). Input to

Mark Rectangle X Size(mm)

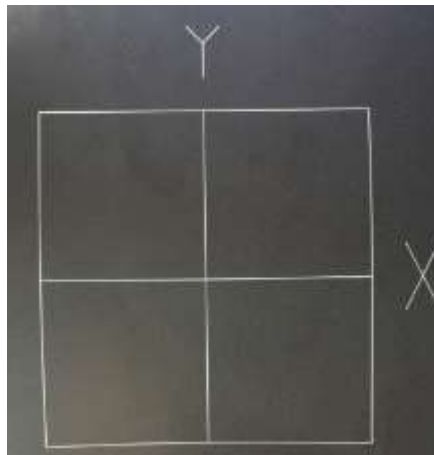
0

Mark Rectangle Y Size(mm)

0

(Press “Entry” on the keyboard after input the every value )

Every time we need to measured cross on the center.



**Noted :** if you want to change size of this rectangle, adjust Mark Rectangle Size, normally this size need to nearly your calibration size.

Add Calibration Data

- Click “Add Calibration Data” button to add the Sn0 line’s z calibration data.

- Move Z axis for different Z calibration.

- Sn0 is for Z=0,
- Down the scanhead 10mm (or Up the Work table 10mm), the Z(theory)=10mm, Up the scanhead 10mm (Or down the work table 10mm ), the Z(theory)=-10mm. And then we adjust Actual for testing.
- Set “Test Focal: Theory(mm)” value = 10, set “Test Focal: Actual(mm)” value = 20,(it is around this value, Need adjust it according to our marking result),
- Repeat step 6, 7, 8 to make Sn1 line’s z data. Then make other line’s z data
- Different lens, Layer numbers are different, for 174-254 lens, calibrate from -30 to 30 (Means Test Focal: Theory have 7 value, -30, -20, -10, 0, 10, 20, 30).

Example for 174-254 lens.

BJCZ CalibrationWizard\_V1.9.15

| Sn | Z(Theory) | Z(Actual) | Rect Size(X) | Rect Size(Y) | Center Of... | Center Of... |
|----|-----------|-----------|--------------|--------------|--------------|--------------|
| 0  | 0.000     | 1.000     | 45.000       | 50.000       | 0.000        | 0.000        |
| 1  | 10.000    | 19.000    | 43.000       | 49.000       | 0.000        | 0.000        |
| 2  | 20.000    | 40.000    | 41.000       | 48.000       | 0.000        | 0.000        |
| 3  | 30.000    | 59.000    | 40.000       | 47.000       | 0.000        | 0.000        |
| 4  | -10.000   | -21.000   | 46.000       | 51.000       | 0.000        | 0.000        |
| 5  | -20.000   | -43.000   | 47.000       | 52.000       | 0.000        | 0.000        |
| 6  | -30.000   | -65.000   | 48.000       | 53.000       | 0.000        | 0.000        |
| 7  | 0.000     | 0.000     | 0.000        | 0.000        | 0.000        | 0.000        |
| 8  | 0.000     | 0.000     | 0.000        | 0.000        | 0.000        | 0.000        |
| 9  | 0.000     | 0.000     | 0.000        | 0.000        | 0.000        | 0.000        |
| 10 | 0.000     | 0.000     | 0.000        | 0.000        | 0.000        | 0.000        |
| 11 | 0.000     | 0.000     | 0.000        | 0.000        | 0.000        | 0.000        |
| 12 | 0.000     | 0.000     | 0.000        | 0.000        | 0.000        | 0.000        |
| 13 | 0.000     | 0.000     | 0.000        | 0.000        | 0.000        | 0.000        |
| 14 | 0.000     | 0.000     | 0.000        | 0.000        | 0.000        | 0.000        |

Test Z Value  
 Test Focal:Theory(mm)   
 Test Focal:Actual(mm)

Mark Test Image(Grid)  
 Mark Test Image(Circle)  
 Mark Rectangle  
 Mark Rectangle X Size(mm)   
 Mark Rectangle Y Size(mm)

Property Value  
 Test Image Size(mm)E° 2  
 Focal Steps(mm)E° 2  
 Mark Rectangel Size(mm)E° 25

Ref Rect X Size(mm)   
 Ref Rect Y Size(mm)   
 Z Axis Layers

Set Mark Parameters  
 Z Axis Contrl

Add Calibration Data  
 Generator 3D Cor File  
 Save 3D Cor File  
 Load 3D Cor File

The Actual Z value will around the number on the picture's show.

| Sn | Z(Theory) | Z(Actual) | Rect Size(X) | Rect Size(Y) | Center Of... | Center Of... |
|----|-----------|-----------|--------------|--------------|--------------|--------------|
| 0  | 0.000     | 1.000     | 45.000       | 50.000       | 0.000        | 0.000        |
| 1  | 10.000    | 19.000    | 43.000       | 49.000       | 0.000        | 0.000        |
| 2  | 20.000    | 40.000    | 41.000       | 48.000       | 0.000        | 0.000        |
| 3  | 30.000    | 59.000    | 40.000       | 47.000       | 0.000        | 0.000        |
| 4  | -10.000   | -21.000   | 46.000       | 51.000       | 0.000        | 0.000        |
| 5  | -20.000   | -43.000   | 47.000       | 52.000       | 0.000        | 0.000        |
| 6  | -30.000   | -65.000   | 48.000       | 53.000       | 0.000        | 0.000        |
| 7  | 0.000     | 0.000     | 0.000        | 0.000        | 0.000        | 0.000        |
| 8  | 0.000     | 0.000     | 0.000        | 0.000        | 0.000        | 0.000        |
| 9  | 0.000     | 0.000     | 0.000        | 0.000        | 0.000        | 0.000        |
| 10 | 0.000     | 0.000     | 0.000        | 0.000        | 0.000        | 0.000        |
| 11 | 0.000     | 0.000     | 0.000        | 0.000        | 0.000        | 0.000        |
| 12 | 0.000     | 0.000     | 0.000        | 0.000        | 0.000        | 0.000        |
| 13 | 0.000     | 0.000     | 0.000        | 0.000        | 0.000        | 0.000        |
| 14 | 0.000     | 0.000     | 0.000        | 0.000        | 0.000        | 0.000        |

After we finished this 7 layers,  
Input the Sn0 X and Y value into the software  
Input Z axis layer number into the software

Ref Rect X Size(mm)

Ref Rect Y Size(mm)

Z Axis Layers

**Notice: every time we input value, we need to click Enter, this is very important!**

| Sn | Z(Theory) | Z(Actual) | Rect Size(X) | Rect Size(Y) | Center Of... | Center Of... |
|----|-----------|-----------|--------------|--------------|--------------|--------------|
| 0  | 0.000     | 1.000     | 45.000       | 50.000       | 0.000        | 0.000        |
| 1  | 10.000    | 19.000    | 43.000       | 49.000       | 0.000        | 0.000        |
| 2  | 20.000    | 40.000    | 41.000       | 48.000       | 0.000        | 0.000        |
| 3  | 30.000    | 59.000    | 40.000       | 47.000       | 0.000        | 0.000        |
| 4  | -10.000   | -21.000   | 46.000       | 51.000       | 0.000        | 0.000        |
| 5  | -20.000   | -43.000   | 47.000       | 52.000       | 0.000        | 0.000        |
| 6  | -30.000   | -65.000   | 48.000       | 53.000       | 0.000        | 0.000        |
| 7  | 0.000     | 0.000     | 0.000        | 0.000        | 0.000        | 0.000        |
| 8  | 0.000     | 0.000     | 0.000        | 0.000        | 0.000        | 0.000        |
| 9  | 0.000     | 0.000     | 0.000        | 0.000        | 0.000        | 0.000        |
| 10 | 0.000     | 0.000     | 0.000        | 0.000        | 0.000        | 0.000        |
| 11 | 0.000     | 0.000     | 0.000        | 0.000        | 0.000        | 0.000        |
| 12 | 0.000     | 0.000     | 0.000        | 0.000        | 0.000        | 0.000        |
| 13 | 0.000     | 0.000     | 0.000        | 0.000        | 0.000        | 0.000        |
| 14 | 0.000     | 0.000     | 0.000        | 0.000        | 0.000        | 0.000        |

| Property                  | Value |
|---------------------------|-------|
| Test Image Size(mm)E°     | 2     |
| Focal Steps(mm)E°         | 2     |
| Mark Rectangel Size(mm)E° | 25    |

Ref Rect X Size(mm)

Ref Rect Y Size(mm)

Z Axis Layers

Set Mark Parameters

Z Axis Contrl

10. After adding all the z calibration data, click "Generator 3D Cor File" button to build 3D calibration file. Click "Save 3D Cor File" to save 3D calibration file .



11,here have some param for 112-164 lens,

| Nine Point Cor |           | XY Internal Cor |              | Z Axis Cor   |              |              |
|----------------|-----------|-----------------|--------------|--------------|--------------|--------------|
| Sn             | Z(Theory) | Z(Actual)       | Rect Size(X) | Rect Size(Y) | Center Of... | Center Of... |
| 0              | 0.000     | 1.000           | 0.000        | 0.000        | 0.000        | 0.000        |
| 1              | 10.000    | 53.000          | 0.000        | 0.000        | 0.000        | 0.000        |
| 2              | -10.000   | -53.000         | 0.000        | 0.000        | 0.000        | 0.000        |
| 3              | 0         | 0               | 0            | 0            | 0            | 0            |
| 4              | 0         | 0               | 0            | 0            | 0            | 0            |
| 5              | 0         | 0               | 0            | 0            | 0            | 0            |
| 6              | 0         | 0               | 0            | 0            | 0            | 0            |
| 7              | 0         | 0               | 0            | 0            | 0            | 0            |
| 8              | 0         | 0               | 0            | 0            | 0            | 0            |
| 9              | 0         | 0               | 0            | 0            | 0            | 0            |
| 10             | 0         | 0               | 0            | 0            | 0            | 0            |
| 11             | 0         | 0               | 0            | 0            | 0            | 0            |
| 12             | 0         | 0               | 0            | 0            | 0            | 0            |
| 13             | 0         | 0               | 0            | 0            | 0            | 0            |
| 14             | 0         | 0               | 0            | 0            | 0            | 0            |

| Property                 | Value |
|--------------------------|-------|
| Test Image Size(mm):     | 2     |
| Focal Steps(mm):         | 2     |
| Mark Rectangel Size(mm): | 17    |

Ref Rect X Size(mm)

Ref Rect Y Size(mm)

And there just 3 different layers.

## Beijing JCZ Technology Co., Ltd.

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