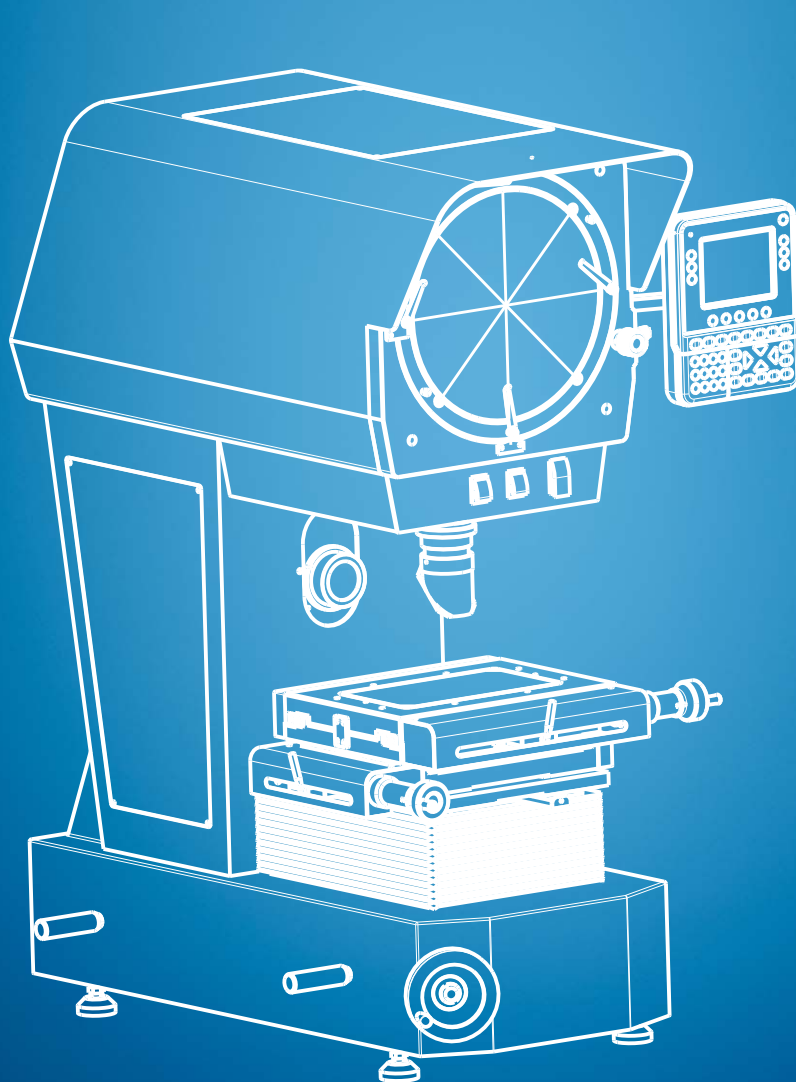


Digital Vertical Profile Projector

Operation Manual



Sinowon Innovation Metrology Manufacture Limited

www.sinowon.com

Preface

Dear Users,

In order to ensure the safety of your equipment and normal use, please read the following note.

Warning:

- When moving instrument, disconnected all the supply power, against hot plug.
- Handle with care when transportation, all of instruments put in the original package, place according to the iconic instruction, carried the goods in the way of closed type.
- Package material must be put in the place the children out of reach.



※This label pasted on the high temperature, such as attention may cause injury, such as: cover, shell, lamp with sharp parts.



※This label is pasted on a variety of power supply, information line collection point and the motor.

Content

1. Instrument Introduction.....	1
2. Instrument Working Principle.....	4
3. Instrument Structure and Function.....	5
4. Unpacking and Installation of Instruments.....	7
5. Instrument Using Method.....	8
6. Instrument Measurement Method.....	10
7. Care and Maintenance.....	12
8. Instrument Electrical Principle.....	13

1. Instrument Introduction

1.1 Application

VP series vertical digital measuring profile projector, is a light, machine, electricity, high precision optical measuring instrument calculator integration, it is widely used in machinery, instrument, electronics, light industry and other industries, universities, research departments and metrological metrology room, laboratory and workshop. This instrument could efficiently detection of a variety of complex shape of the work piece contour size and surface shape.

1.2 Specification

1.2.1 VP300 Series Specification

Product Name	Ø300mm Digital Vertical Profile Projector	
Reverse Image	VP300-1510 (#511-330)	VP300-2010 (#511-340)
Obverse Image	VP300-1510Z(#511-330Z)	VP300-2010Z(#511-340Z)
Metal Stage Size	350x202mm	400x225mm
Glass Stage Size	196x120mm	246x120mm
Stage Travel	150x100mm	200x100mm
Product Dimension	988 x 563 x 1224mm	988 x 563 x 1224mm
Packing Dimension	1200 x 700 x 1480mm	1200 x 700 x 1480mm
Focusing	100mm	
Accuracy	$\leq 3+L/200(\mu\text{m})$	
Resolution	0.0005mm	
Load Capacity	10Kg	
Screen	Dia:φ312mm,Measurement Range $\geq \text{Ø}300$	
	Rotation Angle 0~360° ;Resolution: 1 or 0.01° , Accuracy 6'	
Digital Readout	DP400 (510-340) Multifunction colorful LCD digital readout	
Illumination	Contour Illumination : 3.2V/10W LED	
	Surface Illumination : 3.2V/10W LED	
Working Environment	Temp 20°C±5°C , Humidity 40% - 70%RH	
Power Supply	AC110V/60Hz; 220V/50Hz,200W	
Cold-air Blowing System	3-axis Powerful Fan	
Gross/Net Weight	210/165kg	220/170kg

1.2.2 VP400 Series Specification

Product Name	Ø400mm Digital Vertical Profile Projector		
Reverse Image	VP400-2010 (#511-410)	VP400-2515 (#511-420)	VP400-3020(#511-430)
Obverse Image	VP400-2010Z(#511-410Z)	VP400-2515Z(#511-420Z)	VP400-3020Z(#511-430Z)
Metal Stage Size	308x408mm	308x408mm	458x358mm
Glass Stage Size	198x306mm	198x306mm	356x248mm
Stage Travel	200x100mm	250x150mm	300x200mm
Product Dimension	1003x617x1309mm	1003x617x1309mm	1003x617x1309mm
Packing Dimension	1200x800x1580mm	1200x800x1580mm	1200x800x1580mm
Focusing	100mm		
Accuracy	$\leq 3+L/200(\mu\text{m})$		
Resolution	0.0005mm		
Load Weight	10Kg		
Screen	Dia:φ412mm,Measurement Range $\geq \text{Ø}400$		
	Rotation Angle 0~360° ;Resolution: 1 or 0.01° , Accuracy 6		
Digital Readout	DP400 (510-340)Multifunction colorful LCD digital readout		
Illumination	Contour Illumination : 3.2V/10W LED;Surface Illumination : 3.2V/10W LED		
Working Environmental	Temp 20°C±5°C , Humidity 40% - 70%RH		
Power Supply	AC110V/60Hz; 220V/50Hz,150W		
Gross/Net Weight	280/230kg	280/230kg	280/230kg

1.2.3 VP420 Series Specification

Product Name	Ø400mm Digital Vertical Profile Projector		
Reverse Image	VP420-3020 (#511-450)		
Obverse Image	VP420-3020Z(#511-450Z)		
Metal Stage Size	458x358mm		
Glass Stage Size	356x248mm		
Stage Travel	300x200mm		
Product Dimension	1003x617x1309mm		
Packing Dimension	1200x800x1580mm		
Focusing	100mm		
Accuracy	$\leq 3+L/200(\mu\text{m})$		
Resolution	0.0005mm		
Load Weight	30Kg		
Screen	Dia:φ412mm,Measurement Range $\geq \text{Ø}400$		
	Rotation Angle 0~360° ;Resolution: 1 or 0.01° , Accuracy 6		
Digital Readout	DP400 (510-340)Multifunction colorful LCD digital readout		
Illumination	Contour Illumination : 3.2V/10W LED;Surface Illumination : 3.2V/10W LED		
Working Environmental	Temp 20°C±5°C , Humidity 40% - 70%RH		
Power Supply	AC110V/60Hz; 220V/50Hz,150W		
Gross/Net Weight	280/230kg		

1.3 Objective Lens

1.3.1 VP300 Series Objective Lens

Magnification	10X (Std.)	20X (Opt.)	50X (Opt.)
Field of View	Φ40	Φ20	Φ8
Working Distance(mm)	80	67.7	51.4

1.3.2 VP400 Series Objective Lens

Magnification	5X (Opt.)	10X (Std.)	20X (Opt.)	50X (Opt.)
Field of View	Φ80	Φ40	Φ20	Φ8
Working Distance(mm)	65	80	67.7	51.4

1.3.3 VP420 Series Objective Lens

Magnification	5X (Opt.)	10X (Std.)	20X (Opt.)	50X (Opt.)
Field of View	Φ80	Φ40	Φ20	Φ8
Working Distance(mm)	65	80	67.7	51.4

1.4 Instrument Illumination

1.4.1 Transmission illumination : 3.2V , 10W LED (Light gathering system) .

1.4.2 Reflex Illumination : 3.2V , 10W LED (Optical fiber lighting) .

1.4.3 Cooling : Forced Cooling (Transmission with an axial fan, reflective with an axial fan) .

2. Instrument Working Principle

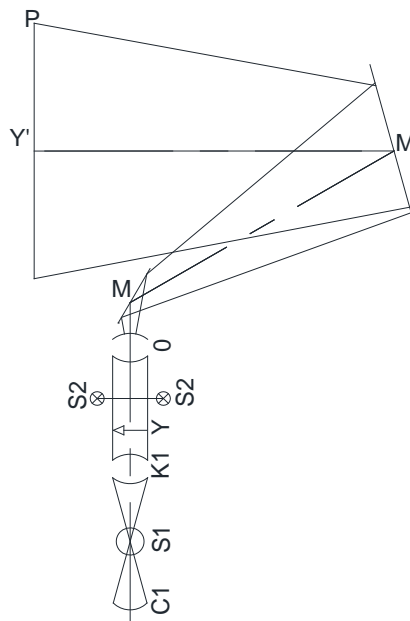


Fig1 Working Principle

The working principle as shown in Fig 1, the measured work piece Y is arranged on the worktable, under the transmitted or reflected light, it from objective o to amplified Y 'through the mirror reflection on M projection screen P matte surface

The projector screen is available on standard glass ruler of Y 'measurement, can use pre drawing good standard enlarge comparative measurement on it, the measured value by lens magnification is the workpiece measurement. It can also coordinate measurement of workpiece Y using digital measuring system on the table; you can use the projector screen rotation angle degree digital display system of the workpiece measurement.

Figure S1 for the transmission illumination, 2-S2 lighting for two reflection optical fiber (24V, two 150W light source by optical fiber transmission illumination, VP series vertical projector 3.2V/10W transmission LDE lamp, K1 photo group) for transmission mirror C1 for spherical mirror. By the nature of the workpiece, the two lighting can be used separately, can also be used at the same time.

3. Instrument Structure and Function

3.1 Instrument Structure

As shown in Fig 2

Mainly consists of four parts: the main body of transmission illumination, the base of the instrument, the working table and the projector box.

3.1.1 The main of transmission illumination : Including the illumination source, Concentrated light source, filter, cooling fan.

3.1.2 Instrument based : The system comprises a vertical grating ruler, a lifting transmission system, a reflection illumination light source, a switching power supply, a control circuit board and a vertical guide rail.

3.1.3 Table: including upper, middle and lower stage working table, X to friction drive mechanism, X to the grating ruler, Y to the friction transmission mechanism.

3.1.4 Projector box: including the projector screen group, mirror, digital display multi-function data processor, objective lens, control panel, mirror, power and other transit board.

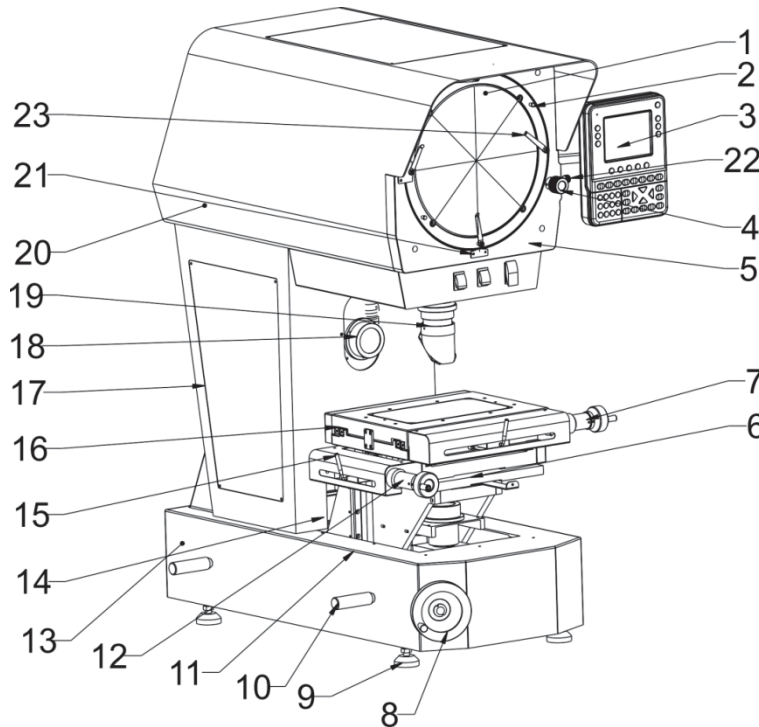
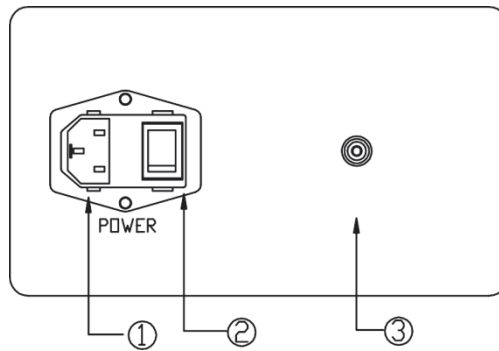


Fig 2 Instrument Structure

1.Screen	2.Screen Fast move Handle	3.DP-400 Digital Readout
4.Rotary Fine Tune Knob	5.Projector Frame	6.Main Body of Transmission Illumination
7.X axis Knob	8.Lifting Knob	9.Footing
10.Carry Knob	11.Dust Cover	12.Y axis
13.Base	14.Vertical Work Table	15.Hinge Group
16.Worktable	17.Lower Stage Table	18.Reflection Illumination
19.Objective	20.Upper Stage Table	21. Null Position
22. Lock Screw	23. Elastic Platen	

3.2 Instrument Control Panel Function

3.2.1 Power board as Fig 3:



- 1.Total Power Outlet 2.Power Switch 3.Ground Connection Nut

Fig3Power Panel

3.2.2 Operation as Fig 4

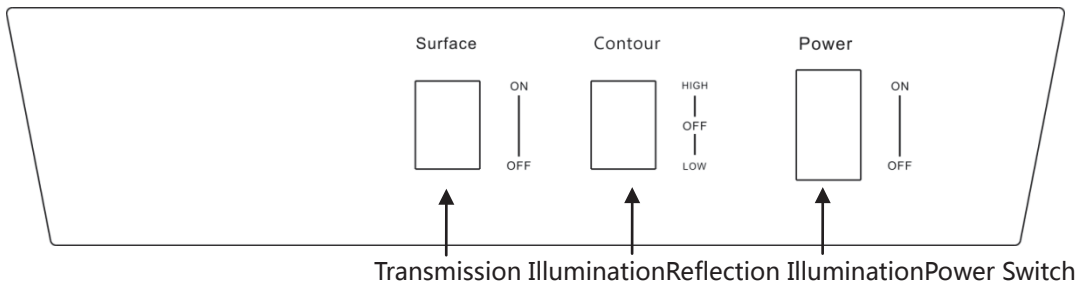


Fig 4

3.2.3 Operation as Fig 5

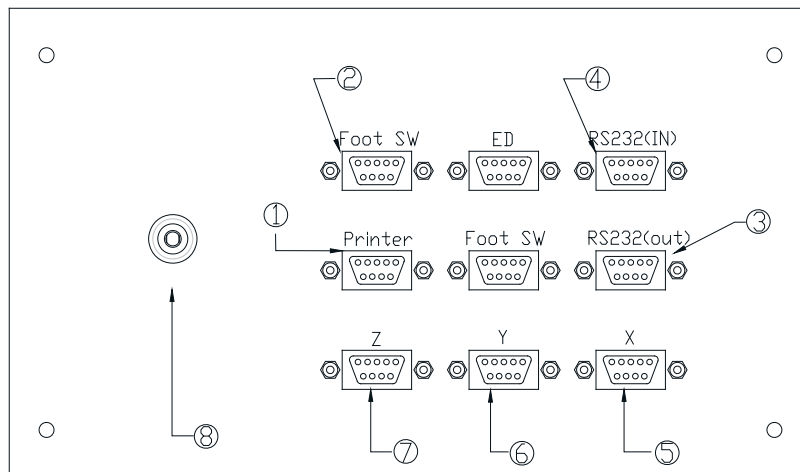


Fig 5 Signal Pin Board

- | | | |
|---------------------------------|--------------------------|-------------------------------|
| 1. Digital Readout Printer Port | 2. Foot Switch Port | 3. Digital Readout RS232 Port |
| 4. Computer RS232 Port | 5. X axis Linear Port | 6. Y axis Linear Port |
| 7. Z axis Linear Port | 8. Digital Readout Power | |

4. Unpacking and Installation of Instruments

- Remove the instrument outer packing box and the inner box, take out the instrument manual and read the contents of this section first. (Fig 6) .
- Four bolts of the base of the fixing instrument are moved to the working platform which is about to be installed. Because the instrument is close to 180Kg, the placing table must have the corresponding carrying capacity and the stability of the instrument.
- Install and adjust the four foot group, make the instrument work table is basic in the state level, with level adjustment.
- Don't make this instrument toward the projector screen for window and a strong light source, so as not to reduce the screen image clarity.
- At present, the wide voltage switching power supply can be automatically adjusted according to the local power supply voltage 220V110V.
- Take off two fixed table transport fixed board, you can move the Y, X work station.

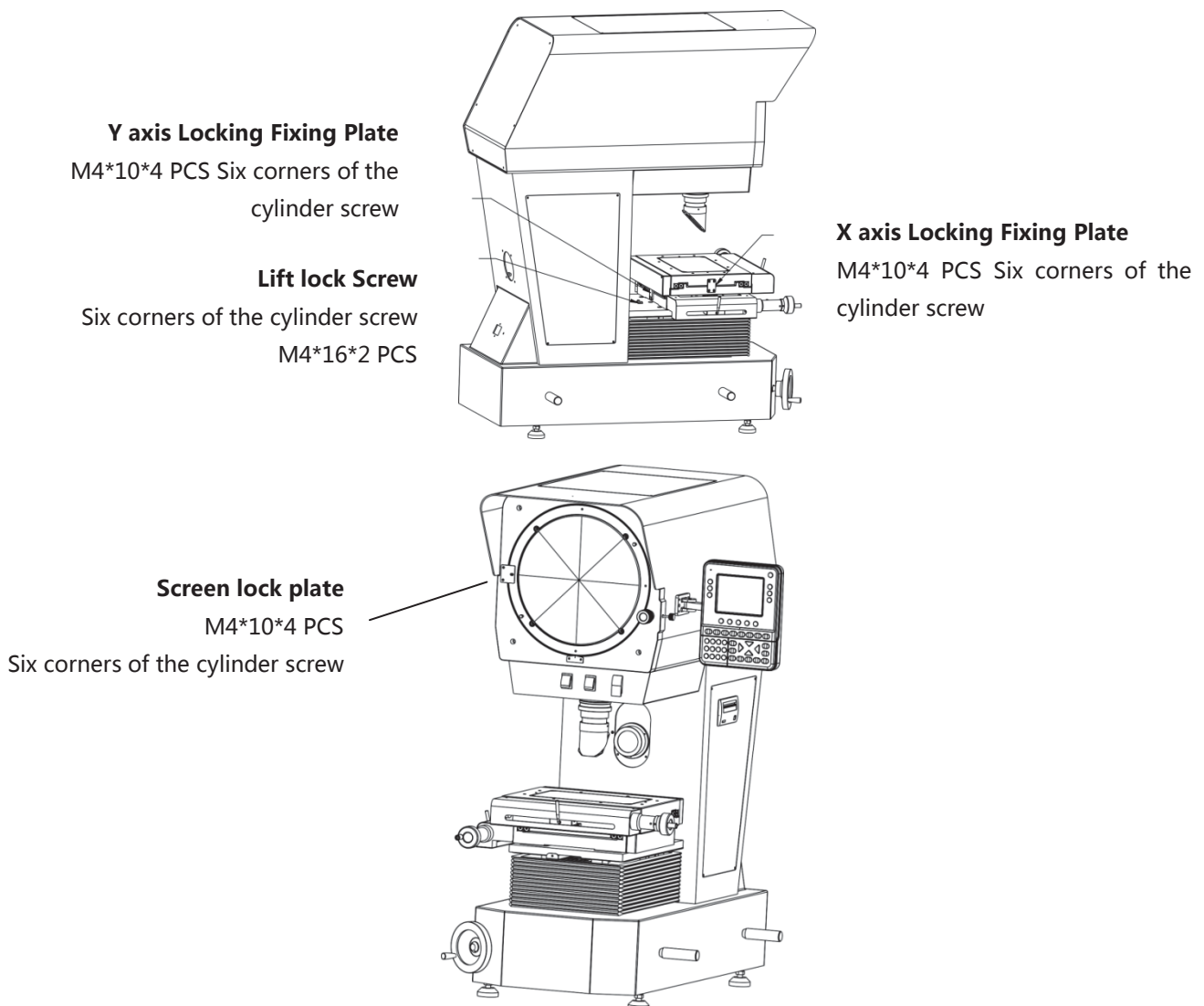


Fig 6 Unpacking and Installation of Instruments

5. Instrument Using Method

Before using the instrument, please read the instruction manual, especially the structure and function of the instrument. In order to have a preliminary understanding of the instrument, it will be helpful for you to use the instrument correctly.

5.1 Replacement and adjustment of transmission illumination bulbs

Sometimes because of transportation, handling and other reasons to change the position of the original bulb, then also need to re adjust the adjustment for recovery adjustment. Please note: this work must wait for lamp cooling before, otherwise, because of the heat from the lamp, burn dangerous.

5.1.1 Restoration adjustment (Fig 7)

5.1.1.1 Take off the objective, turn on the transmission light, if the filament is like the center of the screen is not the center of the screen or the filament.

5.1.1.2 Open the instrument lighting body back, loosen the screws on mobile related parts, when the filament like basic clear (but not very clear) and is located in the center of the screen, fixation screws, mounted on the lens, the instrument can be used.

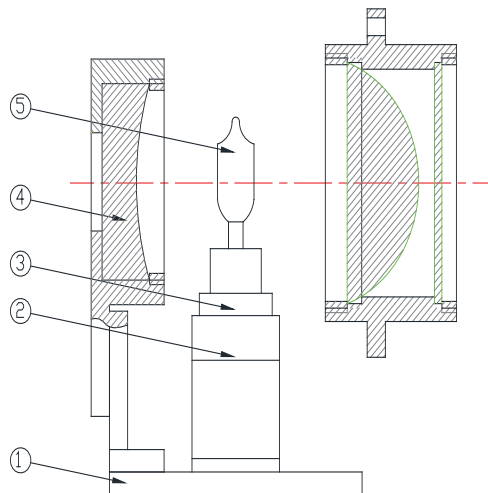


Fig 7 Illumination Group

1.Lamp Holder 2.Adjust Lamp Base 3.Lamp Base 4. Mirror 5.Lamp Bulb

5.1.2 Method for changing a light bulb (Fig 7)

5.1.2.1 Open the instrument main body of illumination back board.

5.1.2.2 After the lamp is cooled, the broken lamp is replaced by hand.

5.1.2.3 Put on a new light bulb (with a soft cloth or paper pad with a light bulb).

5.2 Adjust the Reflection Illumination

The transmission reflection lighting lamp with half mirror surface lighting, lighting lights to pay attention to the center half mirror center, and then use the locking screws.

5.3 Change the Objective and Collecting Lens

5.3.1 Instrument has only one objective, the common interface, each of the objective lens to a single replacement.

5.3.2 Objective magnification selection according to the measurement of workpiece size and the requirements of the detection accuracy. Generally speaking, the higher the multiple, contour measurement accuracy and the coordinates of the measurement accuracy is higher.

5.3.3 Instrument is equipped with 5X, 10X, 20X, 50X, 100X the objective lens, a common condenser, such as the need to enlarge the magnification, and the direct replacement of the objective can be.

5.4 The use of Work Table

5.4.1 After the instrument main power supply is turned on, the working table X, Z to the display value is displayed on the digital readout, with the working table vertical and vertical movement, these values are changing.

5.4.2 X axis can be used for fast and slow motion coordinate measurement with. Y axis friction driving is only for focusing. Z axis transmission that is the work table lifting, with the lifting wheel drive, Z axis motion coordinate measurement.

5.4.3 With Z, X axis measurement, when the workpiece focus is good, the general should be a few times back and forth movement, so that the table from the static state into the measurement state, is conducive to the measurement work.

5.4.4 With Z, X axis measurement, to use the knob, action do not force too much.

5.4.5 The working table is equipped with a rotary table for angle offset, with the center frame, which can be used for measuring the shape of thread.

5.5 The use of Projector Screen

5.5.1 When the instrument is turned on, the rotation angle of the projection screen is also displayed on the digital readout, which can be carried out by the internal setting of the digital readout with degree and minute and hundred changing. As $3^{\circ}24'$ <- -> 3.4° .

5.5.2 When the locking screw (Fig 2 , 22#) is released, the small knob (Fig2,2#) on the screen can be used to rotate the projection screen quickly, and the fine tuning knob (Fig 2 , 4#) can be used as a slow rotation.

The angle bottom measurement should be used as a slow rotation.

5.5.3 Projection screen frame on the four elastic pressure plate (Figure 2,23#) can be used to compress the standard size or glass working scale, for contour measurement.

5.5.4 When the projection screen frame of the white Short-term zero mark (Fig 2,21#), the level of the reticle screen and the X-ray coordinates parallel stroke, parts of the measured edge image will adjust to it and can be made after the tangent X coordinate measurement.

5.5.5 The projection screen reticle has 30° 、 60° 、 90° angle value standard, they can be used as the special angle measurement. At this point, the angle measurement system only needs to measure the angle of the work piece and the standard angle difference.

5.6 The use of RS232 Port

5.6.1 Fig 5 in the RS232 interface, can be used for instrument and digital readout communication, through the use of special software to achieve automatic measurement data processing and mapping functions.

6. Instrument Measurement Method

Projector measurement methods are summarized into two categories: contour measurement and coordinate measurement.

6.1 Contour Measurement

6.1.1 The comparison measuring is carried out with the standard magnification image.

This method is suitable for the detection of complex shape and large volume parts:

6.1.1.1 According to the size of the parts to determine the objective ratio, according to the design drawings and parts of the magnification of the same proportion of the standard magnification, transparent plastic sheet material with smaller scalability. In figure can also draw the tolerance zone. Such as the detection of parts size in diameter is about 25mm, making the magnification of 10:1, using 10X objective to measure. The standard arc angle, thread tooth, network enlargement are also existing ready to purchase.

6.1.1.2 The standard zoom in four elastic pressure plate on the projection screen.

6.1.1.3 The workpiece is placed on the working table of the working table, fixed, adjustable focus, mobile X working platform, lifting Z to the bracket, so that the image of the parts and the larger set.

6.1.1.4 If the image and the image of the larger deviation in the tolerance zone, is qualified, beyond the scope of the unqualified, the deviation value can be measured with Z, X coordinates.

6.1.2 Using the lattice value for 0.5mm standard glass working scale (optional accessories) on the screen directly measure the size of the work image (less than the value of the lattice can also be used Z, X coordinates measured), divided by the objective magnification that is the size of the workpiece.

6.2 Coordinate Measurement

6.2.1 Single Coordinate Measured

6.2.1.1 The workpiece is placed on the working table or the vertical working table, and the objective lens with high magnification is used to adjust the focus.

6.2.1.2 The projection screen rotation zero alignment, namely short white screen frame of the zero mark.

6.2.1.3 To adjust the direction of the workpiece to be measured in parallel with the measuring axis, as shown in Figure 8, the BC edge is parallel to the X axis.

6.2.1.4 We need to Move or fall worktable, the measured length of one end of the vertical line such as AB edge alignment on the screen, X coordinates to zero.

6.2.1.5 Move the X axis, the other end such as CD edge aligned vertical lines, X axis display value is the size of the AD workpiece.

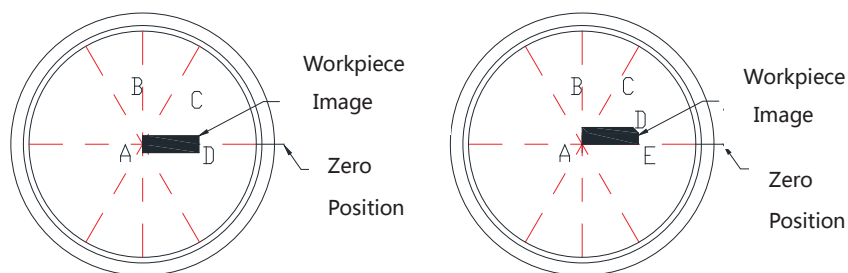


Fig 8 Single Coordinate Measured Fig 9 Double Coordinate Measured

6.2.2 Double Coordinate Measured

6.2.2.1 The rotation of the projection screen is aligned with the zero position mark.

6.2.2.2 The work piece is placed on the working table or the vertical working table, and the objective lens with high magnification is selected and the focus is adjusted.

6.2.2.3 Adjustment of the workpiece is measured in the direction of the X axis and the Z axis parallel, as shown in Figure 9 of the AE//X, AB//Z.

6.2.2.4 Move the X axis and Z axis so that the workpiece lifting, the image on the screen with the A at the point of intersection, X, Z display zero.

6.2.2.5 Again moving and lifting table, the image on the C or D line intersection. Then X alignment display value measuring BC or AE values, Z display value is the measurement of AB or DE values.

6.2.2.6 The use of multi function data processor on the coordinate rotation digital display function (SKEW), can be arbitrarily placed, without precise adjustment, only mobile lifting platform, according to the requirements in the sample can be detected corresponding length, this can save a lot of time to adjust, improve the measurement efficiency. And the specific operation in the digital display box operation manual.

6.2.2.7 The RS232 is connected with the calculator interface, using special measuring software (optional accessory) can achieve dual coordinate measuring data automatic processing and part shape mapping function, the connection device can print numerical and map output measurement, measurement function and measurement efficiency to further expand and improve the workpiece without precise adjustment and can be arbitrarily placed.

6.2.3 Angle Coordinate Measurement

6.2.3.1 The workpiece is placed on the working table or the vertical working table, and the part size is selected as the objective magnification, and the focus is adjusted.

6.2.3.2 Adjust the angle to the center of the projection screen cross line (as Fig 10).

6.2.3.3 It is rotating projection screen, an arbitrary line alignment angle side angle display value of zero.

6.2.3.4 Again, the rotating projection screen, reticle alignment is on the other side angle, when the angle display value is the measured angle value.

6.2.3.5 A projection screen using line 30°、60°、90°..... (the accuracy is 1) measurement can make some special angles.

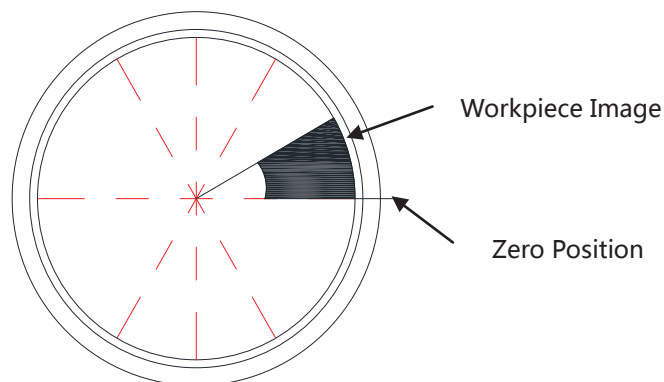


Fig 10 Angle Coordinate Measurement

7. Care and Maintenance

Projector is a light, machine, point and calculator integration of precision optical measuring instruments, the need for regular maintenance and repair. Keep the instrument in good condition, so you can ensure the accuracy of the original instrument and extend the life of the instrument.

- The instrument should be placed in a clean and dry room (room temperature $20^{\circ}\text{C} \pm 5^{\circ}\text{C}$, humidity less than 60%), to avoid the surface of optical parts moldy, rust metal parts, dust debris fall into the instrument guide, the optical system image quality and equipment Of the measurement accuracy.
- Optical parts surface should be kept clean, not touching, above the dust with a soft brush pen. Such as the use of surface stains more effect, can use absorbent cotton or lens paper dipped in a little two toluene or alcohol ether mixture and gently wipe.
- A projection screen working surface grinding surface, try to avoid touching the use. When used for a long time, the screen is dust, oil accumulation, influence of image clarity. At this time, the user can use a clean wet gauze dipped in a little neutral detergent the projection screen wipe gently, stains removed, then wipe clean wet gauze with a few times, to wipe the lotion. Gauze dipped in water can not be too much, so as not to drop to the bench and other metal surface rust, also can be covered with plastic film table. This work if users have difficulty, also can ask manufacturers do.
- Instrument metal naked, with complete or regular use of aviation gasoline wipe clean, and then coated with rust-proof grease to prevent rust.
- The instrument of the lens, the table moving parts, etc. , have high school calibration accuracy, so tightening of the adjustment screw users can not be demolished. If the fault can be requested manufacturers maintenance. Self-demolition, resulting in loss of function, lower accuracy is not a warranty.
- Instrument cooling fan work is normal, the normal use of the instrument, the lamp life is directly related. Users should always pay attention to this problem, should not be found in real time notify the manufacturer maintenance.
- Instrument data measurement system digital form, the factory has been made on the table accuracy of the error compensation, compensation values and other internal settings can not be changed by the user, otherwise, will affect the accuracy of the instrument and normal use.
- When the instrument is not in use, turn off the light at any time: the use of transmission, reflective illumination, in addition to the need, try not to open at the same time, these measures can save energy, the maintenance of good use of the instrument and extend the life of the lamp is good.

8. Instrument Electrical Principle

As Fig 11

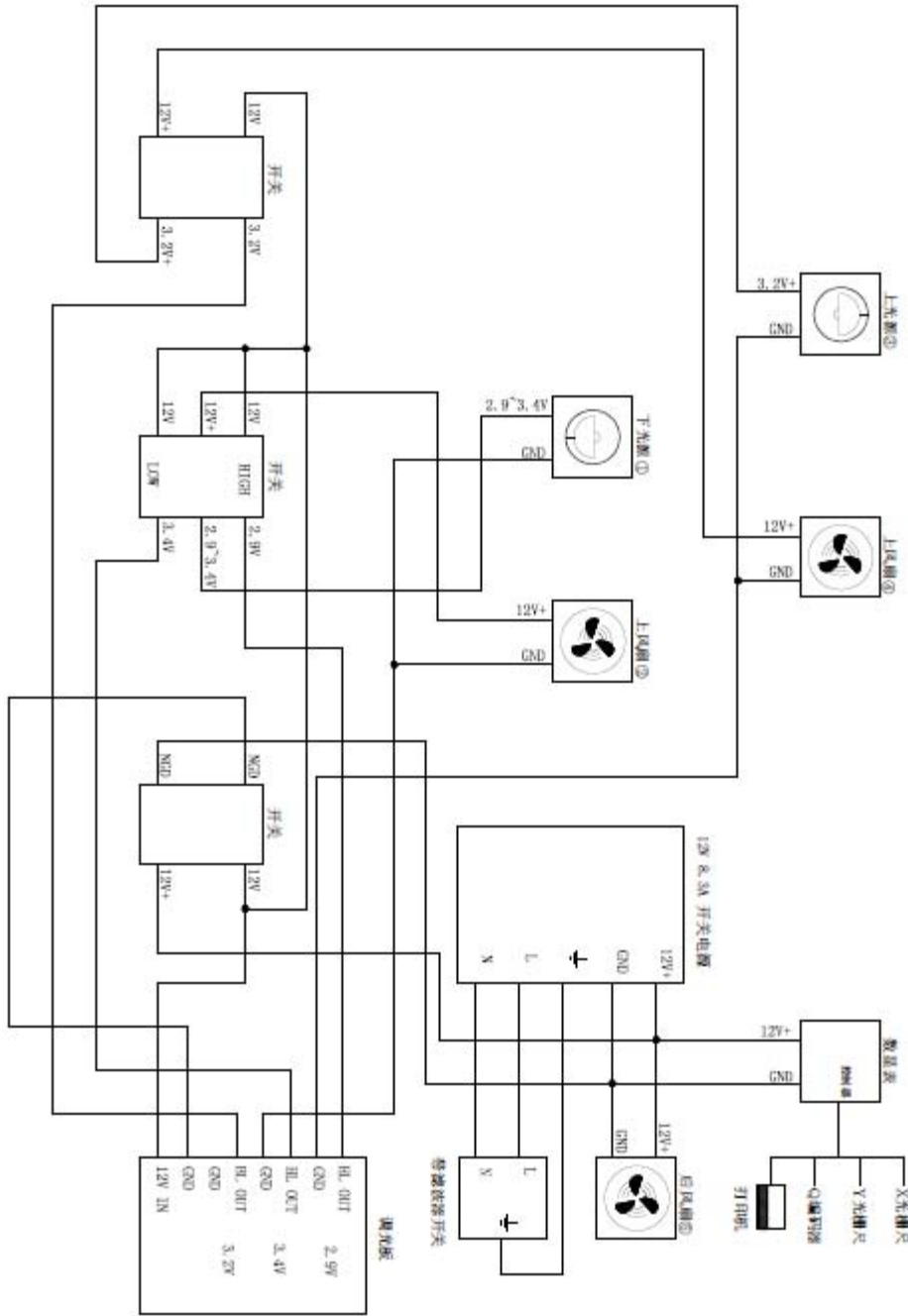


Fig11



ISO 9001:2015 Certified Company



Sinowon Innovation Metrology Manufacture Limited

Address:A1 ,KaiSong Park,2 # Baima Xianfeng
Road,South District,DongGuan,China (523080)

Tel:0086-769-23184144 Fax:0086-769-22854144

Web:www.sinowon.com E-mail:sinowon@188.com

Hotline:0086-137-2828-8444

Authorized Distributors:

