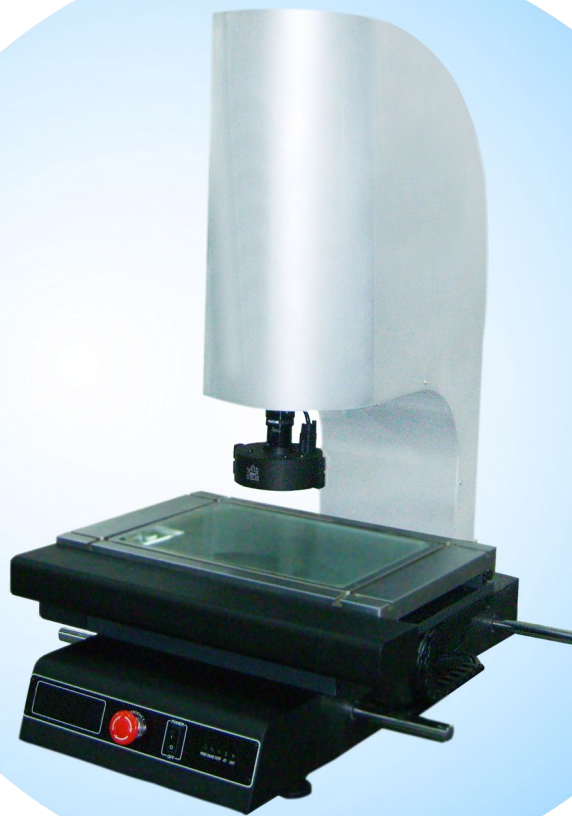


CNC VIDEO MEASURING SYSTEM

OPERATION MANUAL



Safety Precautions



Warning



- ◆ Do not use the instrument with voltages other than the indicated power voltage (AC 110/220V, 50-60HZ), and do not connect multiple instruments to a single outlet as this may result in fire or electric shock.
- ◆ Do not handle the power plug with wet hands as this may result in electric shock.



- ◆ Do not damage, modify, excessively bend, pull on, place heavy objects on or heat the power cord, as this may damage the power cord and result in fire or electric shock.
- ◆ Do not open the cover of the instrument to disassemble or modify the unit or to replace the fuses, as this may result in burn or injury. These actions may also damage the internal circuitry.



Caution



- ◆ When unplugging the power plug, do not pull on the power cord as this may damage the cord and result in fire or electrical shock. Be sure to grip the power plug when unplugging it from the socket.
- ◆ When the unit would not be used for a long time, be sure to unplug the power plug from the socket for safety.
- ◆ Be sure to turn off the power before connecting or disconnecting power and signal connectors in order to prevent damage or misoperation.



- ◆ The unit does not have an explosion-proof structure. Therefore, do not use the unit in an atmosphere charged with inflammable gases as this may result in fire.
- ◆ The unit does not have an earthquake-proof structure. Therefore, do not use the unit in moving areas or areas exposed to strong shocks.
- ◆ would not be used for a long time

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1.Application

CNC Video Measuring System is a high-resolvable and high-efficacious measuring instrument composed of high-resolution CCD color camera, consecutive variable-multiple lens, color display, liner scale, motor motion controller, 2-dimension(2D) data measuring software and high-precision work table. It is mainly used for 2D measurement, but also for 3D assistant measurement. It is widely applied to various precision finishing industries, such as electronic components, precision mould, precision tool, spring, screw processing, plastic, rubber, oil seal valve, camera parts, pedal cycle parts, conductive rubber, PCB processing, etc. It is an essential measuring apparatus for mechanics, electronics, watch, plastic industries as well as academies, research institutes, metric room of measurement and inspection department, laboratory and workshop.

2.Specification

Unit(length): mm

Model Parameter		VMS-2515H	VMS-3020H	VMS-4030H
Work-table	Worktable dimension	450*280	500*330	606*466
	X-Y axes travel	220*120	270*170	370*270
	Z axis travel	150 (focus and accessorial measure)		
	Drive mode	The X,Y,Z- axes are driven by ball screws		
Digit Readout system		Linear scale resolution: 0.0005		
		Computer samples automatically, and the data is input from the USB interface.		
		QMS3D professional software		
Video aiming system		High-resolution color CCD		

	0.7 ~ 4.5× zoom lens, total video magnification 24 ~ 148×. And the total can reach 296× if the 2X lens is used.		
Lighting system	surface light (adjustable LED with 16 areas, 200 levels) and contour light		
X, Y-axis speed	<200mm/s		
Z-axis speed	<100mm/s		
Step motor	0.4 μm/steep		
Motor resolution	10000 steps/rev		
Outside dimensions (L×W×H)	552×670×980	622×685×980	729×898×1020
Weight	140Kg	163Kg	260Kg

3.Working principle

Photoelectrical image measurement is one of advanced precise measuring methods. Its working principle refers to fig.1. Through illuminated of surface light (4) or contour light (embedded in the granite base), the image of the workpiece on worktable will be imaged by zoom lens (5) and then be captured by color CCD and sent to the image card (installed in PC). Then, the PC will read the data from the image card and then analyze and process it. There's no need to move the workpiece during the measurement. Firstly, the step motor will drive the ball screw to move. Then the ball screw will transform the revolving movement of the ball screw into linear movement of the work table (3). Finally, the worktable drives the linear scales to move along the X, Y axes. The whole measurement is controlled by the QMS3D software, which gives orders to the main board to accomplish the procedures of data read, motor control and light control. The working principle if the image system refers to fig.2.



Fig.1 Instrument structure

- | | | | |
|------------------------------|------------------------|------------------------------|-----------------------------|
| 1. Adjustable bolt | 2. Driver of Y motor | 3. Workable | 4. Surface light |
| 5. Zoom lens | 6. Computer | 7. LCD | 8. Z direction linear scale |
| 9. Cover | 10. Post | 11. X direction linear scale | 12. Driver of X motor |
| 13. Y direction linear scale | 14. Lifting hand-wheel | 15. Granite base | |
| 16. Driver of Z motor | | | |

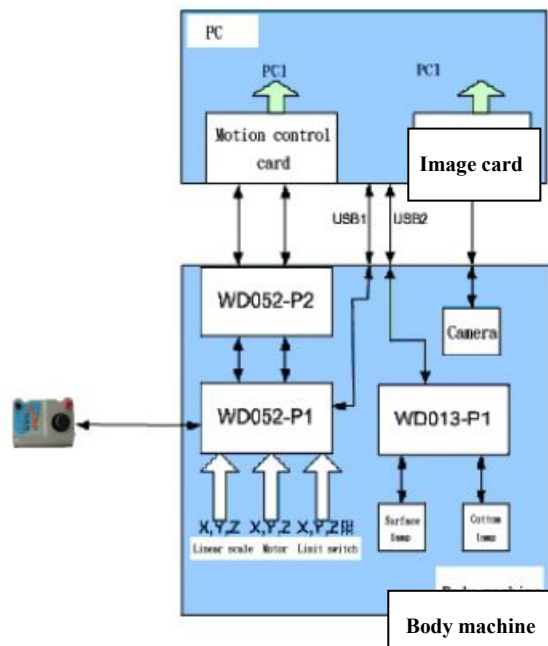


Fig.2 Instrument principle

4.Configuration

Four major parts (fig.1):

1) Main body:

Granite base (15), Post (10), worktable (3) and X/Y/Z ball screw transmission structure driven by motor (3, 10, 14).

2) Image system (for imaging & aiming):

Zoom lens (5): range $0.7 \sim 4.5\times$, video magnification $24 \sim 148\times$.

CDD color camera (in 9): transforming the image captured by zoom lens into electronic signals, then sending the signals to the color display by S terminal.

Computer and LCD (6 & 7): transforming the video signals sent by CCD camera into TV pictures, and then displays it on the LCD.

Contour & Surface light (4): LED light (its intensity is adjustable). The lights have finer illumination and service life 10 times as common lights. The lights are controlled by WD013.

3) Controlling system:

The WD013 receives and executes the orders from PC to accomplish read, motor control and light control.

USB connection indicator light (7 of fig.3) status: on means the USB cable is connected well and flashing means exchanging data.

4) Digital measuring system:

X-axis (11 of fig.1), Y-axis (13), Z-axis (8) linear scales: transforming geometrical displacement into digital signals (Z-axis for assistance).

QMS3D professional software: this is a self-developed software which is used to send orders to the controller and analyze the data from the image card to achieve graphic measurement and data processing.

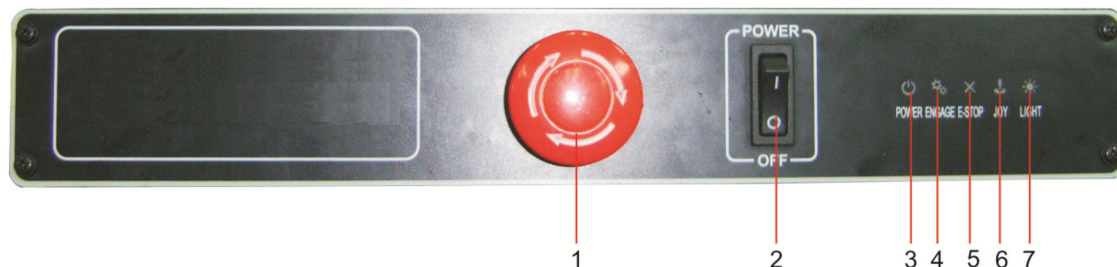


Fig.3 Front panel

1. Emergency stop switch: you can press the Emergency stop switch when a mistake would happen which may damnify the instrument or other, and then the instrument would stop its movement at once.
2. Power switch
3. Power indicator light
4. Motor indicator light
5. Emergency stop indicator light: after pressing the Emergency stop switch, the light will be on
6. Indicator light of the light controller, when the USB between the PC and light controller is communicating normally, the indicator light will be on or flashing.

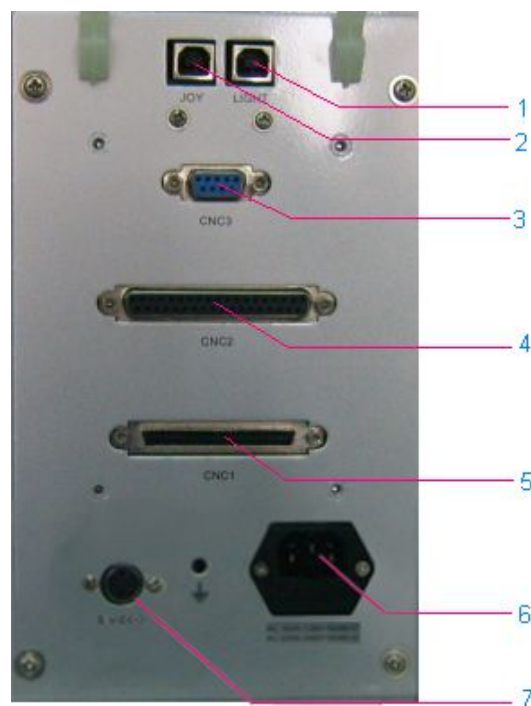


Fig.4 Back panel

1. USB interface of the light controller
2. USB interface of the Joystick
3. Signal cable interface of the Joystick
4. Interface of 37P motion control signal cable
5. Interface of 68P motion control signal cable
6. Interface of S-video signal cable
7. Interface of 220V power cable

5.0peration of the Joystick

Joystick is a easy , convenient and friendly interface. User can measure easing by Joystick.

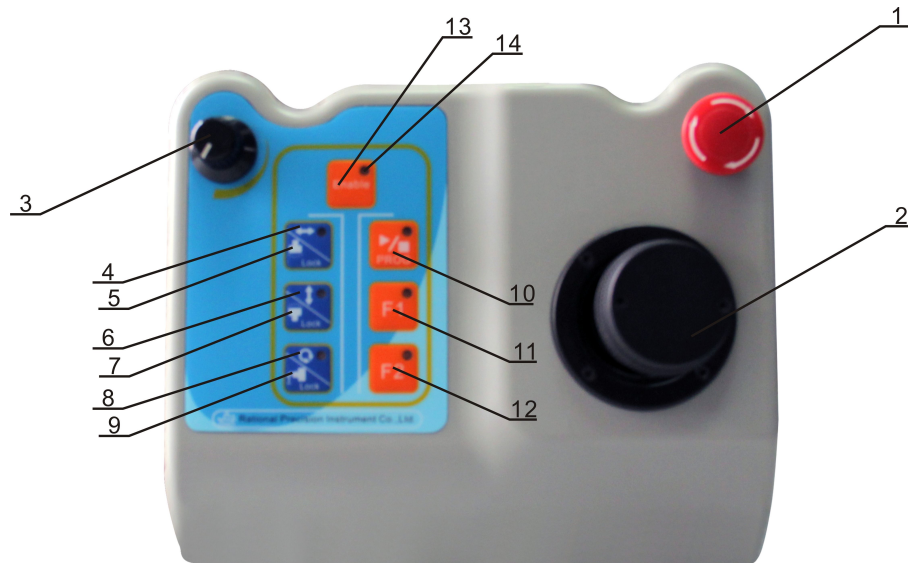


Fig.5 Schematic diagram

1. Emergency button 2. rocking pole 3. Knob 4. X-axis locking button 5. Adjusting surface light button 6. Y-axis locking button 7. Adjusting bottom light button 8. Z-axis locking button 9. Adjusting coaxial light button 10. User program 11 illumination adjusting button 12. Blank button 13. Enable button 14. Indication light



Enable button: Press the button, the indication light is on, the rocking pole is active Press again, the light will be off, and the pole will be disable.



X lock button: under moving mode, when the indication light is on, that means, the X axis moving is locked, press the button again, the indication light will be off, X axis will work.



Y lock button: under moving mode, when the indication light is on, that means, the Y axis moving is locked, press the button again, the indication light will be off, Y axis will work.



Z lock button: under moving mode, when the indication light is on, that means, the Z axis moving is locked, press the button again, the indication light will be off, Z axis will work.



Program button: run or end the program.



F1 button: press F1 Button(LED light will be on),open the illumination adjusting function:

At this time, X, Y, Z axis lock buttons are switched to the second function, three indication lights will be turn off;

1. Press X lock button, only this indication light is on. Rotating the knob, the surface light can be adjusted.
2. Press Y lock button, only this indication light is on. Rotating the knob, the bottom light can be adjusted.
3. Press Z lock button, only this indication light is on. Rotating the knob, the coaxial light can be adjusted.

After finishing the adjusting, press F1 button, (the light will be off). the three lock buttons would be returned to return common moving function.



F2 button: blank button the measuring software can set it different function buttons.

6.Measurement

It includes three measuring modes: Profile measurement, Surface measurement and Height measurement

1) Profile measurement

This mode is to measure the edges of the workpiece with contour light. If necessary we can also use surface light to get the clearer edges.

2) Surface measurement

This is the main function of the video measuring system. As long as we can see the surface size with surface light, we can measure the workpiece. For example: IC, size of circuit on the PCB, and so on. Even we can measure the size of the black Plastic and rubber.

3) Height measurement

When install the high magnification lens, video measuring system can measure the height, such as the step height and the height of the blind hole. The Height measurement can only use the surface light or coaxial light.

Please read the QMS3D operation manual for more details.

7.Unpacking and installation

- 1) Remove the outside and inner packages, take out the Operation manual and read this chapter carefully before operating.
- 2) Lift the body machine on the stand, install the four feet screws and adjust the worktable with the spirit level.
- 3) Remove the fixed plate of X, Y and Z, then the three axes can move.
- 4) The power supply should be AC 110/220V.
- 5) Please review the Operational manual before operating the machine.
- 6) Generally, Agent undertakes the installation.

8.Maintenance

The Video Measuring System is a precise measuring instrument integrating optics, electricity and mechanics. It requires the regular maintenance to keep good measuring status, ensure the measuring precision and extend the service life.

- 1) Place the VMS in the clean and dry room(temp: $20^{\circ}\text{C} \pm 5^{\circ}\text{C}$, humidity: $< 60\%$). Avoid the surface of the optical part to be damaged, the metal parts to be rusted and the dust to fall in the rail.
- 2) Clean the working parts as often as possible after use. You had better to lay a dustproof covering on it.
- 3) Smear the transmission organ and rail with lube periodically. Ensure the instrument in a good status for use. The viscosity of the lube should conform to ISO VG32 -150. The higher viscosity would bring better effect. Usually the replacement cycle is one year.

The quantity of the infused oil is about 1/3-1/2 of the nuts space and the supplies or replacement interval depends on the consumed conditions.

- 4) Clean the stain on the surface of the worktable glass or the paint with neutral detergent or clean water. Do not clean with organic solvent because it will take away the luster of the painted surface.
- 5) The LED light can be used for quite a long time, but user should inform the dealer when it is spent, and the professional would replace a new one for you.
- 6) The precision parts such as video system, worktable, linear scale and transmission organ are adjusted precisely. All the adjustable and fixing screws are already fixed. Do not disassemble them without permission. Do inform the dealer when problems happen. The failure or decrease of precision caused by disassembling the VMS without permission is beyond our repair responsibility.
- 7) Do not unplug the connectors of the VMS. If they are unplugged, plug them correctly and tighten the screws. Otherwise it may affect the function of the VMS or may break down the whole system.

9.Back of the PC

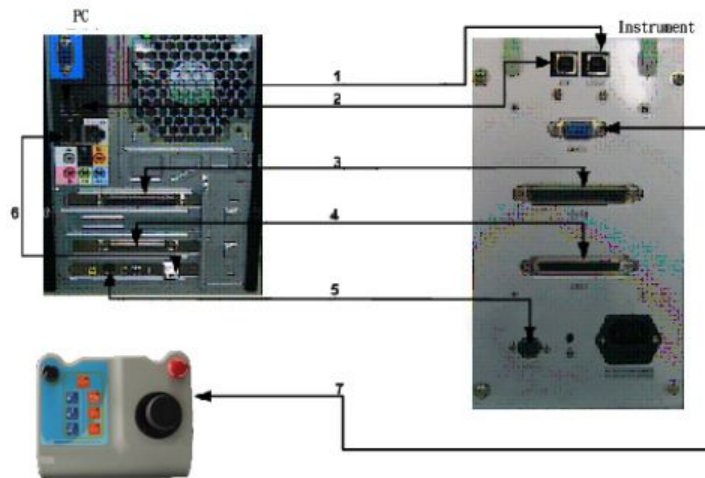


Fig.6 System connection

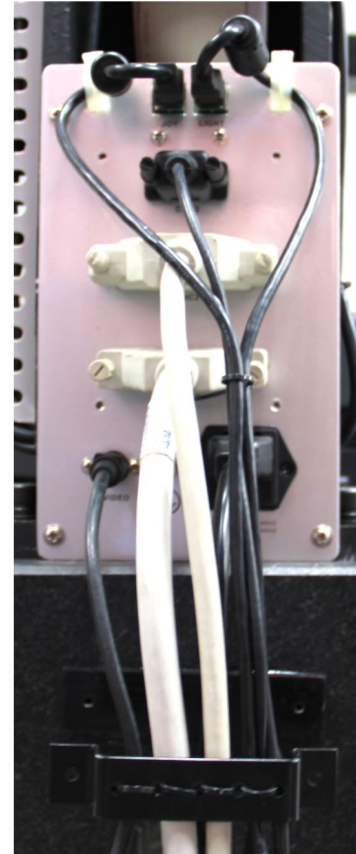
- 1, 2 Standard USB cable 3. 37P motion control signal cable
 4. 68P motion control signal cable 5. S-Video signal cable
 6. Softdog USB cable 7. 9P Joystick cable

10.List of the Instrument

Name	Quantity	Name	Quantity
01. body machine	1	13. 37P cable	1
02. PC (windows XP / windows7)	1	14. 68P cable	1
03. LCD	1	15. 9P cable	1
04. Joystick (WD057)	1	16. standard USB cable	2
05. motion control card	1	17. securing USB cable	1
06. QMS3D software	1	18. operation manual	1
07. calibration gauge	2	19. certificate	1
08. dusty cover	1	20. Packing list	1
09. hole cover for the lifting hand	4	21. 0.5x, 2× add lens	option
10. 2.5A Fuse	5	22. MCP probe	option
11. S-Video signal cable	1	23. Auto-Zoom Lens	option
12. Power cable	1	24. Coaxial light	option



1. The arrangement method of the cable



2. The bundle method of the cable

3. Finished side view



4. Finished front view

