Static Image Inspection System

Operating Manual

Observer Series 3000 PRO MARK Edition

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1 Introduction

1.1 About Our Company

SCG Vision technology Co., Ltd. is a worldwide leader in quality inspection providing based on machine vision, artificial intelligence.

SCG providing all kinds of printing quality inspection product and system based on ten years experiences in large-scale Digital Signal Processing (DSP), high-performance artificial intelligence calculation, micro-chip research, and Advanced Intelligence Vision (AIV), etc.

1.2 About Our Products

Naked eye could not inspect print quality when printing machine working in ultra-high speeds. We can neither shutdown the machine, nor increase the productivity to avoid the defective index. It would increase the cost or lower the productivity effect.

Using web inspection system, especially SCG Observer 3000 is the best way and shortcut to reduce productivity cost, raise productivity effect in real time.

Other inspecting systems on market have many weak points, such as very expensive, with complicated structure, hard to maintain, high running cost, etc. The key feature—sensor was still in 0.3 megapixel level and limit the inspecting ability for today's printing requirements with high-definition, sophisticated color, etc.

200 megapixel High-Definition (HD) sensor, lens and non-loss transmission are introduced by SCG to prints inspecting with Observer 3000 Series. Observer 3000 has freeze, zoom in/out, patrol view functions with any adjustment range, it also brought military-level modularization design, water/dust-proof, and shock resistance function into Observer 3000 series. These will minimum installation, maintenance and training cost during its full-life cycle.

1.3 About This Manual

Assembly and start-up of the Observer 3000 inspection system **MUST** be carried out first after reading and reviewing this manual.

Following the instructions in the operating manual will help avoid danger and to prevent damage to the print quality inspection system caused by improper assembly or operation.

This operating manual and particularly the safety instructions **MUST** be

observed by all persons working on or with the Observer 3000 system.

Before beginning the assembly and start-up procedure, the safety information in chapter 1.7 of this manual **MUST** be carefully read.

Changing or loading software on this system **MUST** be carried out exclusively by SCG staff or authorized by SCG.

Any procedures or actions may cause the **loss of warranty rights.**

The values and data shown in this manual (e.g. in the input screens) are to be considered as examples, unless otherwise expressly stated.

1.4 Symbols Used in This Manual

Thought this manual, you will see some symbols called icons, and these highlight special types of information. We use these to help you better understand and apply the material.

When you see any of the following icons, this is what they mean:

Warning!
You must obey by this type of warning without fail, in order to protect yourself, as the operator, from life threatening injuries caused by dangerous electrical voltages.

Attention!
You must obey this type of warning, in order to protect yourself, as the operator, from bodily injuries arising from mechanical movements.

Tips
This symbol is used to point out additional useful tips, which will help you make optimum use of all the functions.

1.5 More New Features

More new and bright features are available as below：

- Analyzing print quality easily with screen freezing function.
- Multi-direction rotating with X / Y / XY axis.
- Spilt screen function with reference image saved in memory for directly comparison of the live image against a reference image.
- Color Vector Analysis Function to analyze the information of print products accurately, and provide real-time CMYK index for reference.

1.6 System Components

SCG Observer 3000 printing quality inspection system consists of the following main components as Chart 1-1.

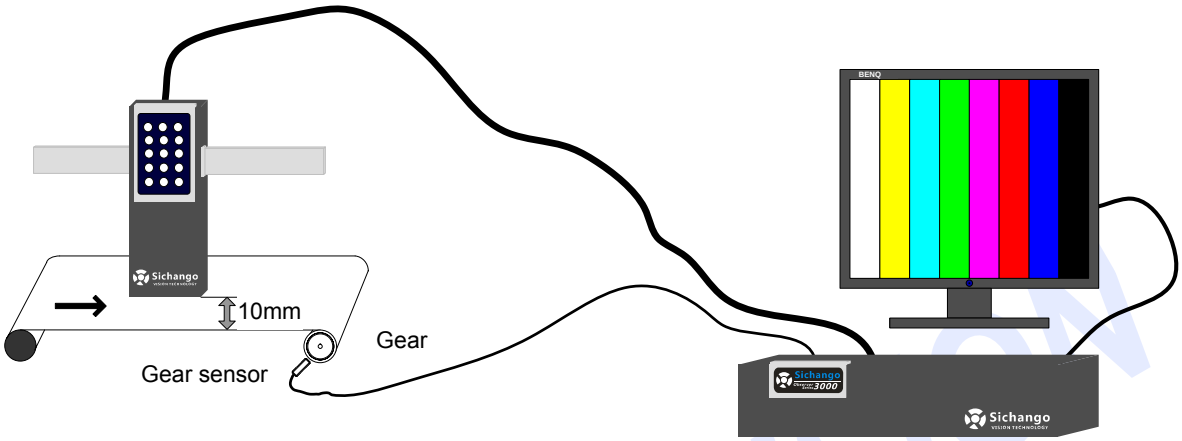
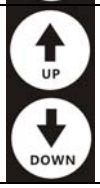


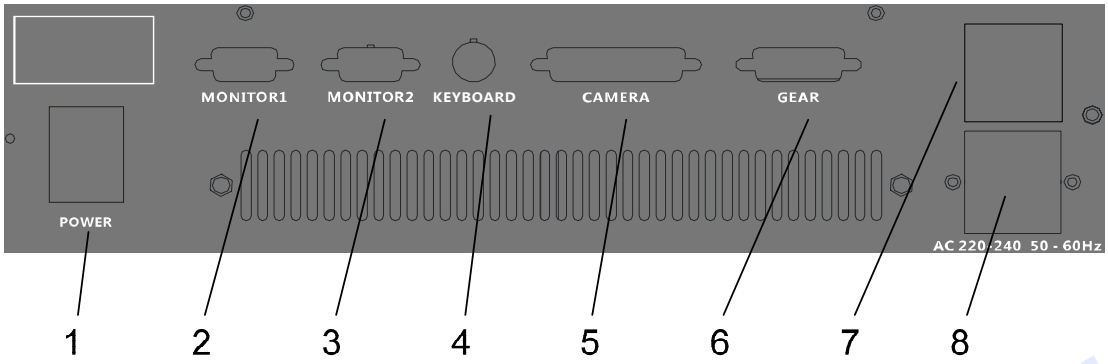
Chart 1-1

1.7 Control Panel Fitted To the Camera Unit

Key functions of menu control

Function Key	Description
	● Menu control: Reset all factory function. ● Menu control: Save lens parameter data
	Camera control: Camera mode selection function which shift between AUTO and SNAP.
	Camera control: Split Screen mode function which circle from Normal, Whole Screen Freeze to Split Screen (by Left/right).
	Camera control: Image Rotating. Function circle switch the image from Normal, By X axis, By Y axis, to By X+Y axis.
	Camera control: Decrease brightness
	Camera control: Increase brightness.
	Camera control: Zoom in, reduces the image area displayed on the screen (showing more detail).
	Camera control: Zoom out, enlarges the image area displayed on the screen (showing less detail).
	Camera control: Increase lens focus.
	Camera control: Decrease lens focus.
	● Menu control: in major screen, it calls on function menu. ● Menu control: confirm function at each menu function.
	Menu control: Left and right function in each menu function. Including: PPL and Gear number.
	● Menu control: up and down in menu. Including: PPL and Gear number. ● Menu control: increase/decrease image position in web running direction with 1 unit.

1.8 Controller Connections



Pos.	Function
1	Power Switch
2	VGA signal connection to monitor 1
3	VGA signal connection to monitor 2 (optional)
4	Keyboard connection (optional)
5	Camera unit connection. Power supply for the camera unit and signal transfer to and from the camera unit.
6	Gear, connection for proximity sensor/digitizer/etc Power supply for the sensor/digitizer/etc, and signal transfer from the sensor/digitizer/etc.
7	Main power supply (220V AC, 50~60Hz)
8	Monitor power supply (220V AC, 50~60Hz)

Warning!
DO NOT cover the air outlet, or temperature in cabinet will rise high.

1.9 Safety information

The Observer 3000 has been designed to be installed in another machine or to be integrated with other machine to form a single system in compliance with directive 98/73/EU (Machinery Directive).

It's forbidden to commission the Observer 3000 system until the user/operator has determined that the machine in which the Observer 3000 system has been installed, complies with the specifications given in this directive.

Installation of this system onto a production line must be done in accordance with the relevant rules (EN 294, EN349) and the specific local, regional and national regulations for prevention of accidents, such as:

- Specification for safety distances between SCF equipment and customer's machine, e.g. machine walls, open areas, around rollers,

etc.

- Installation of connecting cables between the individual system components must be well anchored, without excess tension and places in such a way as to not be a safety hazard.

- Take care of free headroom.
  If the free passage is limited, respective building components have to be labeled and painted in tallow and black.

- Handling the camera cable:
  It must not to be kinked:
  Lay with minimum bending radius=100 mm (4'')

- Cable connectors (e.g. between camera and controller) should only be disconnected when the controller is no longer connected to the mains supply (mains plug of the controller has been removed). Any infringements will result in **the warranty claim being invalidated**.

- In principle, the complete system does not have ATEX certification, i.e. you are not permitted to use it in area where the danger of an explosion exists!
  Specially designed parts (sensors, etc.) that are ATEX certified are marked accordingly. You must abide by the installation instructions and the details stipulated in the manufacturer's documentation without fail!

- Before installation and start-up remove all packing materials (if present).

Assembly, installation and commissioning must be carried out only by qualified personnel!

Switch off the mains voltage before opening the controller and before opening and reaching into the camera unit. If it becomes necessary to work on the open equipment with voltage applied, then only protection class IP 00 is provided. There is always increased danger because of the mains voltage!

- Disconnect the main supply connecting cable and wait 10 minutes, and then discharge the capacitors. The work can only be carried out when this has been done! It is not sufficient to just turn the system off!

Never use the traverse of the camera unit as a tread or a step ladder. Do not remove and safety devices.

2 Technical Data

2.1 Complete System

Power supplies:	100V ~240VAC 47~63HZ	
Fuses:	Ceramic fuse, 7.5A/250V AC	
Web speed:	Max. 600m/min	
Max number of tooth per gear sensor	Max 10000	
Ambient conditions	Temperature:	0 to a max 40℃ (0 – 104 ℉)
	Humidity:	20% -80% No condensation
Place of installation:	In closed buildings < 2000 m height above sea level	
Protection class:	IP 20	

2.2 Camera Unit

Visible field of view:	90mm X67.5mm (3.5'' X 2.6'')	
Image recording frequency:	Max. 10 images/second	
Magnification:	30x	
Case dimension:	H = 290 mm (11.4'')	
	B = 110 mm (4.3'')	
	T = 160 mm (6.3'')	
Weight:	Approx. 2.9 kg (6.39 Lbs.) (Without traversing system)	
Connecting cable length:	Standard:	2.5 m (8.2')
	Optional:	1.8 m (5.8')
		3 m (9.8')
		5 m (16.4')

2.3 Controller

Case dimension:	H = 90 mm	(3.5'')
	B = 350 mm	(13.8'')

	T = 350 mm (13.8'')
Weight:	Approx. 5.6 kg (12.35 Lbs.)
Connecting cable length:	Standard: 1.8 m (5.9')

2.4 Monitor

Monitor size:	Standard:	17'' LCD 4:3
	Optional:	19'',22'',24''
		4:3, 16:9, 16:10
Monitor connecting cable length:	Standard:	3m (9.8')
	Optional:	1.5 m (4.9')
		3 m (9.8')
		5 m (16.4')
Power supply connecting cable length:	Standard:	3 m (9.8')
	Optional:	1.8 m (5.9')
		3 m (9.8')
		5 m (16.4')

2.5 Inductive Proximity Sensor

Protection class:		IP 65
Sensor	**Gearwheel sensor**	NPN/PNP type
		Diameter: Φ4/Φ8/Φ12/Φ19
	Inductive sensor	NPN/PNP type
	Rotating sensor	Incremental/absolute encoder
	Without sensor	Getting sync pulse signal from printing control system
Sensor connecting cable length:		2~15m (6.56'~49.2') by customer requirements

2.6 Traversing System

Traverse length	Max. 1.5m (4.92')
Single cantilever	Max. 600mm (23.6'')

3 Transportation

The SCG Observer 3000 video web inspection system is supplied ready for installation.

The equipment is shipped as pre-assembled components:

1	Camera unit	Observer 3000 Camera	1
2	Controller	Observer 3000 Controller	1
3	Monitor	19'' LCD monitor (standard)	1
4	Connection cable	2.5m (standard)	1
5	Monitor (VGA) connecting cable	3m (standard)	1
6	Power supply cables	1.8m/3m (standard)	2
7	Traversing system	As required	1
8	Operation manual		1

All in standard boxes and protected by foam panels.

If the components will not be assembled immediately, they should be stored in a dry room until required.

Storage conditions	Temperature:	-10 to a max 55℃
	Humidity:	10% -95%
		No condensation

4 Installation

4.1 Locating requirements

Installation site:	Normal printing works	
	with a **non-explosive** atmosphere	
Ambient conditions:	Temperature:	0 to a max 40℃
		(0 – 104 ℉)
	Humidity:	20% -80%
		No condensation

4.2 Installation

4.2.1 Installing the Traverse

Install the traverse together with the camera unit in the press in accordance with the accompanying installation diagram.

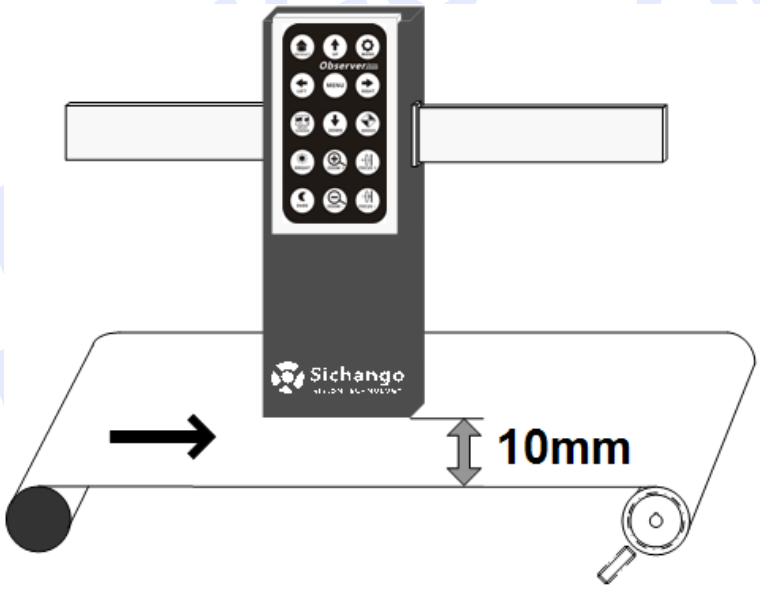


Chart 4-1

4.2.2 Installing the gear sensor

Install the sensor in right way and right place is the key to use our device correctly.

Gear sensor can be installed on the gear of plate cylinder, or the gear linking with plate cylinder with the same linear velocity.

Shaft joint is another choice when using photoelectric encoder.

How to install two major gear sensors will be introduced below.

The installation of sensor **MUST** be carried out only by qualified personal under the guide by Sichango.

Sensor with REDLION

Redlion gear sensor is a NPN type sensor with Φ19mm, length 101mm, the distance between gear and sensor should be 0.4~3.5mm.

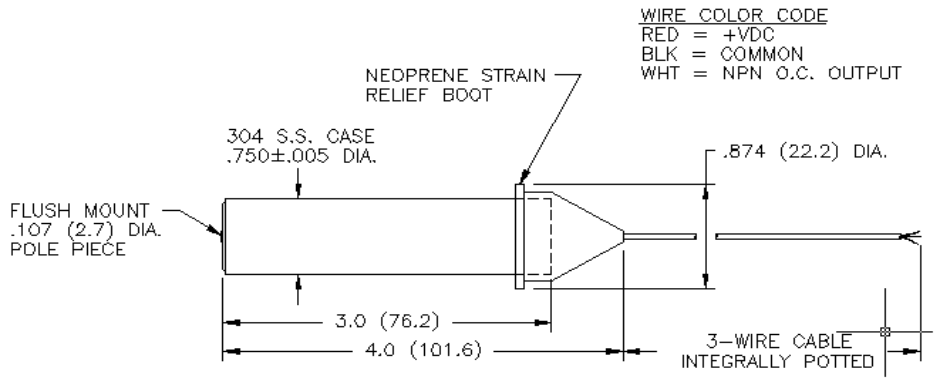


Chart 4-2

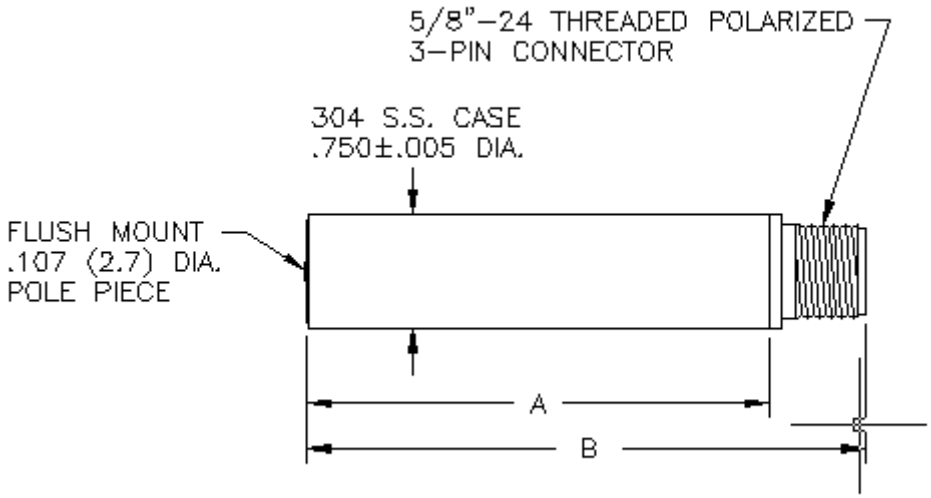


Chart 4-3

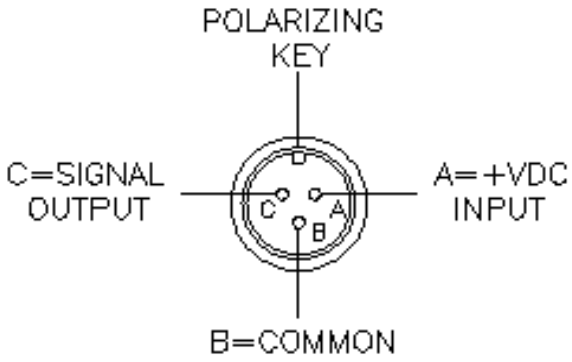


Chart 4-4

Universal mounting bracket for Redlion sensor (Option).

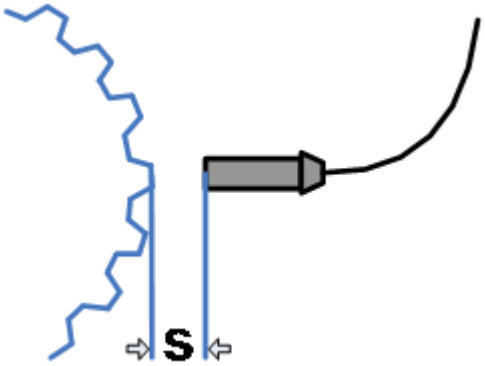


Chart 4-5

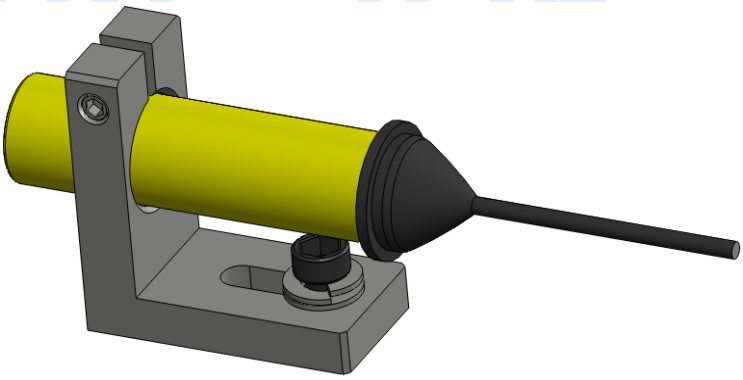


Chart 4-6

Sensor with OMRON

Omron gear sensor is a NPN type sensor with Φ4mm, length 25mm, the distance between gear and sensor should be 0.2~0.4mm.

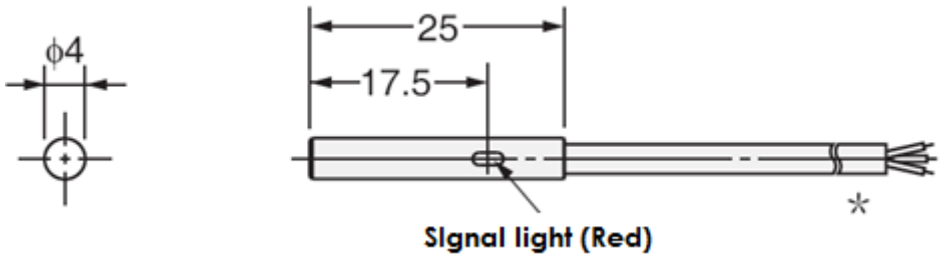


Chart 4-7

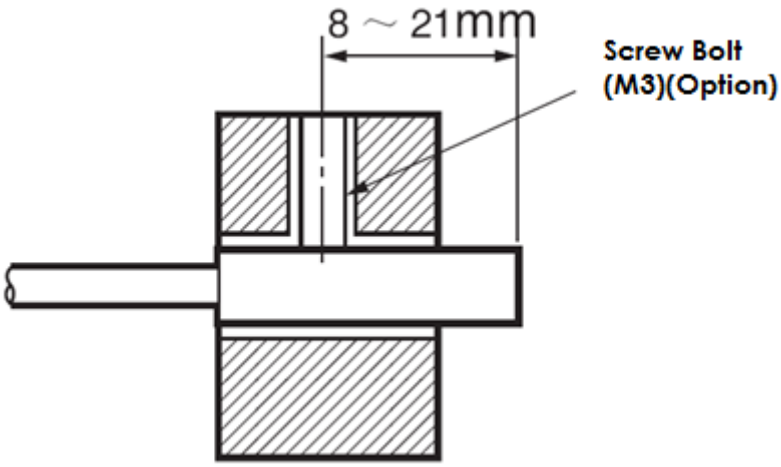


Chart 4-8

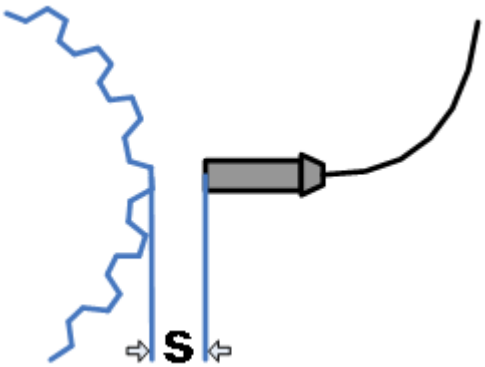


Chart 4-9

Universal mounting bracket for Redlion sensor (Option).

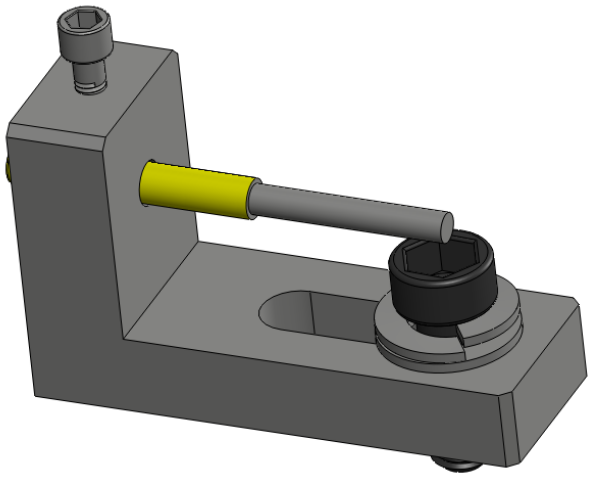


Chart 4-10

Tips

The distance between OMRON sensor and gear is not easy to handle, you can use a name card or serveral A4 paper insert into the gap and press the gear head to the gear, when draw out the paper to make the correct distance.

You should monitor the result from low speed to high speed of the print machine on LED display and adjust the distance as needed.

5 Operation

5.1 Turning on the System

1. Turn on the main switch on the back of the controller.
2. Turn on the monitor power.

SCG Observer 3000 will run for a few seconds in Test Mode with this screen show as below:

Chart 5-1

In Test Mode, system will check RGB colors, if these colors are not in normal condition, pls check monitor cable or monitor.

The camera unit will flash for once.

After initialization, system will into main menu.

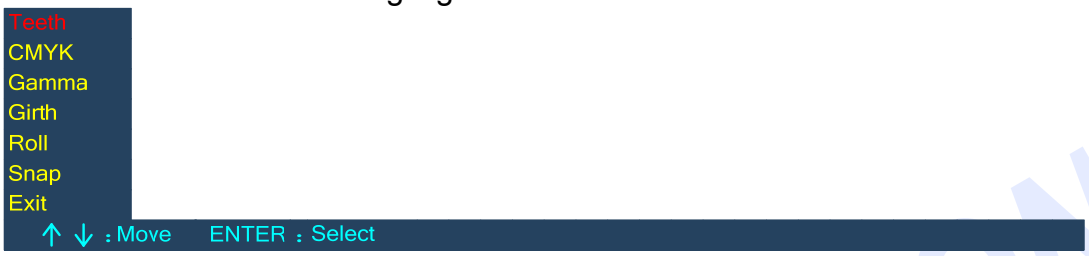
5.2 Setup Sensor Parameter

SCG Observer 3000 can accept varieties of sensor's signal, these signal

will provide position data to system. It will work precisely with correct gear parameter configuration of tooth number.

Please setup the tooth number parameter of gear sensor as follow:

Press MENU to call on function menu, using UP move to “Tooth Number” in menu. This sub-menu will highlight with red.



Press MENU into sub-menu of “Tooth Number”, using UP and DOWN to modify the number quickly with 10 per press. Using RIGHT and LEFT will precise modify tooth number with 1 per press.

Press MENU to quit current menu, system will save the tooth number result.

The number: 0 or 1 have same results means to flash once when accept 1 signal.

5.3 Selecting Operating Mode

SCG Observer 3000 can be run in any of the two operating modes: AUTO, SNAP. Use MODE to switch between these two modes freely.

5.3.1 AUTO Mode

In AUTO mode, camera will take the image with frequency in 3 times per second. Signal from sensor will be ignored by system. Mode type on main screen will show with AUTO mode.

图 5--4

5.3.2 SNAP Mode

The system is synchronized to the web by sensor such as gear sensor, inductive proximity sensor, encoder or digitizer in SNAP mode (operating mode). The image displayed on the screen is up-dated with each flash.

图 5--5

5.4 Adjusting the Image Position

5.4.1 Adjusting the Image Position in Web Running Direction

SCG Observer 3000 System divide the distance between two shots of camera into 1024 units from 0 to 1023 which operator can adjust the image position with these two arrow keys 

.

The two arrow keys on the camera unit are used to move to the required image position in web running direction in SNAP mode.

Notice when using these two keys:

- Press the arrow key that corresponds to the required direction in order make slight movements in image position.
- Press and hold the arrow key for at least 2 seconds to make major movements in image position.

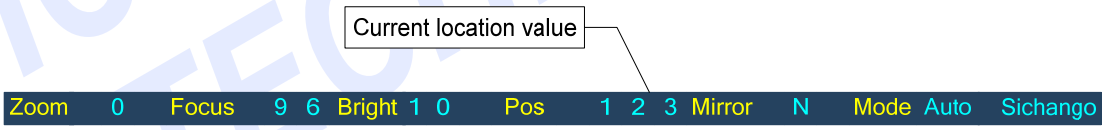


图 5—6

5.4.2 Finding register mark with inching feed

When printing machine begin to work or change print material, operator is going to find the register mark to check printing quality.

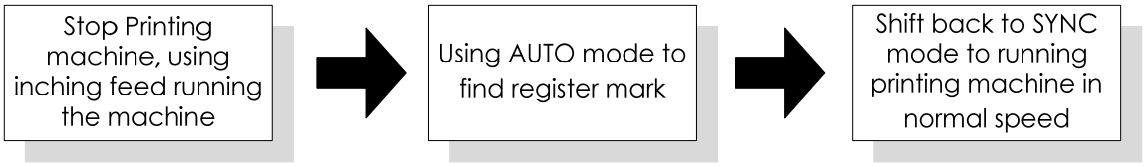
At this situation, you should stop paper feeding, press 

shift to AUTO mode, press 

and zoom out to 0, using printing machine “inching feed” function and move the camera by hand to find the register mark, adjust the zoom and focus to get the clear image of register mark.

When the mark is clear, press 

and shift back to SYNC mode, start the printing machine in normal speed.



5.4.3 Finding registration mark with high shooting frequency in low printing speed

when you want to find printing registration mark during printing, please low down the printing speed of printing machine. Press 

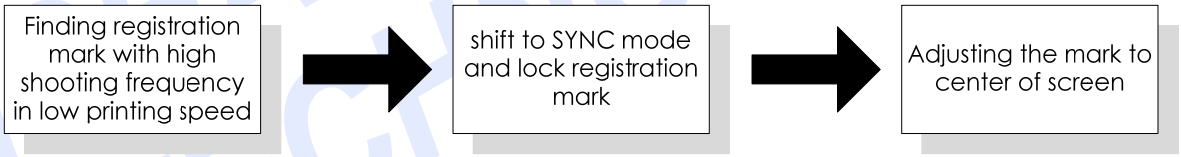
first and adjust multiple to 0, click 

once and shift from SYNC mode to AUTO mode, click 

once into high speed auto shooting status, using 

to find registration mark on screen. Press 

once again into SYNC mode when registration mark was found. Move the camera to make registration mark to the center of screen display, adjust camera multiple, focus until the object is clear. The workflow is:



5.5 Lens Control

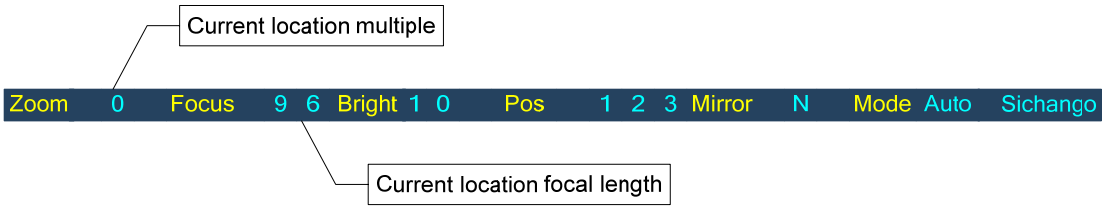
5.5.1 Zoom In and Out

SCG Observer 3000 has a 12X optical magnification lens, it divided into 64 classes from 0 to 64. The lens will initial to 0X when turn on the system. Operator uses 

to adjust lens magnification.

System provides lens focus adjustment function to avoid any affection during turn on/shut down the printing machine, system installation. Operator uses 

to adjust lens focus to get clear image. Lens focus range is between 10 and 2208. Lens magnification and lens focus parameter will show on bottom menu bar with number.



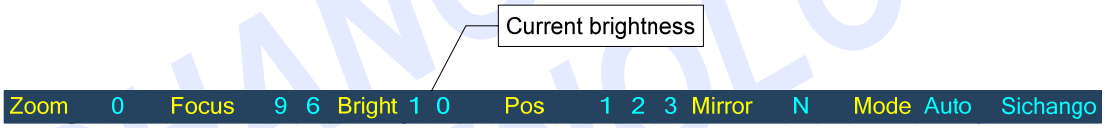
When distance between camera and print materials is changed and lead to image out of focus, then adjust the lens magnification and focus manually with careful:

- Adjust lens magnification to 64X.
- Adjust lens focus manually until the image is clear.
- Increase or decrease lens magnification as needed during system use, slight adjust lens focus to get clear image.

5.5.2 Brightness Adjustment

System default brightness is set as 48, use 

these two keys to adjust the brightness. The brightness range is from 0 to 96, the number is showed in bottom menu bar.



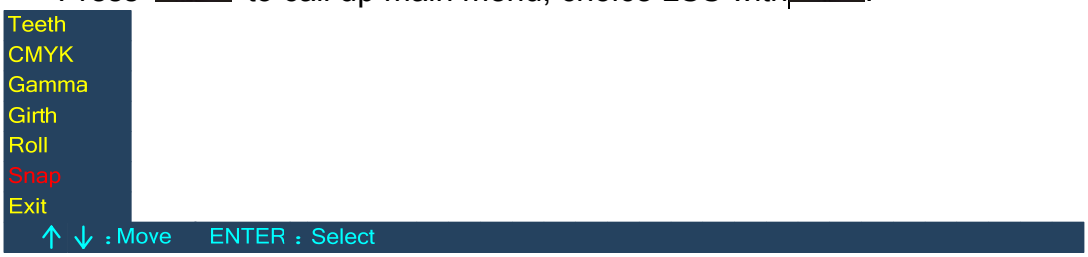
5.5.3 Low Speed Shooting(LSS)

Stroboscopic lamp can be adjusted to Low Speed Shooting (LSS) status to save the lamp's life when printing machine into stable running status. Shooting speed can be lower to 1/9 of normal speed maximum.

Press 

to call up main menu, choice LSS with 

.



Press 

into sub-menu of LSS, use 

to adjust LSS value per click from V1 to V9.

Press 

to quit current menu, system will save the change. Initial value is V1

5.5.4 Printing Plate Length (PPL)

The length of printing plate, operator can adjust the value in parameter setting.

Press 

to call up main menu, choice PPL with 

.

Press 

again into sub-menu of PPL, use 

to adjust PPL value per 1 mm by each click, or using 

to adjust 10 mm per click.

.

Press 

to quit current menu, system will save the change. Initial value is 0 mm.

5.5.5 Gamma Correction

Press 

to call up main menu and choice sub-menu “Gamma”.

Press 

into this function and use 

to open/close Gamma function. Press 

again to quit current menu, system will save the change.

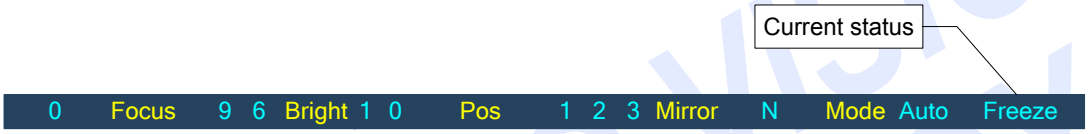
What is Gamma Correction:

Gamma Correction can edit the gamma curve of image which to modify non-linear color of image and increase the contrast of image with finding dark and light signal.

5.6 Screen Split and Freeze

SCG Observer 3000 provide screen split and freeze function during web inspection.

Press  once to into screen freeze function. The screen will freeze ignore sensor's signal. "Freeze" status will show in bottom menu bar.

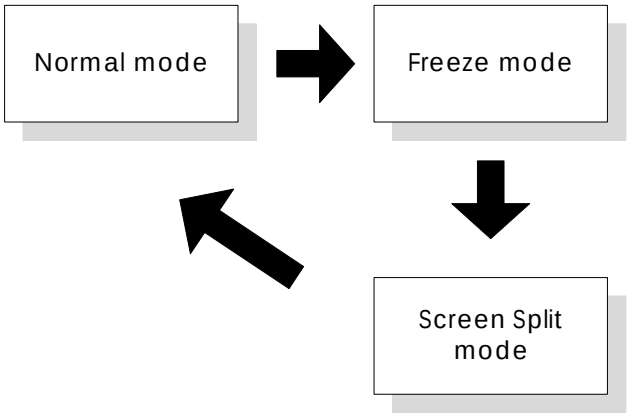


Press  once again to into screen split function. It enables the current captured image (right image) and a saved reference image (left image) to be displayed simultaneously on the screen.

This enables a continuous visual comparison to be made between the current print, which is displayed in right half of the screen and a saved "reference", which is displayed on left half of the screen. The "reference image" will remain saved in the system's reference image store during operation until it is overwritten by a new "reference image".

The content of the reference image store will be deleted when quit this function.

Press  again to quit screen split function.



5.7 Auto-rolling

Press MENU once to into function menu, and press UP twice to scroll to "Rolling" function, the characters on chosen menu will turn into red.

图 5—16

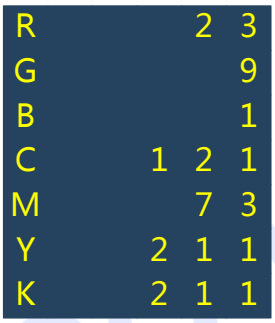
Press MENU into sub-menu of "Rolling" function, press RIGHT and LEFT to edit rolling direction and speed. When adjust to needed status, press MENU and quit current sub-menu, new rolling status will be saved.

图 5--17

5.8 RGB/CMYK Analysis

Press MENU and choice "RGB/CMYK Analysis" function.

When into this function, “analysis data zone” will show on right top screen, and with a sampling box  . The RGB/CMYK data of color in sampling box will show in the analysis data zone.



Using 

key to move sampling box on the screen. Press the key for at least 2 seconds to make a quick movement on the screen.

Press 

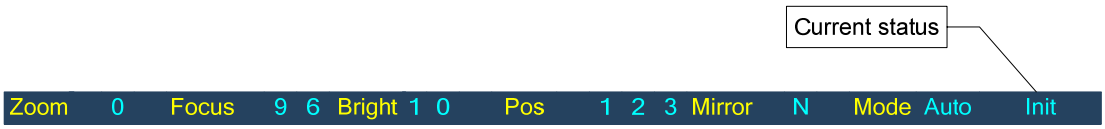
to quit current function.

5.9 Restore Factory Settings

Press 

and 

at same time for at least 3 seconds to restore factory settings, then shut down and restart the main power, adjust the lens focus and magnification.



5.10 Language Selection

Hold 

and 

together for at least 3 seconds, system will switch between Chinese version and English version.

6 Trouble Shooting

No.	Fault	Reason	Solution
1	Stroboscope doesn't flash in any mode	System does not power on	Open system power
		The cable between controller and camera does not in good condition.	Shut off system power and check the cable carefully.
		Controller's fuse is break down.	Check and change.
		Input voltage is not 220V.	Check the voltage.
2	System is good in AUTO mode but not in SNAP mode	SNAP signal cable plug does not in good conditions with controller.	Fasten sensor cable plug with controller
		The material of gear does not match the sensor.	The gear MUST be magnetic material such as iron or steel, nylon and plastic can not work.
		The distance between sensor and gear does not correct.	Adjust the distance between the sensor and gear. The sensor MUST aim the center of gear.
		The gear cable has error or be broken.	Change the sensor and cable.
3	System work correctly, but image is unstable	System in AUTO mode.	Shift to SNAP mode.
		Gear number is wrong.	Config to right gear number according to plate cylinder gear number.
		System in Auto-rolling mode.	Set the Auto-rolling to "stop" and check again.
		The install angle or distance does not fit system requirement or sensor is damaged.	Adjust the sensor or change a good one.
4	In SNAP mode, system work correctly in low speed, but does not get image in high speed.	The install angle or distance does not fit system requirement.	Adjust the distance or angle to the gear.
		Scrap iron attached to the sensor.	Iron scrap on the sensor will affect the signal, the sensor MUST keep clean all the time.
5	Stroboscopic lamp in high light or low light, or	Error occurred in stroboscopic lamp.	Change the stroboscopic lamp unit.

	does not work during printing.		
6	The initial screen is lacking some color when turn on the system	Poor contact of monitor connecting cable.	Fasten the plug of cable or change the cable.
7	System display welcome screen in pink color.	CMOS sensor error or damage.	Change the camera unit.
8	OSD parameter showing 1 or 2 and doesn't work when system turn on	Camera motor position error.	Change the camera.
9	The stroboscopic lamp works, but system does not display.	Display is power off.	Open the display power.
		Display cable power is loose.	Re-connect or fasten the power cable.
		Display signal cable is loose.	Re-connect or fasten the power cable.
		Camera cable is loose or damage.	Re-connect or fasten the signal cable.
10	Camera focus is clear in one point but not clear in other point on the traverse	The traverse does not parallel with printing material.	Adjust the traverse with printing material to parallel.
11	System and image is correct, but image will move slowly in one direction in SNAP mode.	Gear number setting is wrong.	Config to right gear number according to plate cylinder gear number.
		System in Auto-rolling mode.	Set the Auto-rolling to "stop" and check again.
		Gear sensor sync signal is interfered.	System MUST have good earthing to the ground. If has no good earthing ,please earthing with printing machine base plate.

7 Maintenance

7.1 Warranty

We will replace the fault part during warranty (typically one year or defined in contract).

When out of warranty, appropriate cost will be charged depends on fault situation when fault part express back to us.