polaroid

POLAROID T-REX PLUS
Flat Bed UV Printer

USER MANUAL

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Table of Contents

POLAROID Digital Printing System

POLAROID Digital Printing System, reserves the right to make changes without prior notice to the specifications and materials contained herein and shall not be responsible for any damages (including consequential) caused by reliance on the materials presented, including but not limited to typographical, arithmetic, or listing errors.

This equipment has been tested and found to comply with the limits for a class A digital device. Pursuant to part 15 of the FCC Rules, these limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which the user will be required to correct the interference at his own expense.

This printer is a color inkjet printer that uses a UV-curable ink, has a built-in USB interface. This manual, the User's Guide, describes the features of the printer, names of components, information needed before use, and basic operations, such as how to turn the power ON and OFF, loading and setting of the media and loading of ink.

The following items should be read before proceeding to Section 1;

- Contents of the package
- Safety precautions
- Handling precautions
- Notion

Read these items to use the printer safely and properly. Keep this manual in a place where you can quickly access it any time.

Disclaimer

This is an alpha release of the User's Guide for POLAROID T-REX printer. We have made every effort to guarantee the accuracy and integrity of the information in this manual. If you find some errors or omissions, please bring them to our attention so we can check and correct them accordingly.

This manual can be used as a reference for operation and routine maintenance of the POLAROID T-REX printer. It cannot be a replacement for the formal training provided by POLAROID Technology, regarding on how to operate the printers properly. POLAROID Technology, will not take any responsibility for the consequences of misusing this manual and appendix.

Manual Usage Conditions and Limitations

The manual includes patent information, which belongs to POLAROID Technology, the purpose of which is to help the authorized customers. Without the written permission from POLAROID Company and the public declaration, any content of this manual should not be used for other purposes. The text and images are subject to change without prior notice. Any software mentioned in this manual is provided by permission. Use or copy of this software must be according and to follow prior regulations. If the information in this manual has changed, there will be no further notice unless it is specified.

Contents of Package

The internal printer components, including the options, are installed on the main unit on delivery. The print heads and extension table assembly are included on a separated box within the main crate.

If any parts are missing or damaged、contact the shop or dealership where you have purchased the product or the nearest service center.

Printer Introduction

The POLAROID T-REX printer is a wide format digital printer suitable for small up to medium size business use. It uses a UV curable ink, which is environment friendly. It provides high productivity and is capable to replace traditional silkscreen printing. This type of printer is widely used in the fields such as advertisement, packing, printing, interior decoration, POP board, glass work, flexible packaging, wooden work, printing circuit board, etc.

POLAROID T-REX series printers uses drop-on-demand and Piezo-electric technology. It can print colorful and wide image by using the highest 1440x1440 dpi resolution. It can output any size of images with "tile" feature in the software. Indeed, it is a combination of roll-to-roll and rigid board printer.

Table 1 General Features

Technical Specification:

Print			
Model	POLAROID T-REX		
Print Size	2500*1300mm		
Print Head	4~9 industrial print head		
Daft	45sqm/h	64sqm/h	85sqm/h
Production	35sqm/h	54sqm/h	65sqm/h
Quality	24sqm/h	31sqm/h	44sqm/h
Super	18sqm/h	26sqm/h	32sqm/h
Resolution	Up to 1200dpi		
Print Technology	Piezoelectric inkjet, Grayscale Technology		
Ink Types	LED UV curable ink		
Ink Configuration	Standard CMYK, Lc, Lm, White, Vanish (Optional)		
Ink cartridge size	2.5 Liter		
Image process Software	Aurelon , Caldera, Onyx Optional		
Color management	ICC based color, adjustment curves, density adjustment		
Operating System	Windows 10 64bits USB2.0/3.0 Hard Ware 500G+		
File format	Tiff, Jpeg, Postscript, EP/ PDF, etc		
Media			
Media Thickness	0-10cm		
Platform	Divided into 4 independent suction area for various media size printing		
Media	Acrylic, wood, glass, ceramic, metal, PVC, industrial film, etc		
Ink Supply	Negative pressure system Ink level sensor to alarm		
Curing System	LED UV lamps		

Dimensions	
Printer	4760mm(L)*2096mm(W)*1592mm(H)
Package	5000mm(L)*2250mm(W)*1900mm(H)
Weight	
Printer	1500 KG
Package	2000 KG
Operating Conditions	
Temperature	20 to 30°C
Relative Humidity	30% - 70%, non-condensing
Electricity Request	
Power	6000W 28A
Requirements	220 VAC, single-phase, 50Hz
Warranty	One year limited warranty(Please contact your local dealer for details)

Table 2 Polaroid T-Rex Plus UV Printer Model Coding

Code	Explanation
POLAROID	Brand Name
T-REX PLUS	Product series name
PP	Flat Bed Printer
Print size	250 cm X130cm maximum size of media it can print
UV	Ink Type

Table 3 POLAROID T-REX PLUS UV Printer PC configuration

CPU	core i7
Memory	8G
Hard disk	SSD 500G
Interface	USB2.0 and USB3.0

About the manual

The manual provides the end user all the information related to the machine basic functions, software installation, machine parameter calibration, maintenance and troubleshooting of POLAROID T-REX.

Chapter 1 - Safety Operating Instructions

1.1 Brief Introduction

This chapter introduces the important safety information. Please read and understand the safety information carefully before operating the printer.

1.2 Safety Information

POLAROID printer uses the following chemical substances

- All kinds of printing media
- UV Ink
- Cleaning liquid (UV Flush)

1. 2.1 Solvent and Ink Properties

- Solvent and Ink are flammable.
- Eye contact with the ink and solvent will break the cornea and weaken the eyesight.
- Contact lens should not be worn when operating printer or when there is no proper ventilation.
- Wear safety glasses and gloves while flushing print heads, ink tube or moving the ink bottles or containers.
- Solvent and ink can be irritating to eyes, throat and skin. Inhaling the ink fumes would result in swoon or other symptoms.
- Solvent vapors are heavier than air and may flow and gather in low spot.

This caution symbol represents danger. If this sign is ignored it may lead to serious injury or damage to the printer.

1.2.2 Danger of Fire and Explosion

Open flames, heat energy or spark around the printer can trigger fire and explosion.

- No smoking, pilot lights, open flames, stoves, heaters or halogen lights should be turned on within 5m distance from any edge of the printer.
- No portable spark-producing equipment (static, electrical or Mechanical) within 5m distance from any edge of the printer.

1.2.3 Anti-ultraviolet radiation

- Wear UV protection glasses and gloves when operating the machine and avoid being too closer to UV lights.
- When doing maintenance task or being close to the flatbed machine, UV lights must be shut off or close all UV protection doors.

1.2.4 Proper Ventilation and Exhaust System

- The vacuum exhaust system must be functioning before the printer operates.
- Do not ignore this safety warning sign to avoid accumulation of flammable fumes in the area.

1.2.5 Ink and solvent spillage, a potential risk of Fire and explosion

- Store ink and solvent in proper cabinet for flammable liquid storage.
- Keep ink and solvent containers tightly closed at all times. If a container has sign of damage/leakage, fix or replace it immediately.
- Clean ink or solvent spillages as soon as possible.
- Only use dry powder, or carbon dioxide type of fire extinguishers.

1.2.6 High voltage may shock people or trigger a fire

- If there's no emergency power switch which can shut down all the power, do not connect the printer to main-power supply.
- When the machine's power is on, do not open the back cover of machine, or avoid touching electrical parts.
- The printer or other equipments should be grounded, according to the local safety electrical connection regulation. The ground voltage should be less than 3 V.
- Set the machine on smooth ceramic tile or cement ground
- Use specified anti-static floor mat to minimize harmful static build-up.

1.2.7 Printing media rolls are bulky and very heavy

- Wear hand and foot safety protection gear when loading, unloading and handling media to avoid serious body injuries.
- Use proper heavy duty handling equipment if available.

1.3 Fireproofing

Ink and solvent should be clearly labeled and stored in a specific area for flammable liquid and should be in accordance with local regulations of fireproof and safety standard. Ensure that the specified fire extinguisher is always available near the storage area and should be cleared from any obstacle in case of emergency.

1.4 Exhaust System

The printing area should be equipped with sufficient exhaust system. The exhaust should be installed in such a way build up of fumes is minimized. Best location for the exhaust should be at lowest level, this way the fumes build-up is minimized. Solvent fumes are heavier than air, so fumes build-up concentrates on the lower level of the room.

Electrical installations inside the printing area must be in accordance with local Electrical Safety Regulation

1.5 Handling Precautions

1.5.1 Power Supply

1. Install the printer near an easily accessible electrical outlet.
2. Do not provide power to the printer through the same power line as for other noise generating devices such as motors.
3. Use a power supply matched with the printer specification.
4. Connect the power cable directly to an electrical outlet. Do not plug several devices into one electrical outlet.

1.5.2 Printer

1. Do not place anything on top of the printer.
2. Do not rest you elbows on the printer.
3. Open and close the top cover gently from the front of the printer with both hands.
4. Before connecting or disconnecting the interface connector, turn the printer OFF.
5. Do not clean the surface of the cover with benzene or paint thinner. The coating may come off or deteriorate. Wipe the cover with a soft cloth, if the cover is very dirty, use a cloth moistened with a neutral detergent.
6. Do not touch the ink jet head surface.

1.6 Regular Inspection and Maintenance

The following regular inspection and maintenance must be performed in terms of characteristics of the UV-curable ink;

1. Clean the carriage unit and the flat table conveyor surface everyday.
2. Make sure that the carriage covers are always replaced.
3. Perform ink supply circuit and print head cleaning when leaving the printer for a long time (2 weeks or more with no power).
4. Perform head cleaning after leaving the printer idle for a long time.
5. Shut off the UV lamp whenever the printer is not in use.
6. Printing of reflective materials is prohibited、avoid solidifying the nozzle surface.

1.7 Consumables

1. Always use the recommended consumables (printing media, ink, ink filters). Failure to follow this instruction may cause poor printing quality and breakdown.
2. Do not use ink past the expiration date as this may cause a print head breakdown and poor printing quality.
3. Put a used ink bottle into a plastic bag and dispose of it as an industrial waste. Observe local regulations for disposal of waster ink bottles.
4. Avoid spilling ink into your skin or clothes. Wash any ink off immediately with soapy water.
5. Check the waste ink container everyday so as not to permit waste ink to leak from you printer.
6. If the waste ink container is being installed or removed, spread a stain preventing sheet so as not to stain the floor with spilled ink.
7. Store ink in a dark and cool place. Never store the ink in high temperatures or direct sunlight, doing so may cause the ink to deteriorate.

Chapter 2 - Basic Operation

2.1 Getting Started

This section provides the necessary information to operate the printer. Familiarize yourself with the basic of the printer before reading Section 2.

Contents of this section;

- Operating conditions
- Consumables
- External Views, Part Names and Functions

2.2 Operating Conditions

This section describes the operating conditions for the printer.

2.2.1 Installation Space

There must be sufficient space around the printer for the replacement of frequently used parts, for the output of the printed media and for ventilation. In addition, maintenance space is required to repair the printer or replace components.

2.2.2 Environment Conditions

2.2.2.1 Operating temperature and humidity levels

The printer should be used within the temperature and humidity ranges as shown below;
Temperature : 20 °C to 30 °C
Humidity : 30% to 70%

- To obtain better print quality, use the printer within temperature of 20 °C to 25 °C.
- When the operating temperature is lower than 20 °C or higher than 40° C, print speed is reduced to two-thirds of normal print speed to maintain good print quality.

2.2.2.2 Places where the printer must not be installed

Do not install the printer in the following places:

- A location near a fire
- Places exposed to direct sunlight
- Places subject to vibration Places with excessive dust
- Places subject to extreme changes in temperature or humidity
- Places near an air conditioner or a heater
- Places where the printer may get wet
- Places near a diazo copier that may generate ammonia gas
- Places with poor ventilation
- Unstable place

2.3 Consumables

2.3.1 Available Media Types

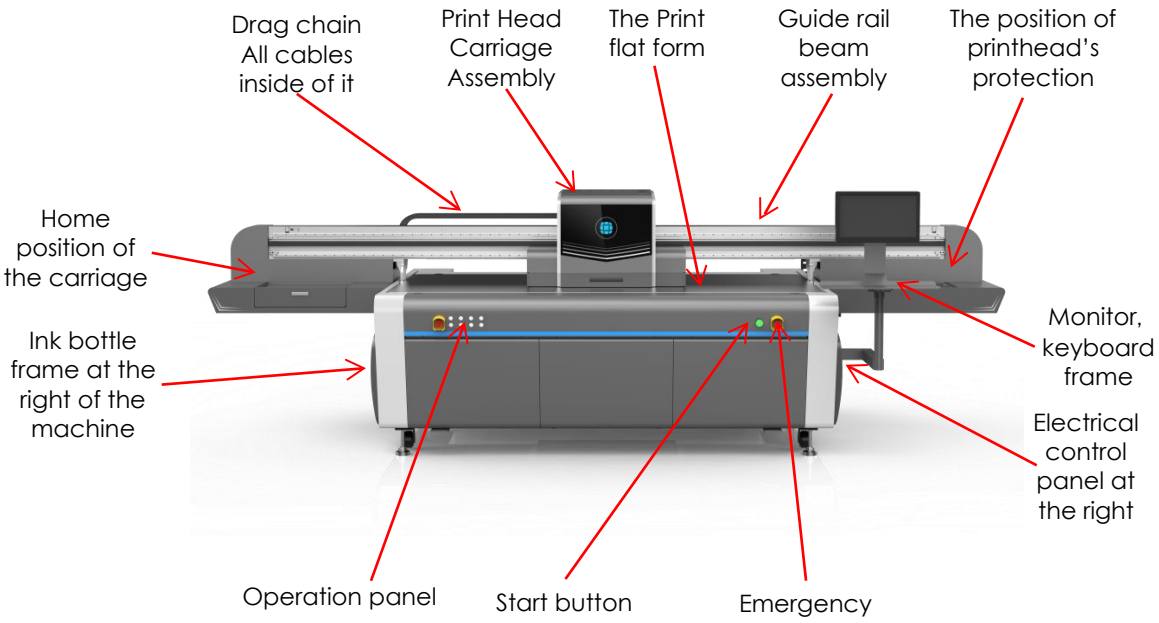
The following types of media are available:
For details ask our sales office or a nearby agent.

- Paper

- Advertising banner
- PVC
- Mesh Fabrics
- Adhesive Vinyl
- Glass Sheets
- Ceramics
- Steel Sheets
- Acrylic Boards
- KT Boards
- PVC Boards
- Foam Boards

Note: Contact our service center for detail

2.4 External Views, Part Names and Functions



2.4.1 Emergency Stop Button

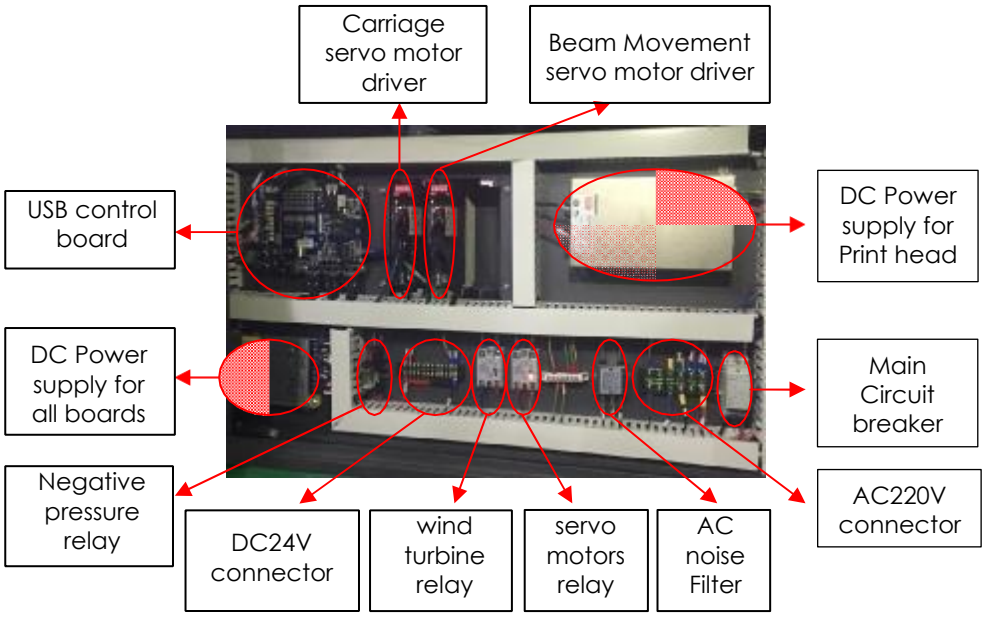
The emergency stop button is placed near the four corners edges of the machine. Once it is activated/pressed, electrical power for the printer controls is cut-off.

2.4.2 Start Button

The start button is placed on the control panel. This switch will not work if the emergency stop button is not released. To release the E-stop button simply turn is according to arrow head direction. Pressing the start button will restore electrical power to the printer.

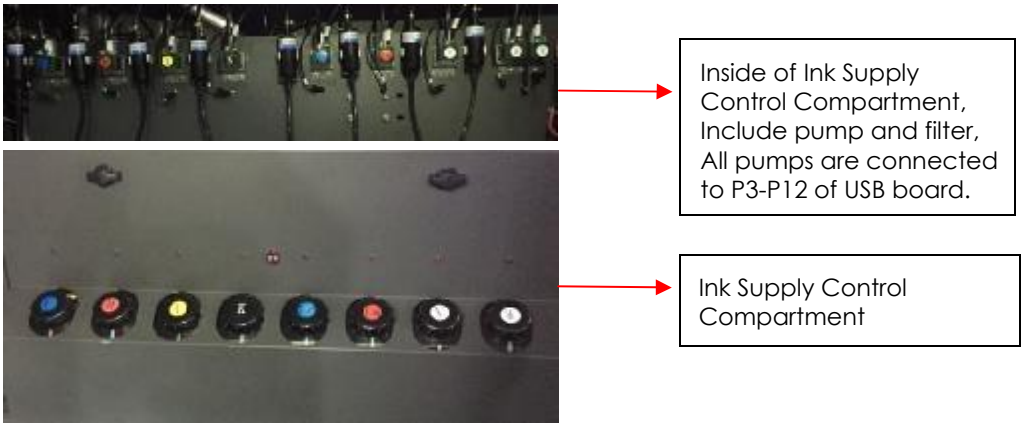
2.4.3 Electrical Control Panel

The electrical control panel contains the servo motor drivers for the Beam Movement servo motors, Carriage servo motor, DC Power supplies, USB control board and the Main Circuit breaker



2.4.4 Ink Supply Control Compartment

It is located on the inside of the ink bottles compartment. The buzzer, fluid level indicator, the corresponding ink supply pumps and W cycle ink pump are mounted on the ink supply control compartment



2.4.5 UV Power Supply

The UV power supply provides power to UV lamps and the intensity of light can be adjusted to Low or High.

Water inlet

Power adjustment knob of UV LED

Power lines of output

Cooling fan

Input power line

Input power switch

Water output

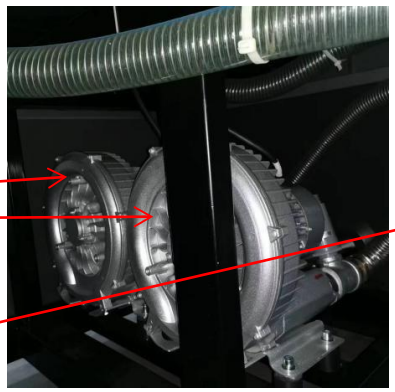
The export and entrance of water cycle for cooling UV LED

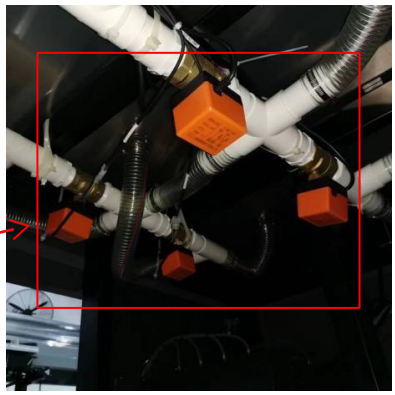
Signal line for controlling UV LED is connected to USB board

2.4.6 Suction Pumps and Vacuum Chamber Control Valves

While the Media suction pumps provide suction on the flat bed to hold the media in place while printing is on progress. Vacuum manifold enhances the suction strength. The vacuum flat bed is divided into four (4) vacuum chambers. Vacuum area could be adjusted according to the media size. The numbers on the flat bed signifies the valve number, so if you want to print on 1 m x 1 m size media you can close valves2,3,4 and the last one leaving vacuum chamber for air.

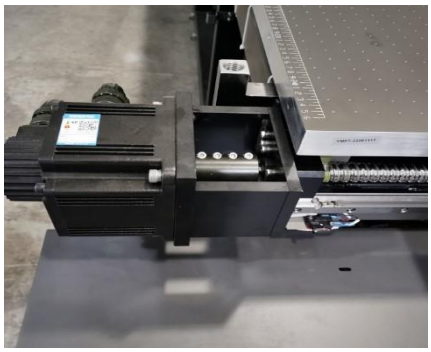
Different area on Flatbed





2.4.7 Precise Control

This mechanism directly controls the screw rod through the motor to ensure the accuracy of movement .



2.4.8 Function Button

2.4.8.1

2.4.8.2 Purage Button

The positive pressure air pump starts to work. All print heads can discharge ink, which can discharge the air inside the print head. When the print head is out of ink, it can be cleaned by pressing

2.4.8.3 Suction1/2 Button

One or two fans can be opened according to different materials.

2.4.8.4 Servo Button

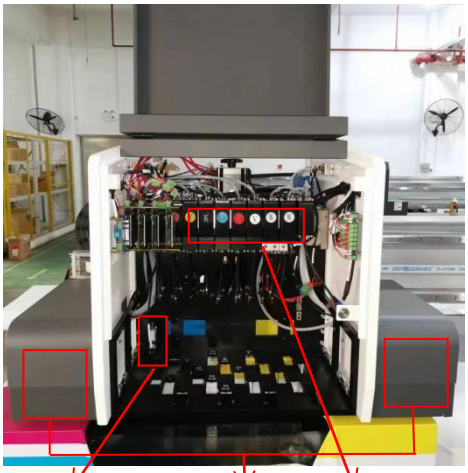
The servo motor can be controlled to open or close. After closing, the carriage can be moved manually. The error of imported parameters or driver can be corrected by restarting.

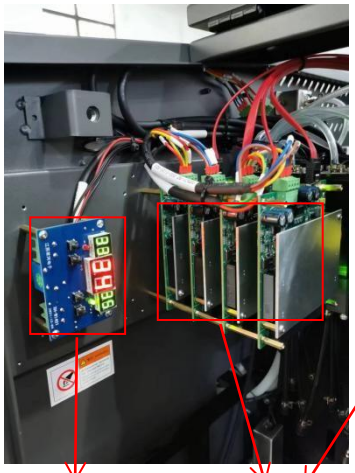
2.4.8.5 Zone I / II / III / IV Button

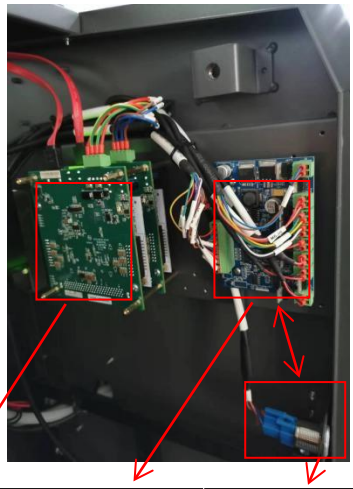
Turn on or off the suction area of the platform.

2.4.9 Print Head Carriage Assembly

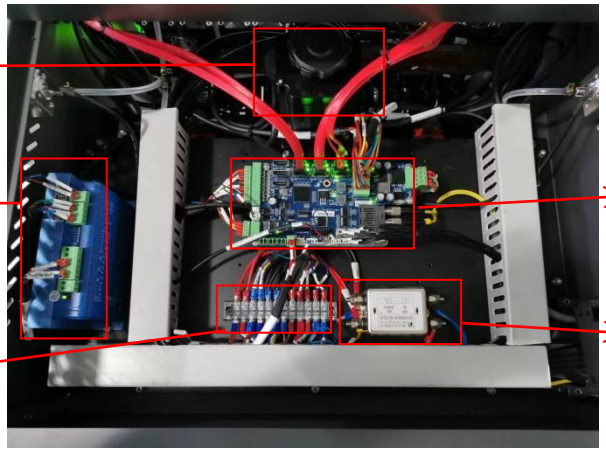
The print head carriage assembly houses the print heads, secondary ink tanks, print head control board, raster reader, negative pressure sensor, carriage height adjustment motor and the two UV lamps.







Media Height Detector | Left/Right UV LED | Ink Tank | Temperate Control Board | Print Head Drive Board | Ink Tank Solenoid Valve Control | Power Switch Of Control Board



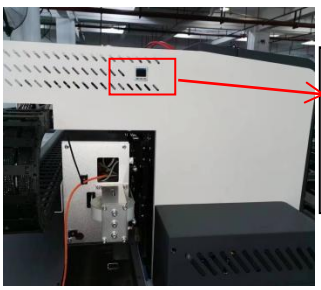
Z-axis Motor

Z-axis Motor Driver

DC-24V Connector

Print Head Control Board

Filter of DC 24V for Print head

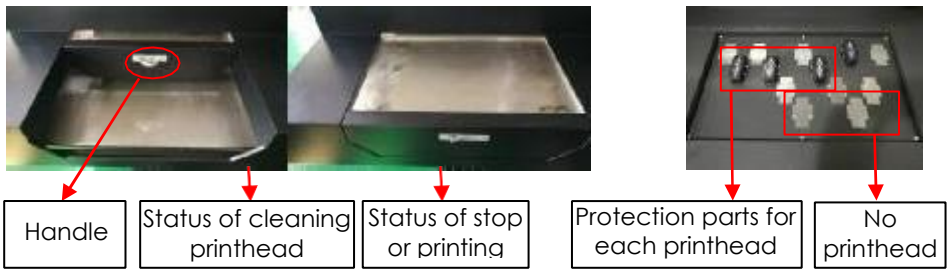


Negative Pressure Display for colors ink (Left side)

Negative Pressure Display for white ink (Right side)

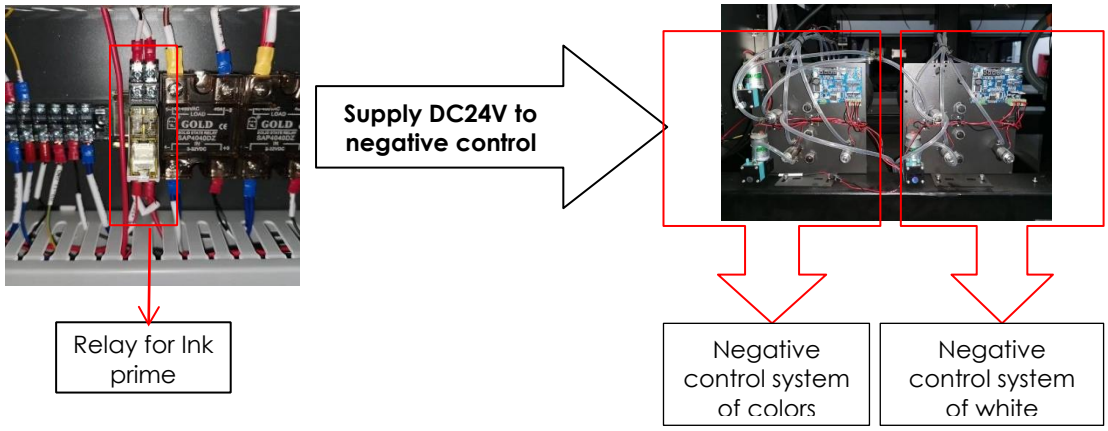
2.4.10 Home position of printheads carriage and protection position of all printheads

Home position is also called printhead cleaning position where you do ink purging/ priming then wiping the excess ink off the printhead nozzles by your hand. protection position protect the surface of all printhead from dry and solidify.



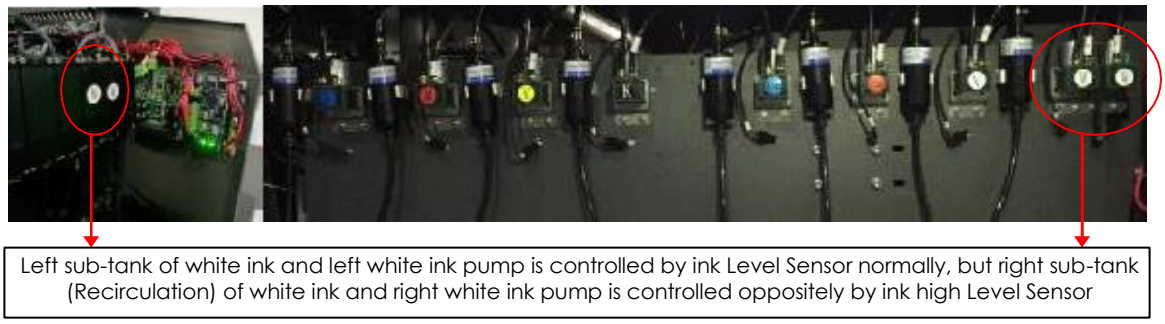
2.4.11 Negative Pressure System

The negative pressure system is used to hold the ink and preventing it to drop. The negative pressure can be adjusted thru its regulator. Turn clockwise vacuum clockwise to and increase the turn counter otherwise. Negative Pressure Shut off/on valves are provided at the back of the carriage to keep the negative into the system when the power is shut-off.



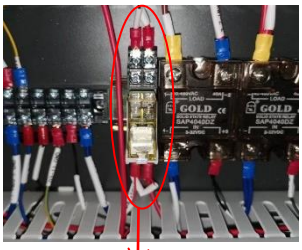
2.4.12 Auto White Ink Recirculation system

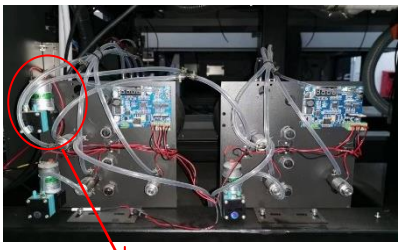
This switch is used to run the white ink recirculation pump manually. It is used to prevent the settling of the white ink pigment on the bottom of the ink bottle. This is an optional feature for this machine.



2.4.13 Ink Prime/Purge Switch

The ink prime button is use to purge ink out of the printhead nozzles. The negative pressure display setting parameters are programmed to control the maximum positive pressure thereby protecting the printhead from excessive pressure.





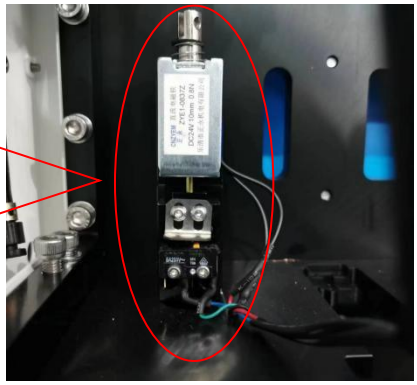
Ink Purge Button → Relay for Ink Purge → Positive Pressure Pump

2.4.14 Auto Detect Media Thickness System

This mechanism will perform media thickness check every time you send an image for printing. A message will pop as shown below, the first window will ask you if you want to adjust the carriage height. The second window will pop out if you click YES and ask you how much you want the height to be set.

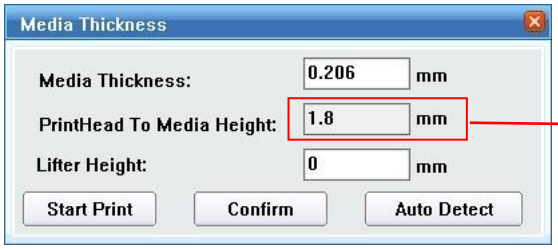
You must click the modify button every time you made changes otherwise the change will not be updated and click close to continue printing. Clicking No or Stop Print button will just simply send the carriage to start printing directly.

This part will detect the top surface of the media



Media Height Detector Assembly

Carriage Assembly



Encode here the height you want

2.5 Starting the printer

1. Make sure there is no media or materials on top of print flat form specifically along the path of carriage during printing.
2. Plug the machine power cord to the electrical power source outlet.
3. Check and reset all emergency stop buttons.
4. Turn on the circuit breaker, leaving the breaker for the vacuum pump turned off.
5. Turn on the computer and plug the Dongle if necessary.
6. Press the machine start button.
7. Open the maintenance compartment door to show the print head carriage status.
8. Open the negative pressure shut-off valves both at the front and back.
9. Activate the ink prime toggle switch.
10. Press the on line/off line button on the control panel to disconnect the machine from servo.
11. Press ink prime button, this will manual start the suction cleaning of the print heads.
12. Test the movement of the printer by moving the carriage using the software operation panel. Left, right, forward and backward, to check mechanical functionality.
13. When everything is verified to be functional, set the printer to on line by pressing the on servo button.
14. Open the operated software and machine is ready for operation.

Chapter 3 - Working System of Polaroid T-Rex Plus

3.1 Brief Introduction

The Polaroid T-REX PLUS large format UV printer is using raster image technology to process photos stored in computer. It is one of the most innovative products, which combines photo digital technology with high precision engine driver. It produces super wide printouts for business use.

It is a high technology equipment with a user friendly operating system with simple operational and maintenance procedures. Though simple, it is composed of several precise systems. In this chapter, we will introduce the system components and operator guide.

3.2 The Ricoh Print head Assembly

In a high quality and high-performance configuration, Ricoh Print head offers a high-resolution, high-speed and compact inkjet print head lineup suitable for both wide format and industrial applications.

Ricoh print heads are based on piezo-electric materials (PZT), in which can be made to move by applying an electric field across it. Ink channels composed of piezo walls can eject small drops of ink in accordance with the electrical signals applied to the electrodes on the walls.

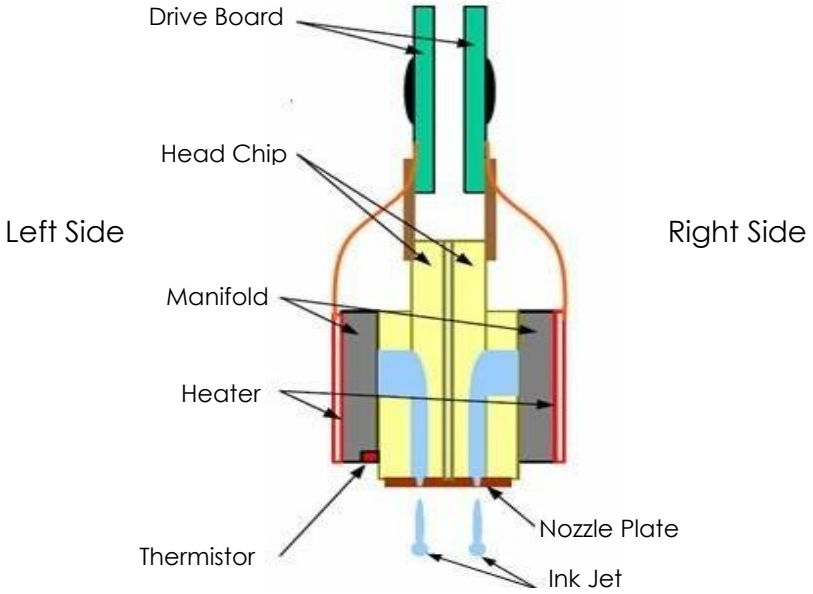
The Ricoh G5 Print Head is driven by "shear mode", in which the walls bend inward and outward to generate a pressure wave inside the channel. This mechanical ejection principle allows a wide range of inks including oil and solvents, which is a great advantage when compared with the thermal ejection inkjet head.

This section introduces the G5 Print Head technologies.

Main Features:

Technology	Piezo Drop On Demand (Shared Wall 3 Cycle)
Number of Nozzles	1280 Nozzles (320 nozzles x 4 rows)
Resolution	600 dpi
Maximum Frequency	30 kHz
Drop Volume/Size	7 pL~35pL
Drop Speed	6 ± 0.5 m/s
Printing Width	54.1 mm
Heater Temperature	Under 55 °C

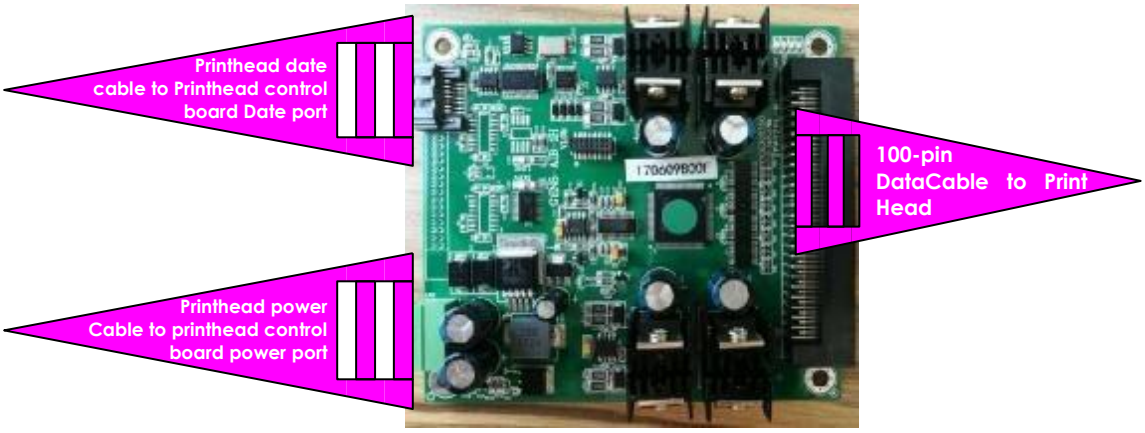
Ricoh Print head Dimensions



Parts of the Ricoh G5 Printhead

3.3 Print Head Drive Board

This board is used as drive board for Printhead which is connected to Control Board thru a data cable and a power cable.

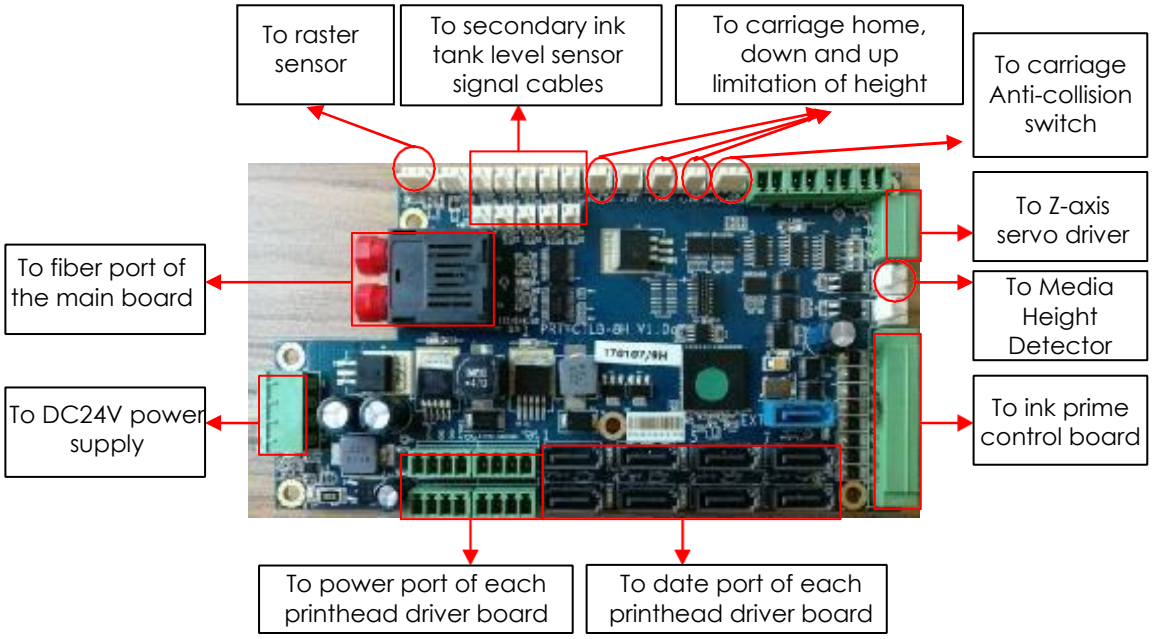


3.4 Printhead Control Board

The image data is fetched by the Print Head Control Board from the USB_IF buffer through the Image Data fiber cable (UCB fiber port to PHB fiber port). The image is then processed by the image data processor and dispatch to the print heads thru the printhead driver boards. The printheads fires the ink depending on the binary status read by the Raster Reader which is sent to the print head control board.

Likewise, the print head heating control is also integrated into the Print Head Control Board. Thus, the print head temperature can be accessed from the POLAROID print driver graphical user interface or GUI.

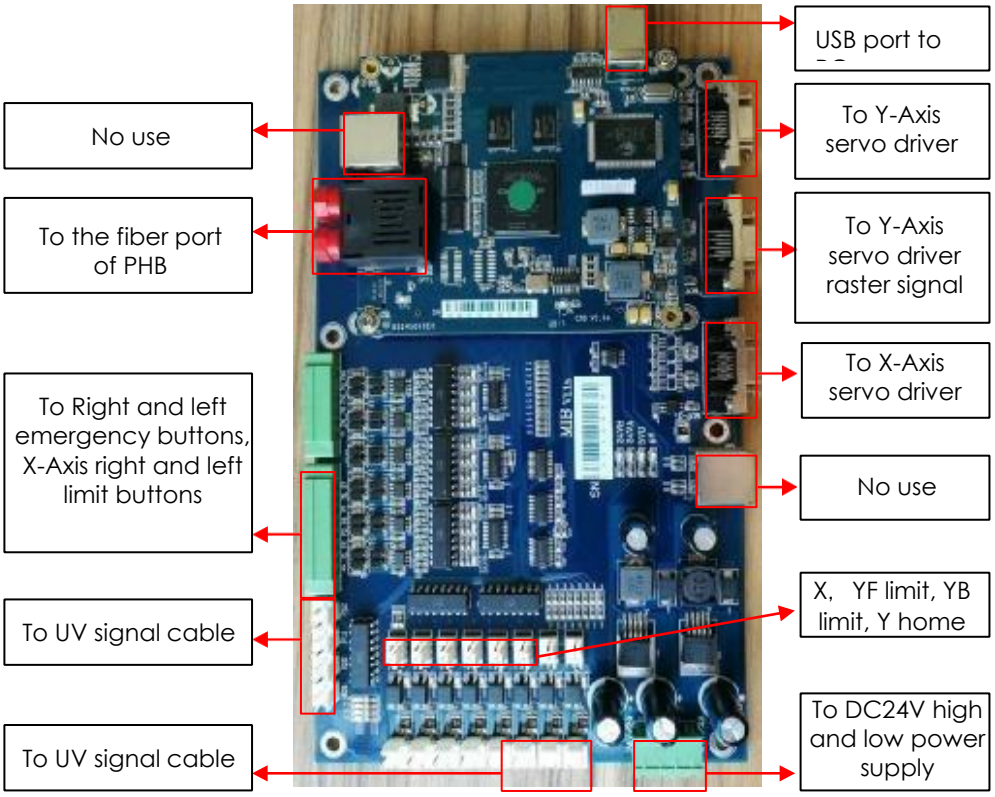
J36 connects to the DC power source for the print head driver power and heating current source. The carriage displacement pulse signal is sent from the encoder reader to the print head control board through PHBJ2.
The secondary ink tank level sensor signal cables from the secondary ink tanks are connected to the J4 (C), J5 (M), J6 (Y), J9 (K), J11 (LC), J13 (LM), J14 (V), J16 (W), J18 (spare), J20 (negative pressure tank for protection of over ink) of the print head control board. If the secondary ink tanks are full, corresponding LED indicators will turn on. The binary status for the secondary ink tank level is then sent to the Servo Driver Board (USB) through fiber cable. It is then processed on the Servo Control Board to activate the ink pump motors.
The Print heads date cables are connected to the Print Head Control Board by connectors port1 to port8; The print heads power cables are connected to Print Head Control Board by connectors J19, J21, J22, J23.
The control for the automatic carriage height adjustment is also handled by this PCB and the POLAROID print driver graphical user interface or GUI.



3.5 USB (main) board

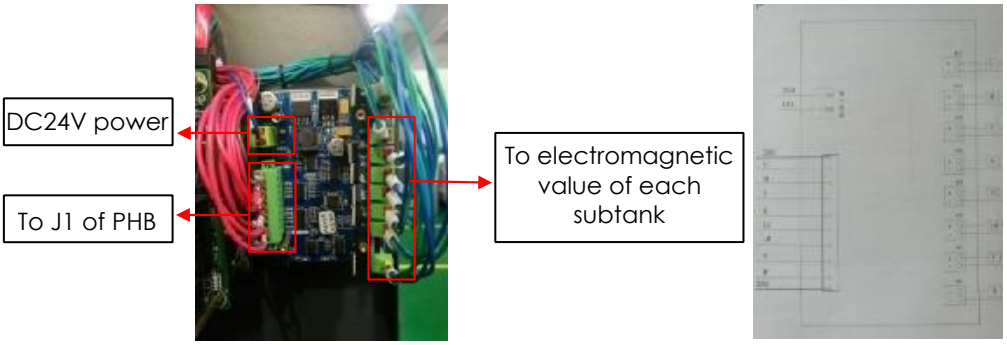
The USB board is the main interface of the machine to PC. The image data and control information are transmitted from the PC USB port to the USB port of this board. The communication and image data transfer are conveyed through the fiber data cable.
For this particular printer model, the USB board is also used to communicate with and control the servo drivers.
The Servo Card or sometimes Servo Driver Board serves as the movement control board and ink control board packed into one circuit board. It is a control circuitry designed to control the x- axis and y-axis movement. It conveys a signal for the servomotor step and direction; and hence, the servo driver can be able to drive the servo motor.
Power to the corresponding ink pumps are sent by this PCB as well as the control signals from the secondary ink tank level sensors are being received and processed thru and fiber. This binary information about the status are being processed accordingly in order to provide the power to turn on the ink pumps to fill in the secondary ink tanks.

The UV status and the carriage limit sensors are also handled by this PCB. The inputs from the status of the switch on the operational panel or the POLAROID print driver graphical user interface or GUI are being received and processed by this board.
The on/off of the UV lamps were also controlled from the Main Board. For both the UV lamps control they are both connected through J12-J14.



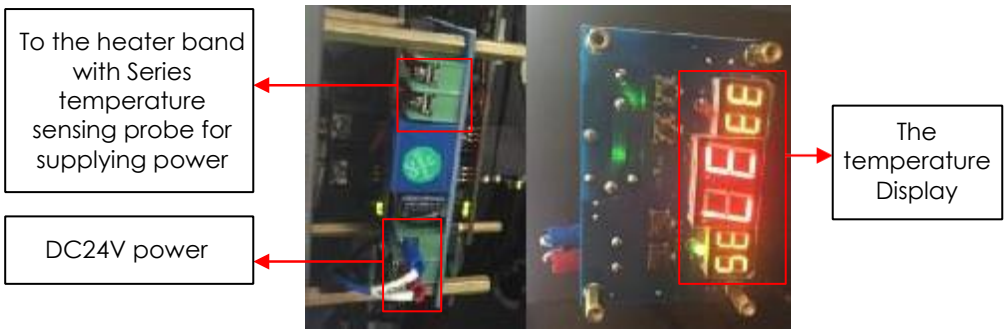
3.6 Single way ink prime control board

The board control single way ink prime of each color thru the electromagnetic value under each secondary ink tank and the POLAROID print driver graphical user interface or GUI (the printer drive software). But the most important function of the board is make the temperature of each electromagnetic value down.



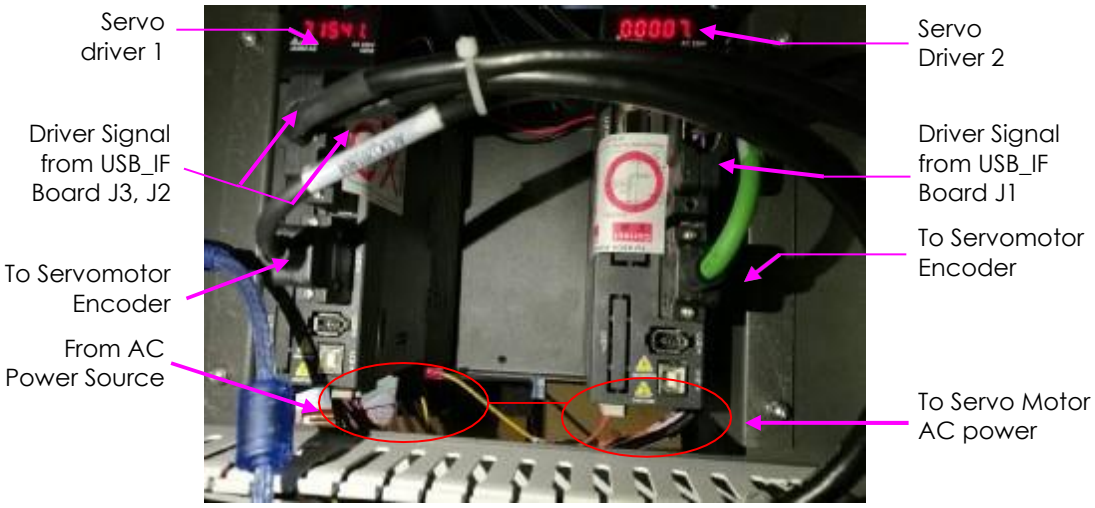
3.7 The temperature control board

The board is used for adjusting the ink temperature inside of all sub-tank by the heater band temperature sensing probe at the back of the sub-tank.



3.8 Carriage and Beam Servo Driver Pack

The Carriage and Beam assembly are driven by Servomotors and are controlled by their respective Servo Driver. This servo motors are basically two-phase, reversible, induction motors modified for servo operation and used in applications requiring rapid and accurate response characteristics. To achieve these characteristics, this ac servo motors have small diameter, high resistance rotors. The ac servo motor's small diameter provides low inertia for fast starts, stops, and reversals. High resistance provides nearly linear speed-torque characteristics for accurate servo motor control.
Servo Driver 1 (SD1) controls the servomotor for beam assembly, Servo driver 2 (SD2) controls the servomotor for carriage.



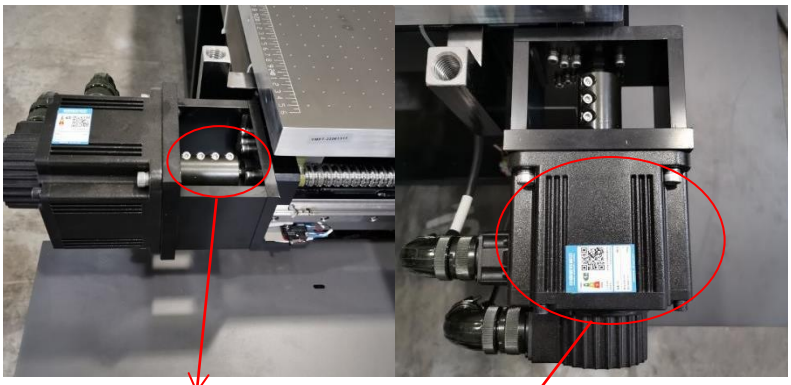
Servo Driver Packs

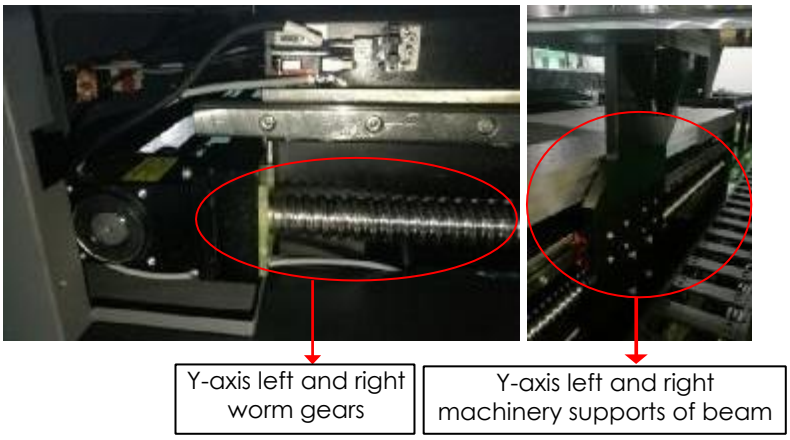
3.9 Carriage and Beam Servomotors

Servomotors (SM) are controlled by their respective Servo Drivers (SD). They are responsible in driving carriage X-axis, Y-axis, Z-axis movements.

3.9.1 Y-axis Servomotors

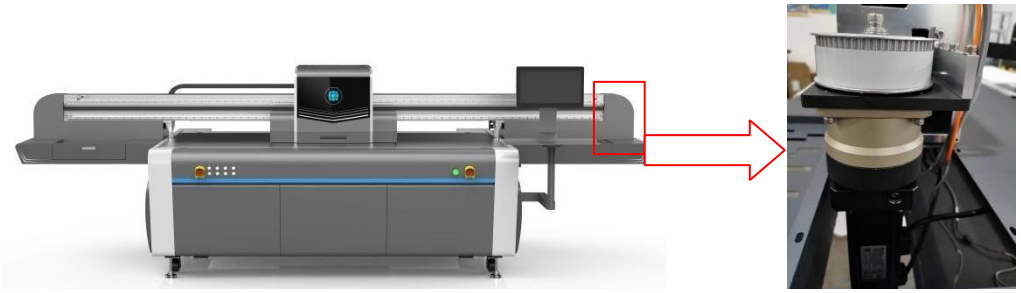
SD1 controls the SM1 which is responsible in driving then both of left and right worm gears . Both worm gears should be synchronized so the beam assembly will move parallel to X-axis of the carriage.





3.9.2 X-axis Servomotor

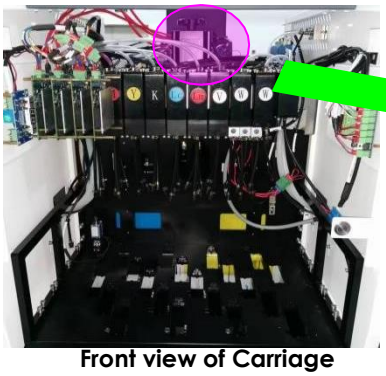
SD2 controls the SM2 which is responsible in driving the carriage X-axis movement . It is installed at the right end of the beam.



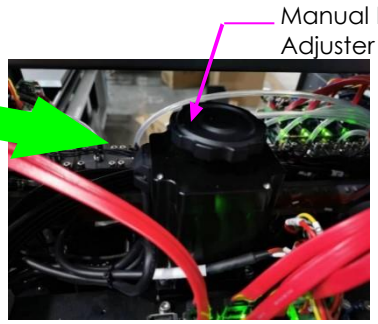
Front View of Machine **Enlarged View of SM2**

3.9.3 Z-axis Servomotor (Stepper Motor)

Carriage height adjuster stepper motor is responsible in driving the carriage up/down movement. A height adjuster knob is provided in case the carriage need tobe move up/down manually for some reason.



Front view of Carriage

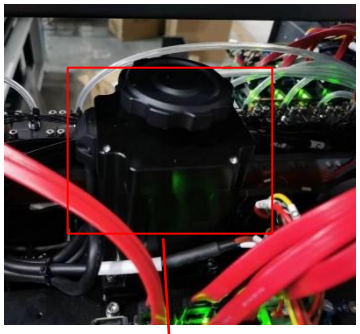


Enlarged View of Steeper Motor

3.10 The Automatic Carriage Height Adjustment System

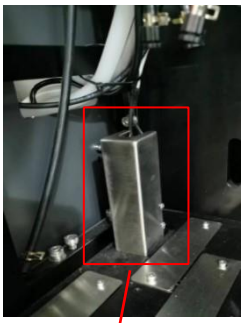
In order for the printer to print seamlessly on different kinds of media, the carriage height should adjust automatically to whatever media thickness it should print upon. For this specific printer model it is equipped with a carriage that could automatically adjust its height depending on the media thickness to be printed upon. The user can choose whether to print using the default carriage gap between media and baseplate to 0 mm or opt to increase the gap up to 5mm.

The assembly uses a solenoid activated mechanical touch sensor to sense the media height. This mechanical sensor protrudes downward from the carriage assembly during media height test. The system uses move pulse of Z-axis Servomotor to determine the accurate height adjustment from default height settings. All actions of carriage height is operated by the the POLAROID print driver graphical user interface or GUI (the printer drive software).



Z-axis Servo Motor

Z-axis Servo Motor Driver



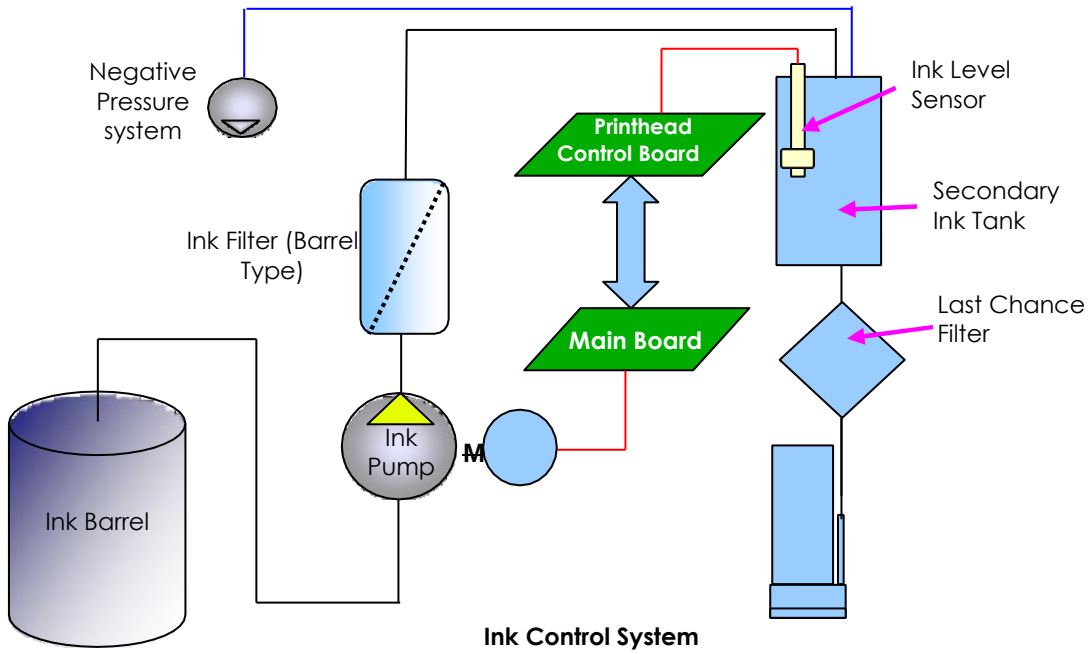
Carriage height detector

3.11 The Ink Control System

The ink Bottle/Barrel serves as the main reservoir for ink supply, should be refilled in a timely manner so continuous supply of ink will not be interrupted during printing. The level of ink inside the bottle/barrel can be monitored visually or using the buzzer system. Refilling is done manually.

The ink pumps suck and discharge the ink into the secondary ink tank. A five-micron filter is being provided to prevent the secondary tank from being contaminated by unwanted particles, which are inherent in the ink. Ink level sensor inside the secondary ink tank sends an open or close contact signal to the Print head control board and Main board to control the operation of the pumps. An optional micro filter is added to enhance the filtering of ink before it flows into the print heads.

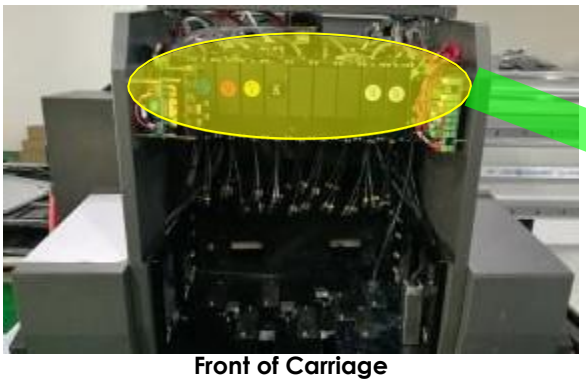
Every time the print heads eject/fire ink droplets, the ink flows and fills the space left by droplets. A negative pressure system is responsible for holding the ink from flowing out of the print head nozzles.



Ink Control System

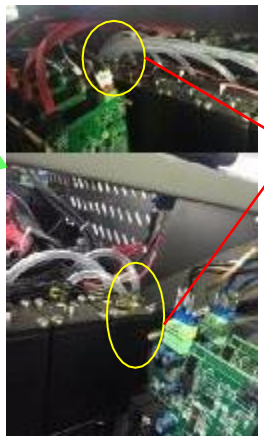
3.12 Ink Protect Tank

These tanks serve as the ink overflow protection and the vacuum line system. If overflow happens, the ink will flow into this tank, once the ink reaches the maximum level, the sensor will shut off the print head control board. Without the ink protect tank, the vacuum system will fail to function if the tubes are filled with overflowed ink.



Front of Carriage

Note: When resetting the negative pressure to zero, you should open the tube connector caps. After the negative pressure is reset replace and tightened cap properly.



Close Up View of Overflow tanks

3.13 Negative Pressure System

Negative pressure system is used to hold the ink from dripping out of the print head nozzles. Pressure settings vary on every machine. The recommended setting range is from -5.2 to -5.6Kpa. Too low negative pressure setting will result to ink dripping or print head cannot jet ink. Too high negative pressure setting will cause ink starving over time and ink overflow in the negative pressure line system.

Note:
Push the arrow up and arrow down buttons simultaneously to reset the negative pressure to zero.

Please refer to negative pressure setting parameters for further details.

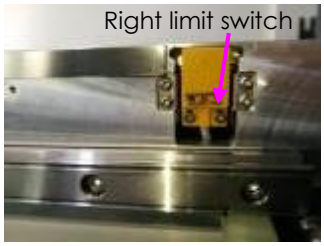
3.14 Limit Switches

There are ten (10) limit switches used on this printer. Three (3) are installed for carriage assembly X-axis movement, six (6) for beam assembly forward and backward movements and one (1) for Carriage height adjustment.

3.14.1 Carriage X-axis Limit Switches

These limit switches are installed on the beam, one the right end while the two are at carriage home position. These switches will stop the carriage to move further in case it over shoot due to servomotor malfunctions.

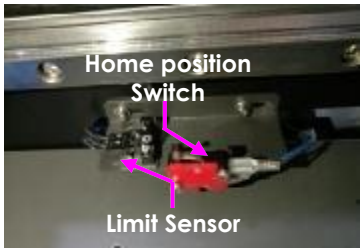
Left end Limit Switches



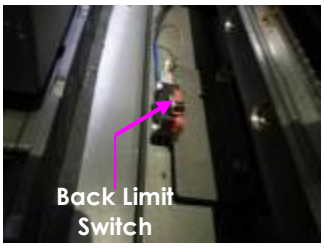
Right end Limit Switche

3.14.2 Carriage Y-axis Limit Switches

These limit switches are installed near the end of each worm gear. The front end serves limit switches serves as home position switch for carriage beam. These switches will stop the carriage beam to move further in case the carriage over shoot due to servomotor malfunctions.



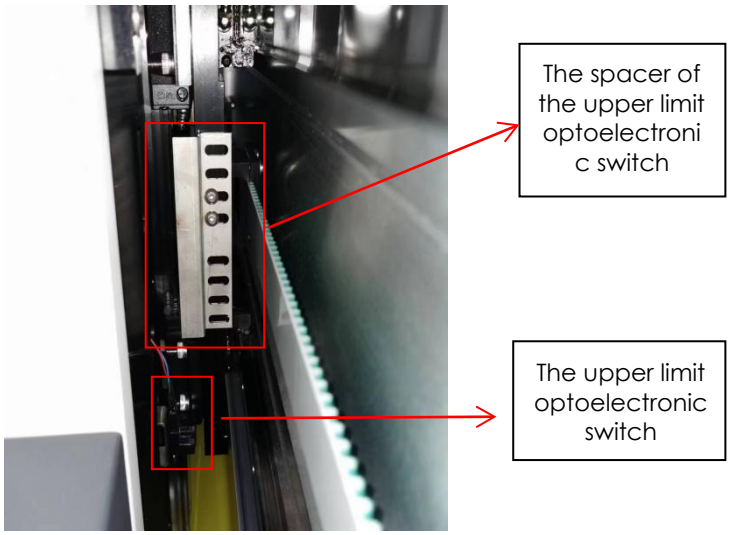
Right and left Home position Switch right and left front limit sensor



Right and left Back Limit Switch

3.14.3 Carriage Z-axis Limit Switches

These limit switches are installed at the right side under portion of the carriage. The upper limit switch control the carriage highest allowable height the carriage can move respectively. The lowest height is controlled by the height detector.

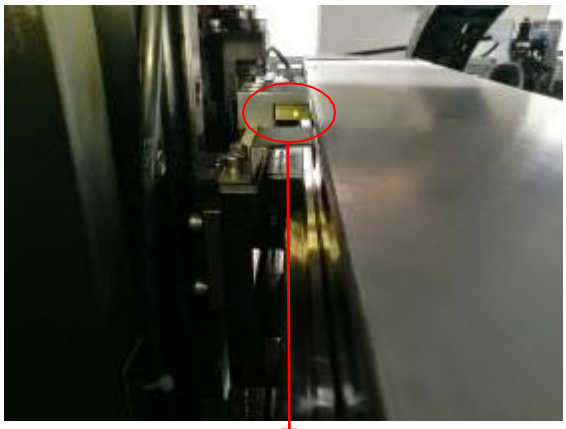


3.15 Magnetoscale Encoder and magnetoscale Strip

The Magnetoscale Strip (magnetoscale Ruler) is a magnetic metal strip marked with dots arranged to form a vertical line, the pitching and number of dots depends on the DPI specification of the strip.The Magneticscale Encoder (magnetoscale Reader) is responsible for reading the lines across the strip length and then generates pulses that will be sent to the Print head to fire the ink droplets.

3.15.1 Normal Printing

The Magnetoscale Encoder is installed at the back right side of the carriage while the Magnetoscale Strip is installed on the beam throughout its length.



The light of Magnetoscale Encoder is green shows the encode is normal. The gap between encoder and strip is 1mm1.5mm .

It is the mounting bracket of Magnetoscale encoder, the cable of encoder is connected to PHB J2.

Chapter 4 - Setting Up The Printer

4.1 Brief Introduction

This is to describe the proper procedure in unpacking and setting-up the machine.

4.2 Wooden Crate Proper Handling

The T-REX PLUS UV printer is packed inside a wooden crate.

- Check the condition of the crate prior to unloading it out of the container van.
- Take some digital photos in case there are some traces of damages on the crate due to mishandling for future reference or other purposes.
- Please pay attention when using fork lift, there are label signs on some portion of the crate that prohibits the use of forklift.
- Bring the crate to the unpacking area where there is enough space to move around when opening the crate. Minimum unpacking area is 3m x 5m.

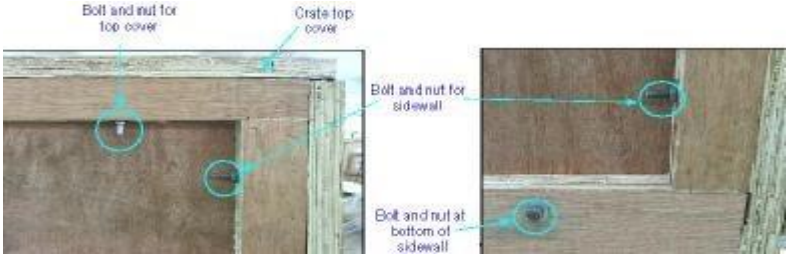
Figure 62 – Outside View of the Crate

Wooden Crate Labels

4.3 Unpacking the Machine

The unpacking area should have a leveled floor strong enough to support the machine weight. Never try to open the crate at elevated platform or inclined floor. At least two persons are needed to do the uncrating activities below.

- Start removing the bolts and nuts from the crate top cover.



- Bring down the top cover on the floor and put away from the working area so that you can move around freely and safely during unpacking.

- Remove the front cover of the crate by removing all the bolts and nuts around this cover. Be careful in opening the front cover as the spare parts and other machine accessories inside the crate might have moved or disoriented during the transit of the package. Put away the front crate cover.
- Remove the side cover by removing the bolts and nuts and keep away from the unpacking area.
- Take and separate the machine accessories, spare parts and inks from the machine to give more space in moving the machine off the platen. Check all the items against the packing list provided.
- Remove the nuts from the bracket that hold the machine base from the platen.

Machine is fixed with holding fixture

- Use forklift or other handling equipment to unload the machine from the platen. Make sure weight is balance on each side of the machine when using the forklift.

Lifting-up the machine using forklift

- Open and remove the anti-static cover and air bubble pack from the machine.

Machine covered with Anti-static sheet

Machine Covered with bubble pack

4.4 Receiving Report

In case there are discrepancies noted between the actual parts received and packing list, it should be reported to our nearest representative. This report includes defective, deformed or missing parts, damaged due to mishandling, wrong delivered parts, etc.

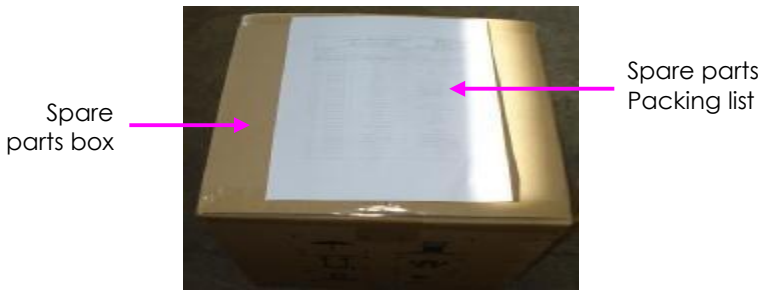


Fig. 4.3a Wooden Crate is secured Spare parts and packing list

4.5 Pre-Installation Requirement

- The minimum working area should be 610 cm x 585 cm, this includes the space for the operator to move around the machine conveniently and safely.
- Prepare the necessary AC plug on the power cord attached to the machine. Please see the Technical Specification table for the power requirements.
- If the PC is not supplied with the machine, customer must meet the minimum PC specification requirement to be used in this machine
  - ✓ Core i7, 8Gb RAM, 500M SDD Hard Disk memory
  - ✓ At least 4x CD-ROM or DVD Drive
  - ✓ USB 2.0 and USB3.0 Port
  - ✓ Windows 10 Professional Service Pack 2
  - ✓ LCD monitor
- Safety signs must be available within the working area.
- Exhaust System must be provided for the solvent and Ink fumes. Please note that fumes are heavier than air so it is most likely the concentration happens at the lower level of the room.
- Lightings should be sufficient enough.
- Flammable Storage Cabinet for the Ink and flushing solution stock is highly recommended to secure them very well.
- Waste Container should be available for ink and flushing liquid waste as well as ink/solvent contaminated cloth inside the Printing area.
- Waste disposal should be in accordance with your local laws governing Hazardous Waste Disposal.

4.6 Machine Pre-Installation

Once the machine is placed and all spare parts are thoroughly checked, start doing the following pre-installation activities;

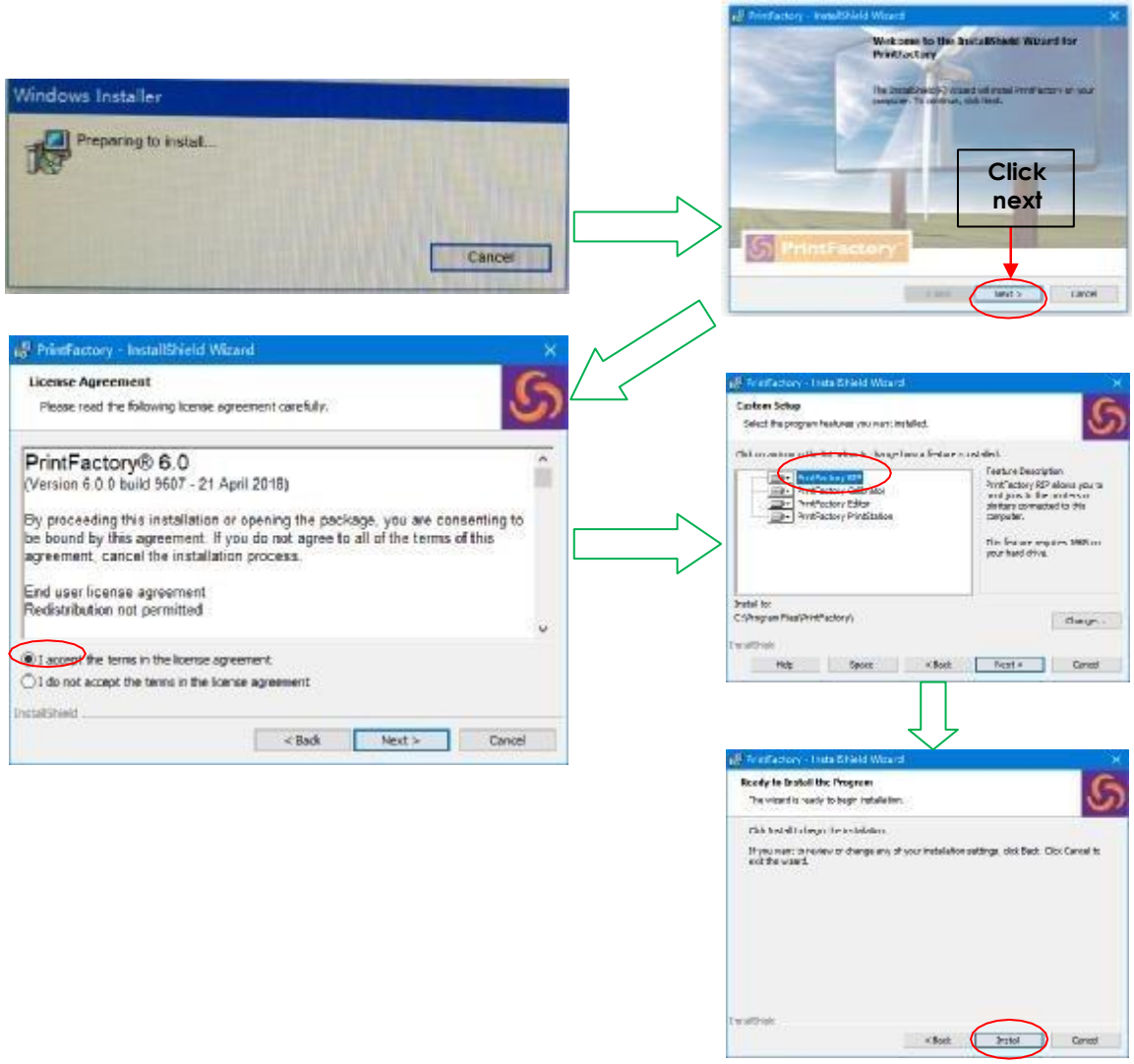
- Install the automatic Feeding and Take-up Rollers if applicable.
- Removed the Tie Wires which hold the Print head Carriage from moving.
- Check the height of the Print head Carriage over the printing platform. The height should be at least 2mm above the media printing surface.
- Check the movement of the Print head Carriage for any obstruction by moving it manually from one end to the opposite end.

- Prepare the necessary power source for the machine.
- Install the LCD Panel / Monitor and the PC, keyboard and mouse to be used on this machine.
- Place the CPU to the computer compartment provided if applicable.

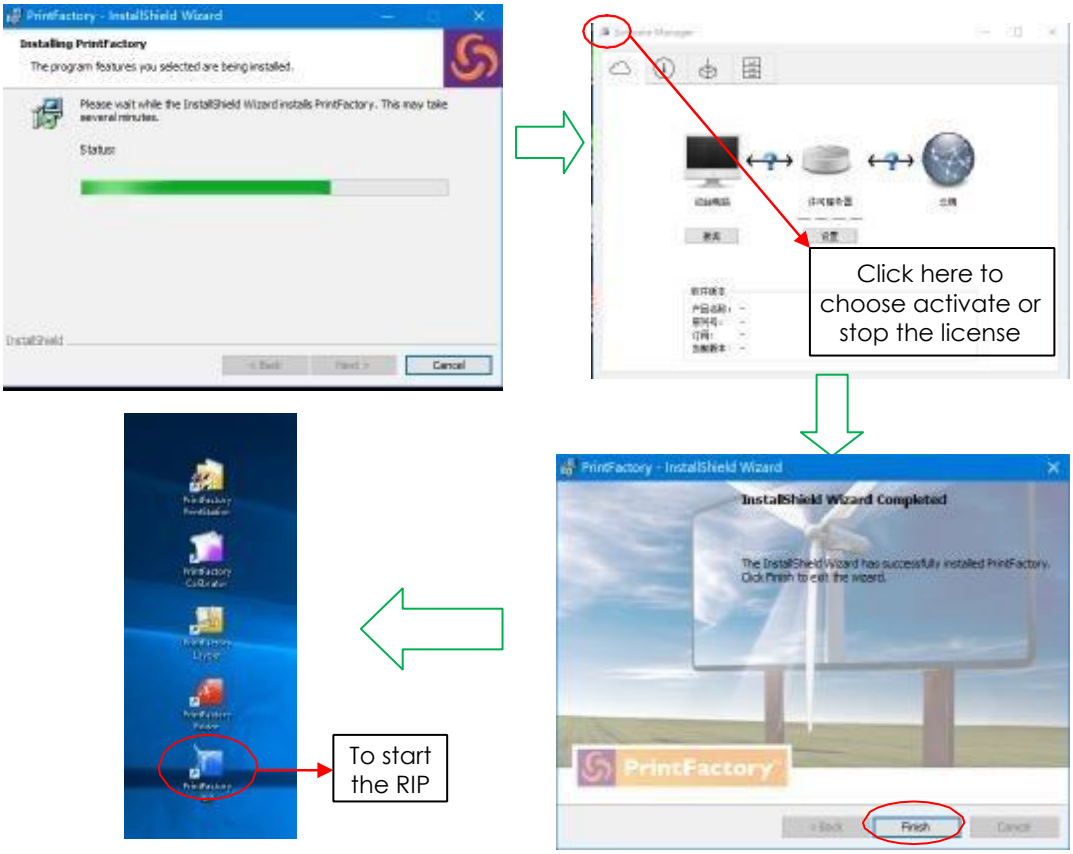
4.7 Software Installation Procedure

4.7.1 PrintFactory RIP Installation

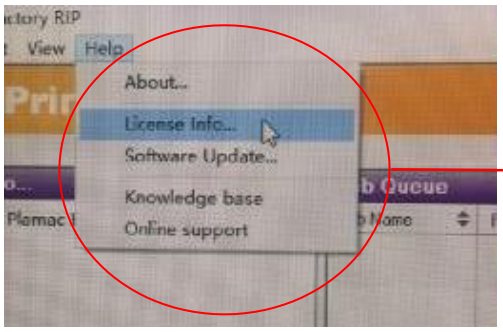
- Turn-on the Power for PC and Monitor.
- Insert the CD supplied with the machine with label POLAROID PrintFactory RIP Edition for the necessary installation.
- The screen will prompt you with starting InstallShield Wizard…, then Choose Setup language window. Select which language you will use. Then click **Next**



- The Application Installer Setup will now prepare the InstallShield for the setup process and it will prompt you later to enter your user number and password. The user number and password can be supplied by software vendor. But your PC have to be connected internet. Click **next, Software to Install**

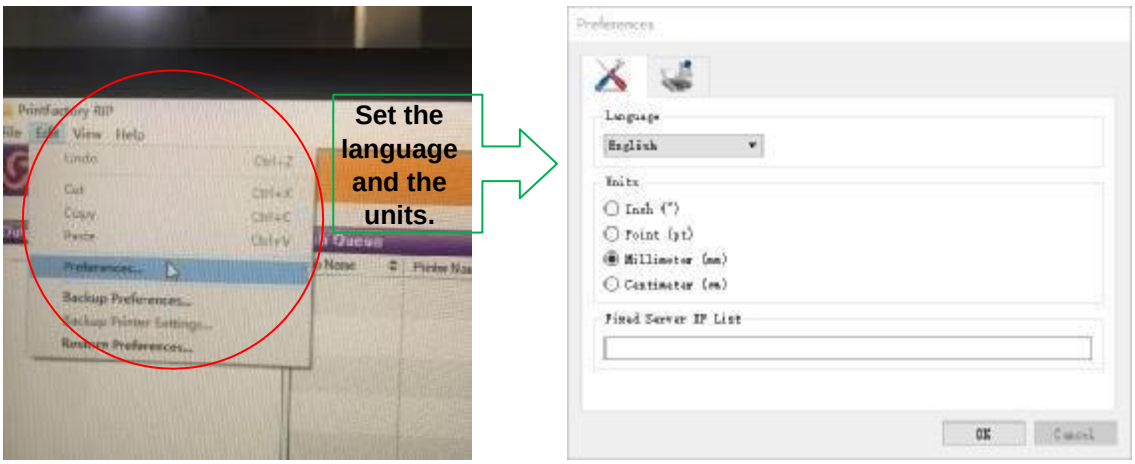


- Click finished, Other installation information that pops up automatically, you'd better to install them, because later you maybe use it, for example make up ICC.
- Then start the software to update it and input the passwords, then set language, ICC etc, and the **Welcome** screen window shows up.
- But if you have to replace the PC, you must stop the license!

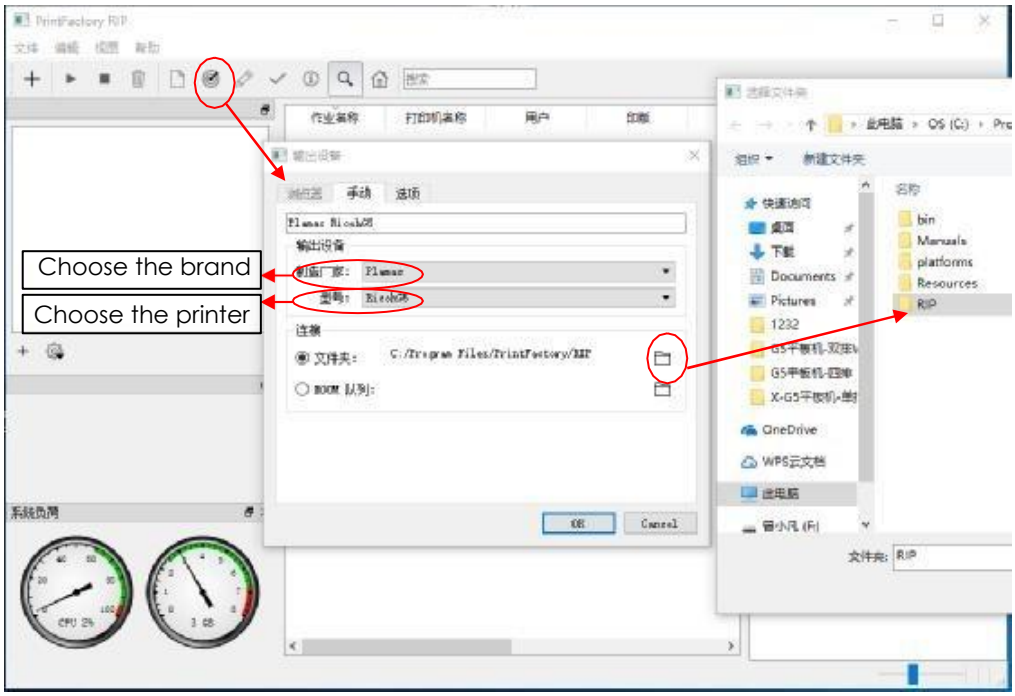


After opening the RIP software, click the help to choose the license information to update it and input the passwords. But if you have to replace the PC, you must stop the license! Then input the passwords again in new PC.

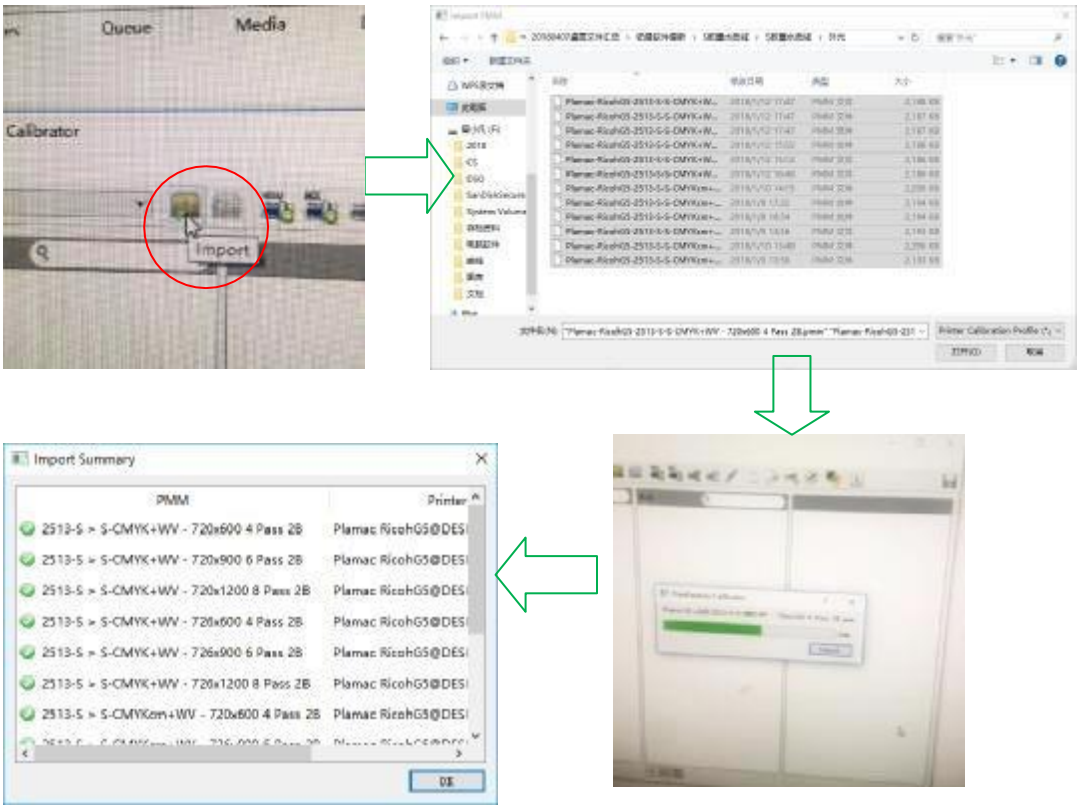
- Right now we can start the RIP software to set operated language, add printer, create the RIP folder where the images which are finished RIP are stored and add ICC files.



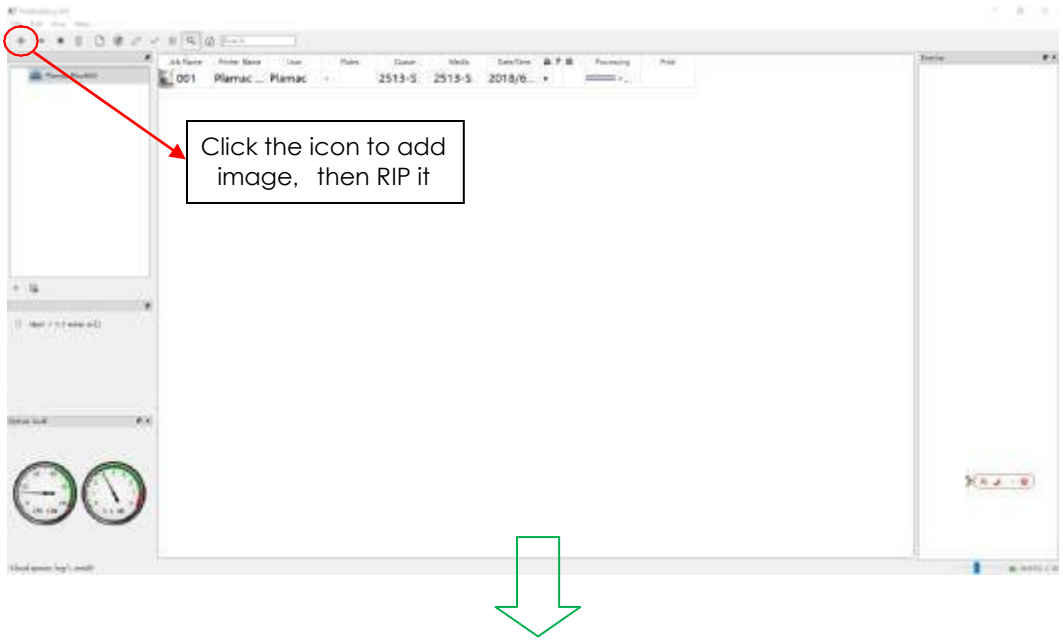
- Add printer, create the RIP folder where the images which are finished RIP are stored and add ICC files.

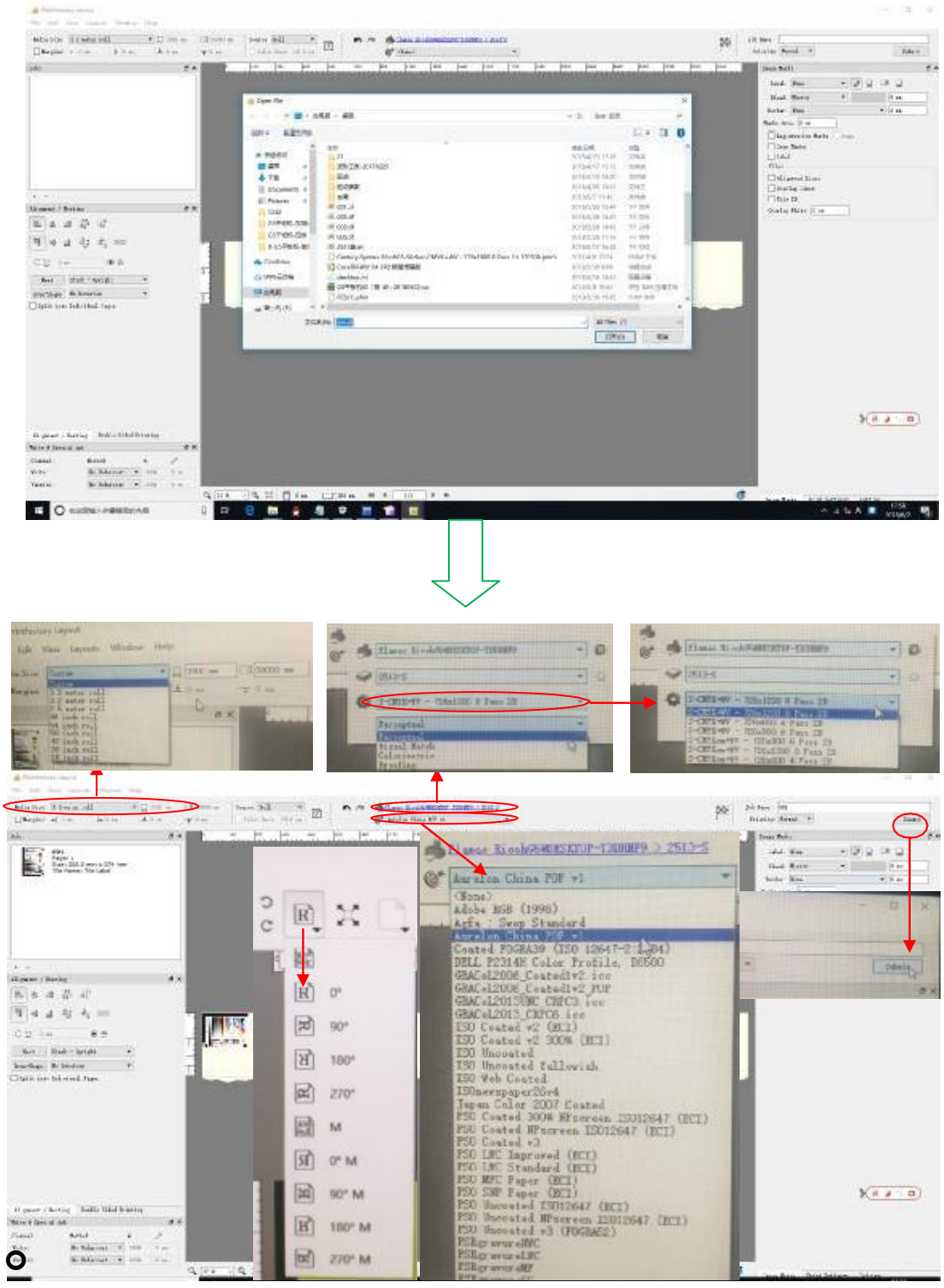


- Import ICC files.

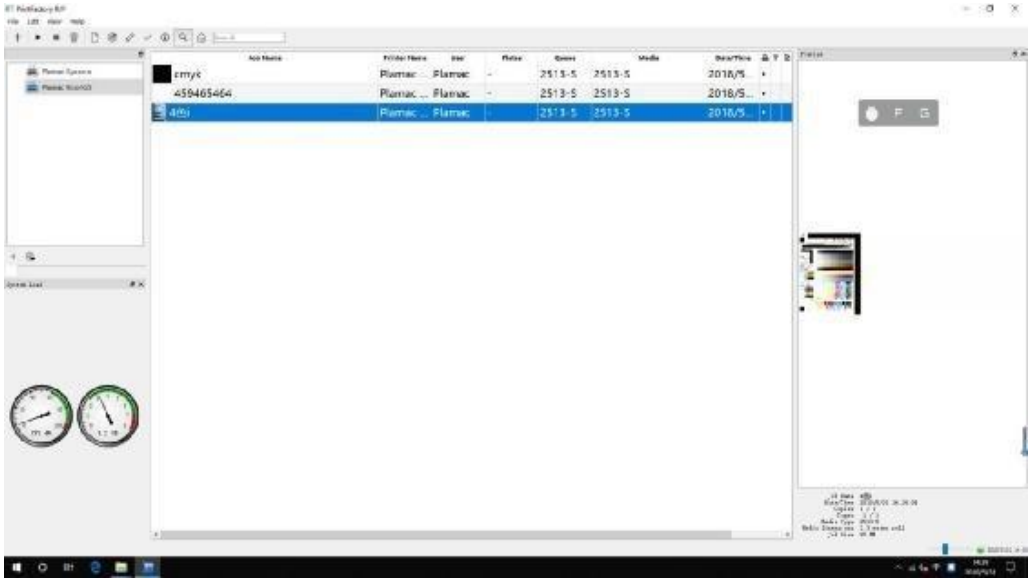


- Start RIP images, then choose the size, printer and ICC, finally submit it to RIP.



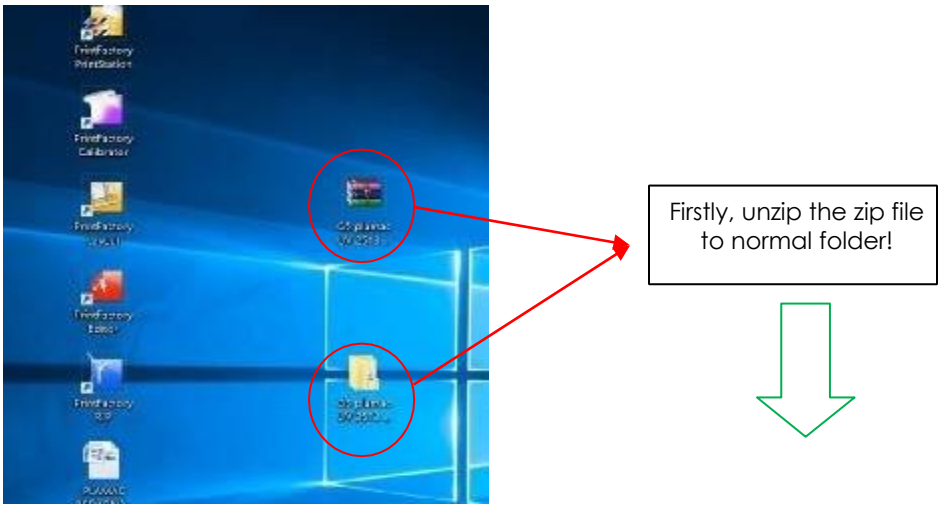

0°
90°
180°
270°
M
0° M
90° M
180° M
270° M

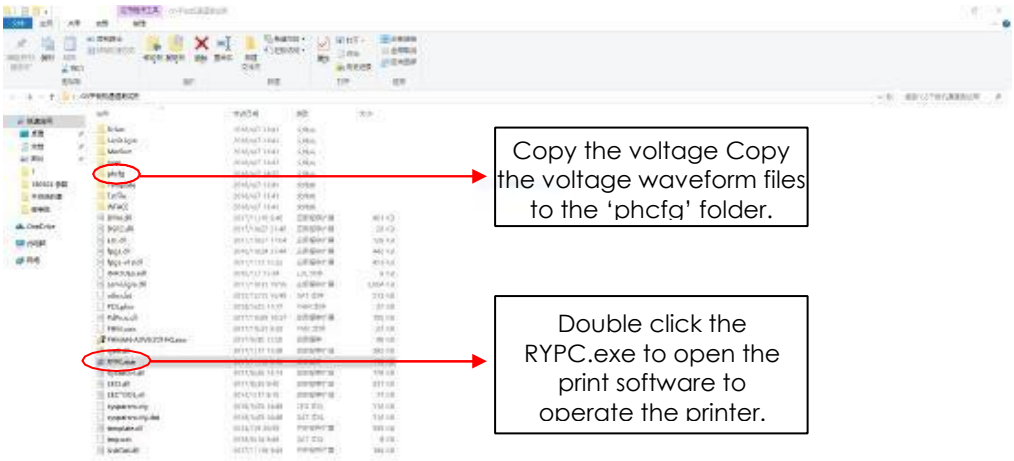
- Finally submit it to RIP, after finishing RIP to go into the RIP folder, select it to print.



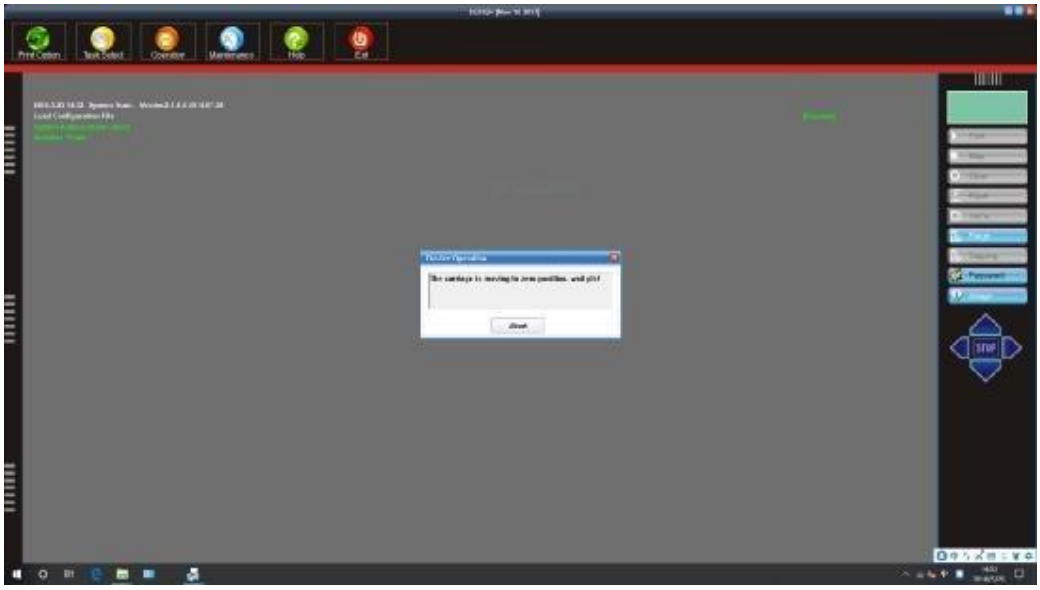
4.7.2 POLARIOID Printer operation software Installation

- Insert the CD supplied with the machine with label POLAROID Print-driver CD into the DVD ROM.
- Copy the driver software from the CD installer to desktop or any other local folder. The filename should be T-REX PLUS UV.rar or T-REX PLUS UV.zip .So firstly translate it normal file.
- The software not need to install, you can start it, then operate it directly.
- But you have to install USB port driver cyusb3 or cyusb2 which are supplied by the factory, before you operate the software.
- Maybe the software still can't be used, this time you need install the environment software named vcredist_x64.exe or vcredist_x86.exe.

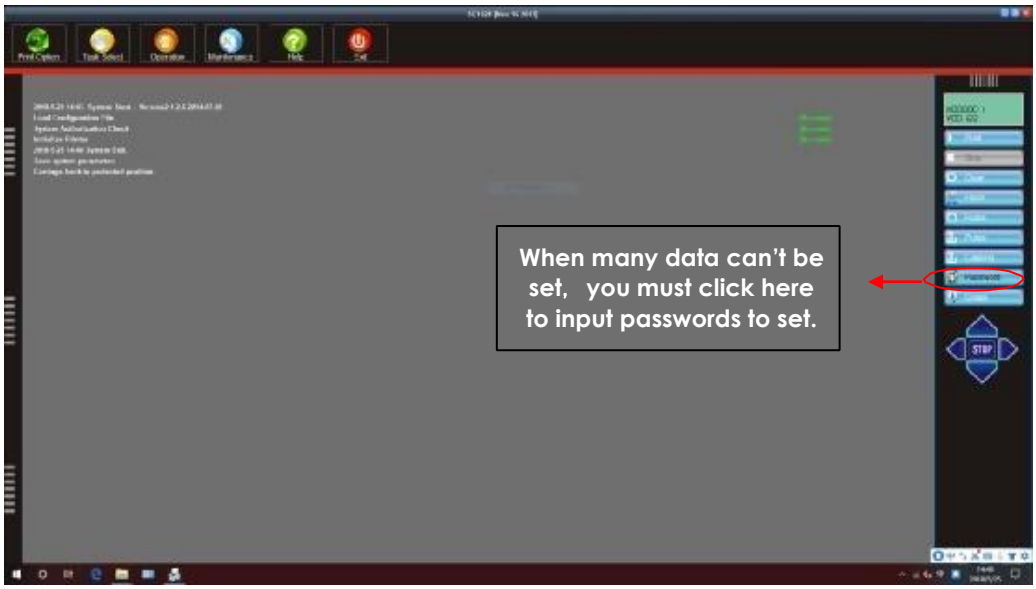




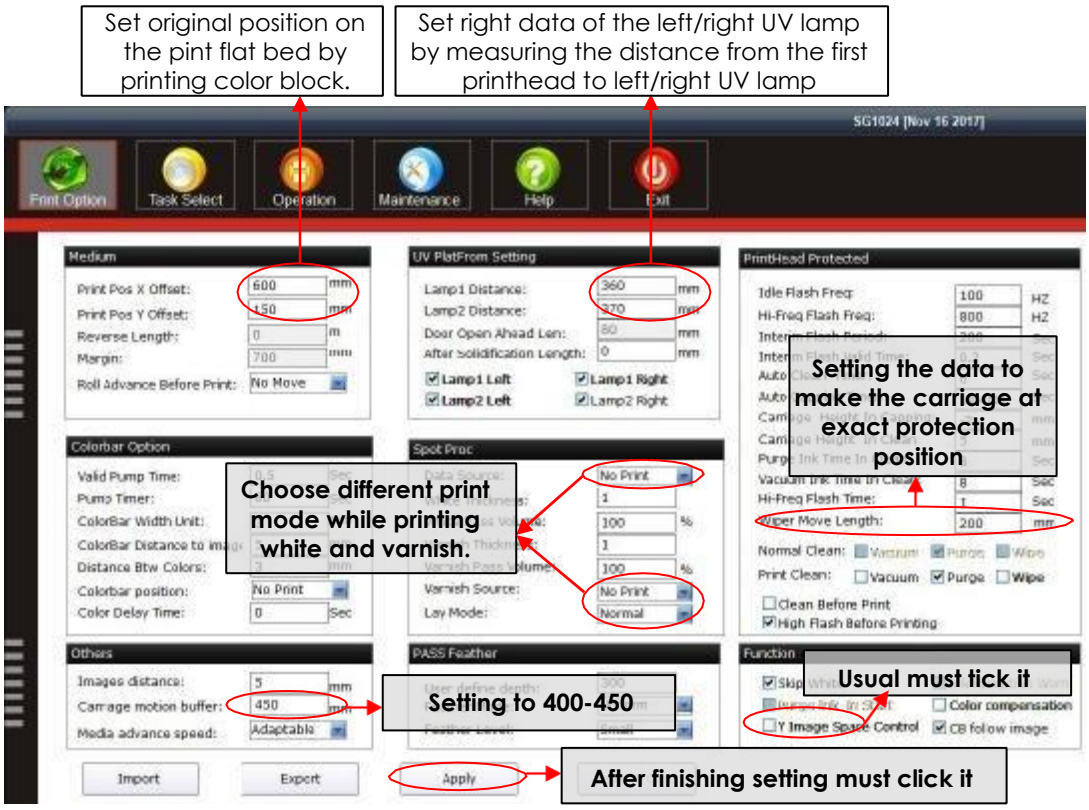
- The software is initializing and check the data of the printer.



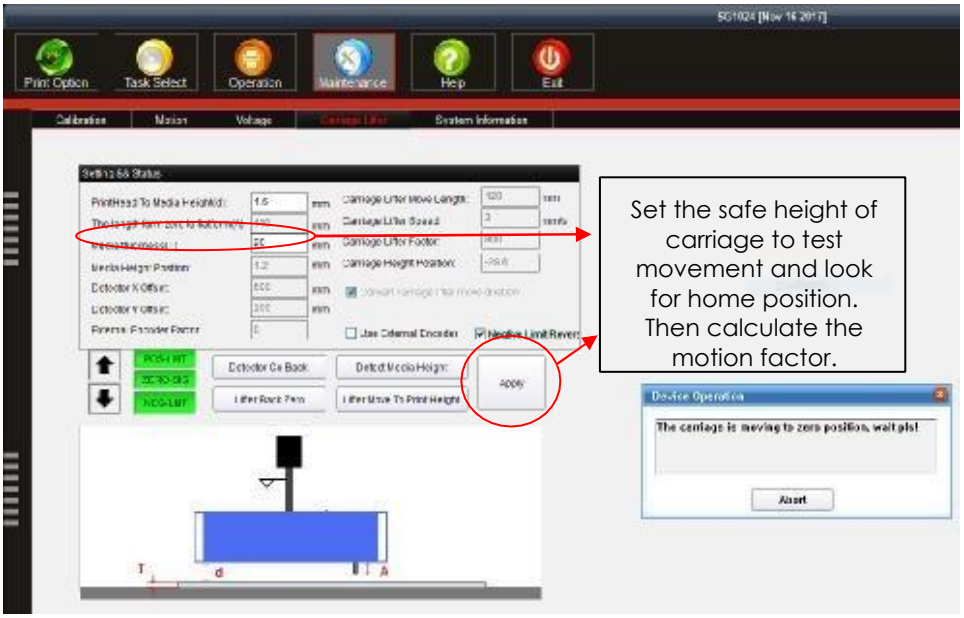
- The software finished initializing and checking the data of the printer successfully

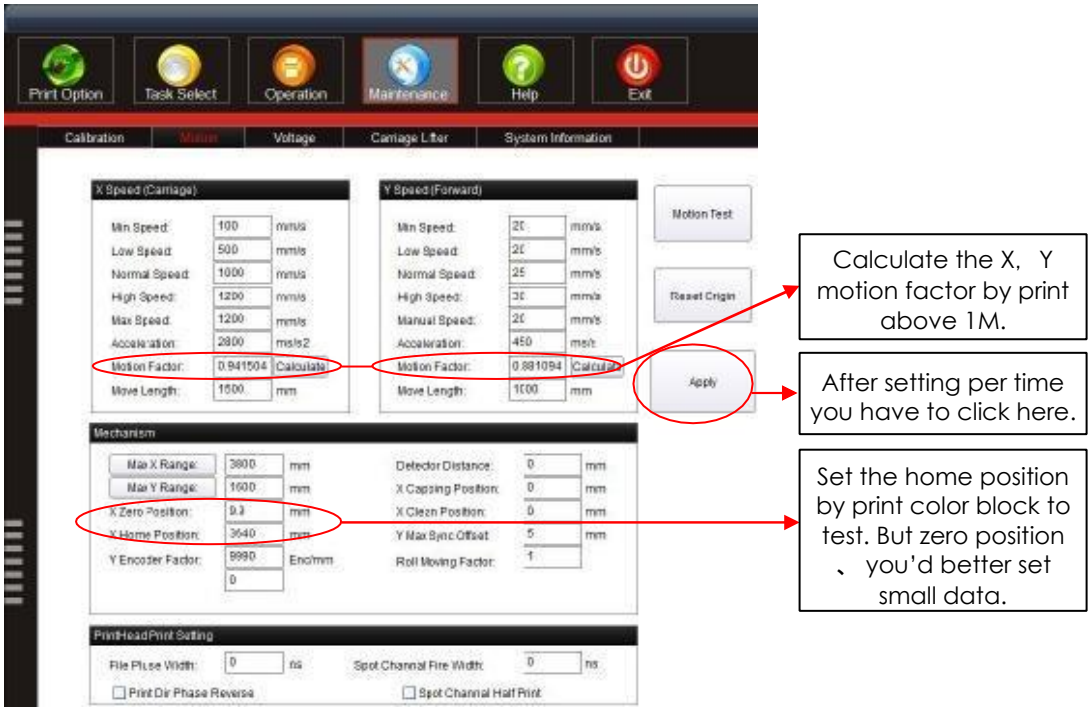


- Setting all parameters in the print option to make the printer work normally!

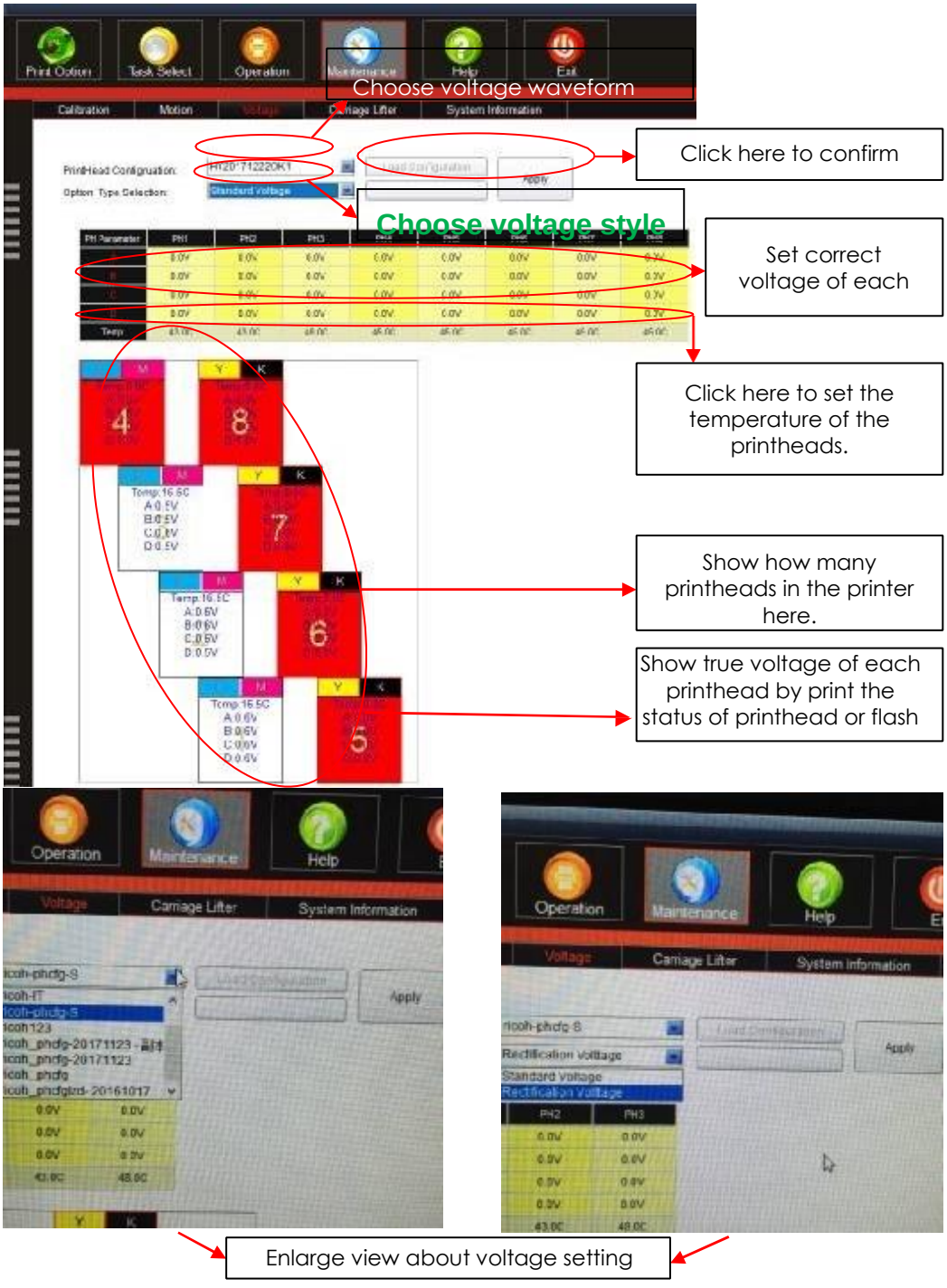


- Test kinds of movement and set voltage、temperature、height etc to make the printer work safely!
  Step 1 check the if there are some things on the print flatbed.
  Step 2 set the safe height of the carriage、then calculate the motion factor、the following figure:





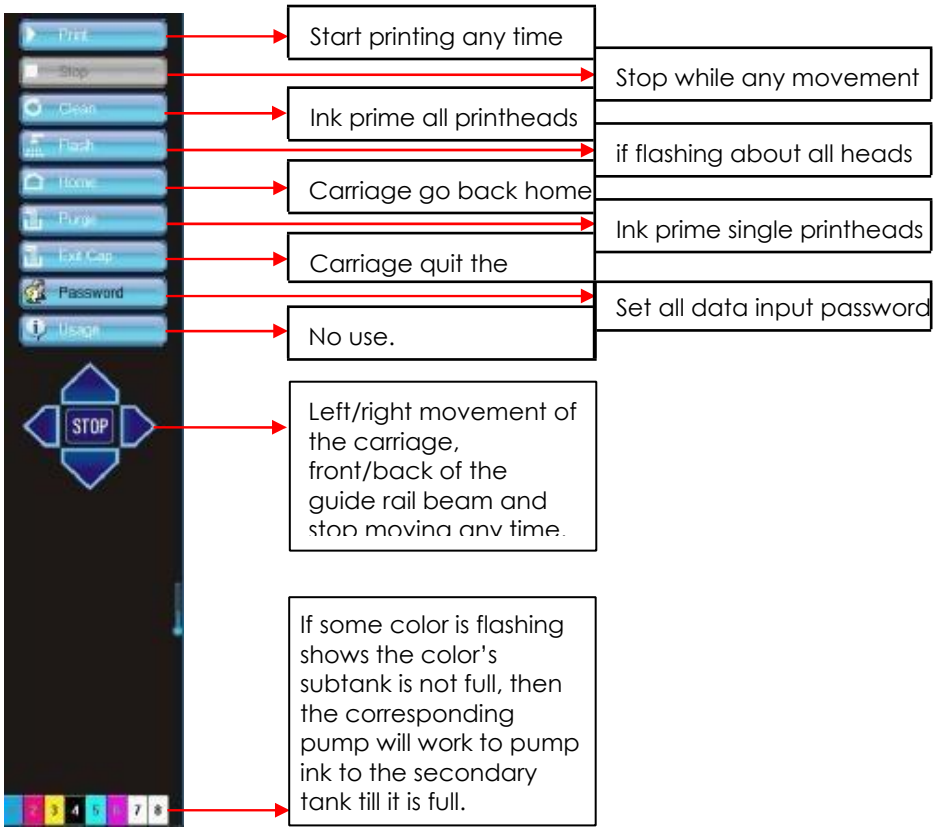
Step 3 Set the exact voltage and temperature, they relate to the precision of the printing.



4.7.3 Testing the Printer Functions through PC

This is to check the mechanical functionality of the Printer through PC.

- Using the POLAROID Driver software, move the Print head Carriage from left to right, then to home position. Check also if the Y-axis Servo Motor is also working by clicking the appropriate arrow head below.



Note: Once all the printer functions are working normally, shut-off the printer power.

4.7.4 Printhead Installation Procedure

Unpacking the Print head

- Open the package, and then take out the anti plastic bag.
- Open the anti-static plastic bag and remove the head.
- Remove the head cap.

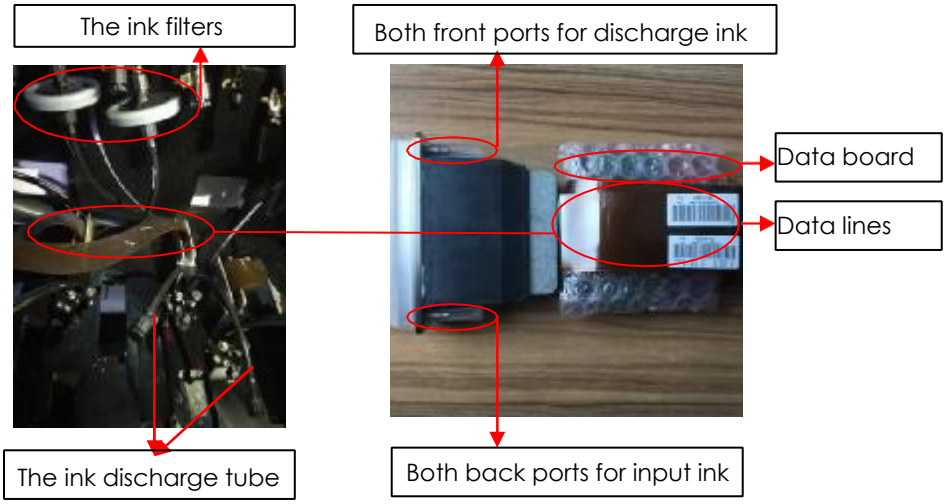
The serialnumber and the voltageof each region of printhead should match

Note:

- ✓ The head is pre-loaded with ink analog to prevent drying of the nozzles during transportation.
- ✓ The head is also equipped with a cap to protect the nozzle surface and prevent drying of the ink analog.

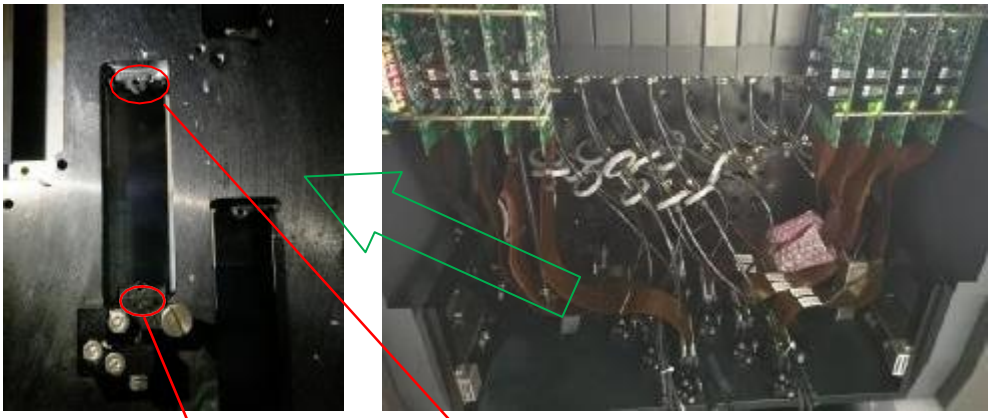
- Hold the middle of both sides of the cap squeeze and twist the cap to release the latch that holds the head as shown below.

- Take note each printhead must have ink input and ink discharge tubing. The input tubing must be connected to the back both ports with disc 20µm ink filter. While the ink discharge tubing should be connected on the front both ports and must be closed using a connector cap. See photo below.



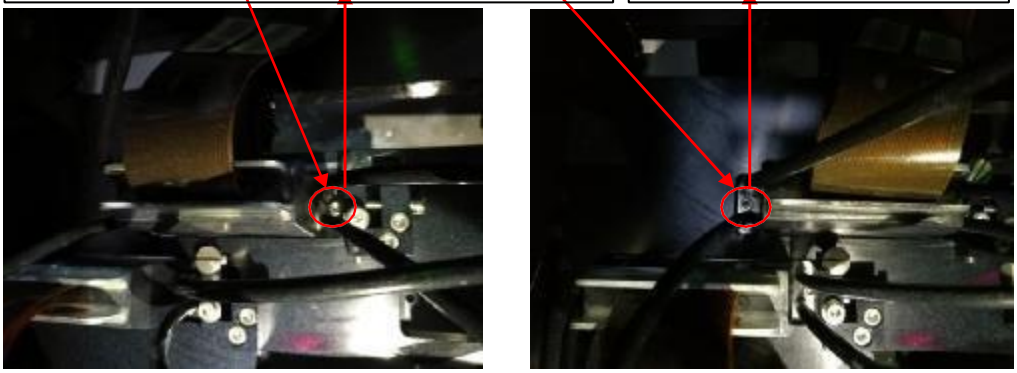
- Install the print head one by one by removing printhead fixation screws from the carriage printhead mounting plate first, position the printhead and replace the two fixation screws accordingly.
- The back fixation screw must be slightly tightened to allow the printhead to move with minimum vertical shake, while the front fixation screw must be tightened properly before doing Y-align. Please take note of proper printhead orientation.

- Connect the input tubing of printhead to the Ink tank supply port accordingly, take note not to interchange the connection for input and the discharge tubes. The input tubing should have a 20μm ink filter.

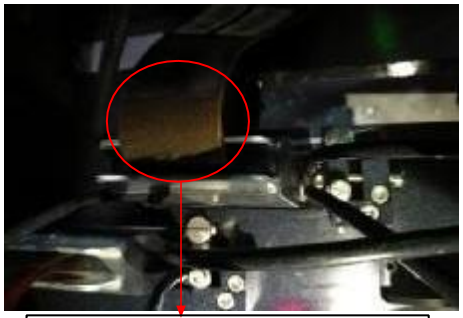


the front fixation screw must be tightened properly before doing Y-align the front fixation screw must be tightened properly before doing Y-align.

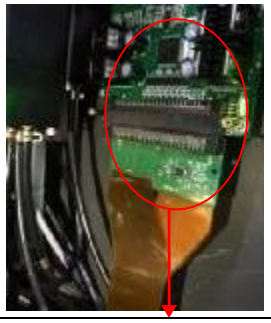
The back fixation screw must be slightly tightened to move with minimum vertical shake.



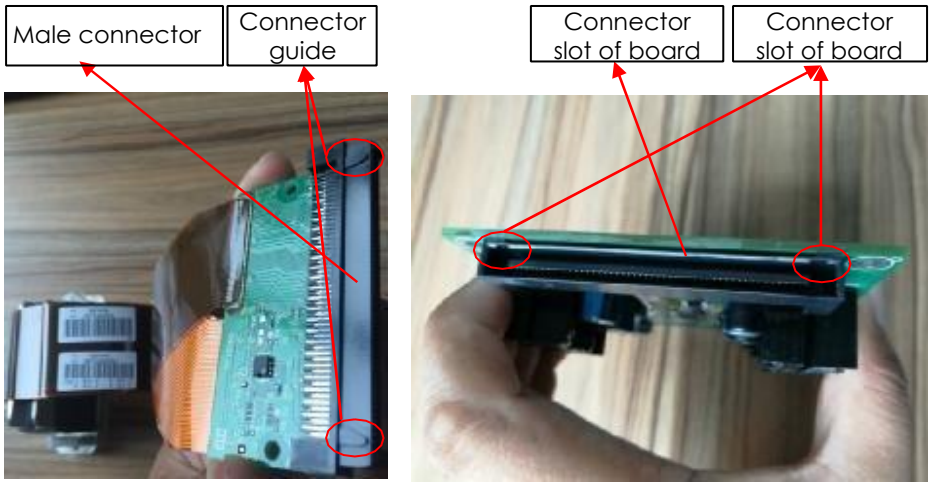
- Connect the 100pins flexible print head data cable on each print head and to the Print head Control Board. Please take note of the proper connection of cable.



The printhead data cable and the printhead are a whole.



The printhead data cable is inserted into the drive board.



- Check all the connection again to ensure there are no misconnections and loose connections on the data cables. Power on the machine and check for any functional abnormalities on the carriage.

4.8 Ink and Solvent Preparation

- Pour the ink and solvent in their corresponding ink/solvent barrels. Be sure to observe proper procedure in handling the ink. See Chemical Safety Information.
- Switch on the printer power.
- Connect the ink pumps one at a time and check for any leakage along the solvent and ink line system.
- Perform Ink Prime by activating the toggle switch. Do ink bleeding all printheads at time to remove air bubbles trapped inside the printhead.
- Perform auto clean for one printhead thru the POLAROID driver GUI.
- Send Test Printhead to see if all printheads prints a shown below. But have to confirm the correct waveform.

The printhead print status of four colors are normal.

Note: **Above is an Illustration of Nozzle Test Print, only four colors are shown due to space constraint, Light Magenta, Light Cyan, White and Varnish printheads must print the same result.**

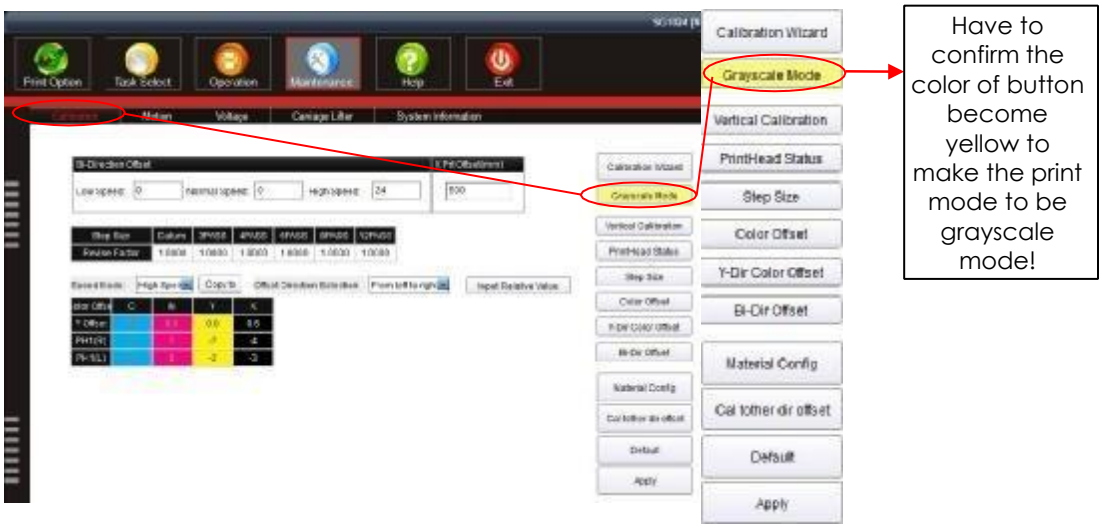
4.9 Print head Alignment

4.9.1 Brief Introduction

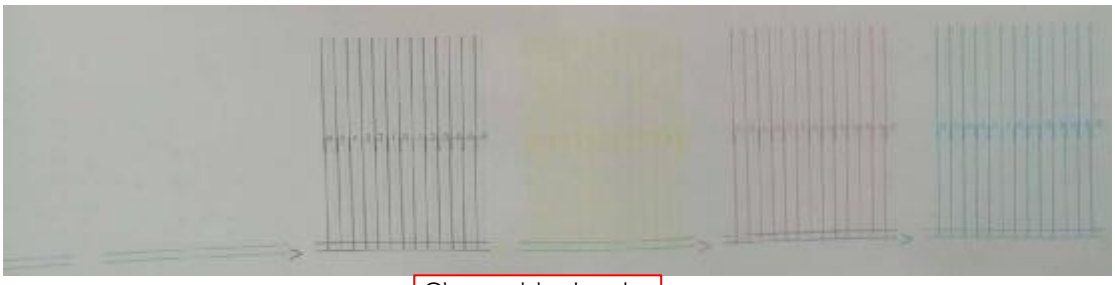
This is to describe the proper procedure in aligning the Print heads.

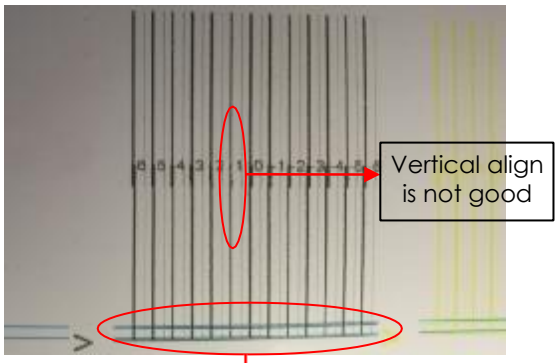
4.9.2 Printheads Mechanical Alignment (Y-Align)

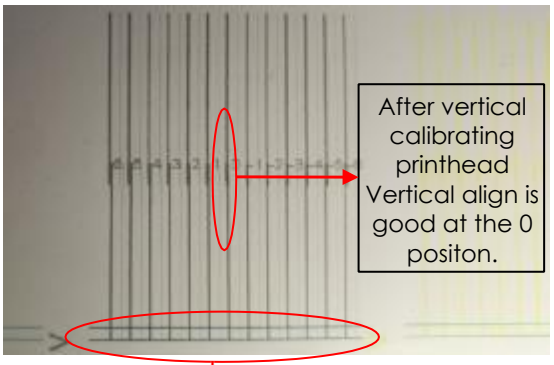
- On POLAROID driver GUI, click Maintenance button、then select calibration. then firstly click. The result should look as shown below.



- Click Vertical calibration to Y-align, including Vertical and Horizontal mechanical calibration, Cyan is the standard color.



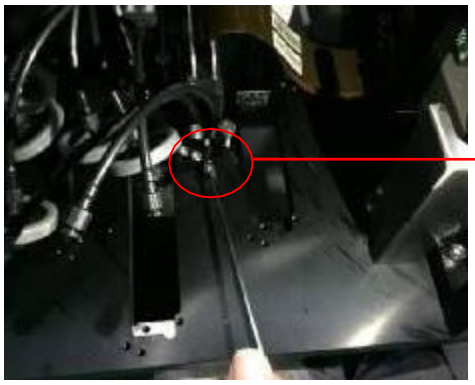




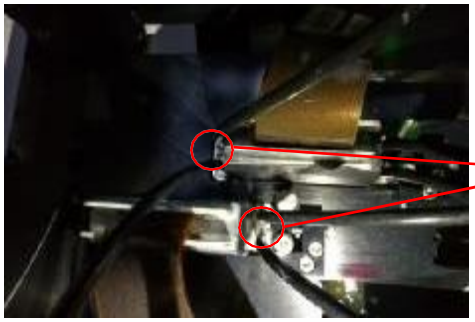
- Below shows how to do Y-alignment of the printheads.

Turn the mechanical alignment screw clockwise to pull the printhead forward and counter clockwise to push to calibrate the vertical align.

Turn the mechanical alignment screw clockwise to pull the printhead forward and counter clockwise to push to calibrate the vertical align at the opposite position



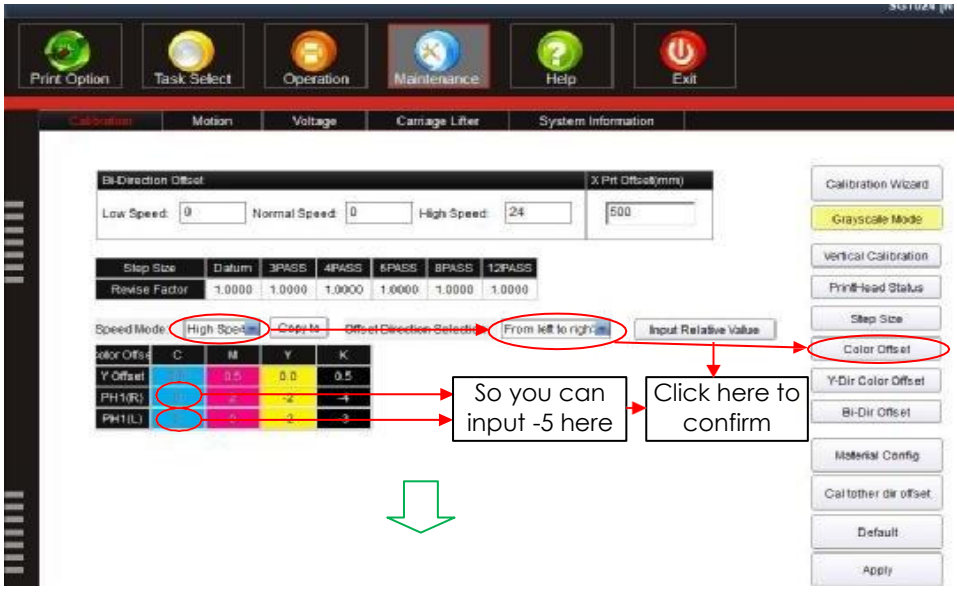
Turn the mechanical alignment screw clockwise to pull the printhead forward and counter clockwise to push to calibrate the horizontal align.

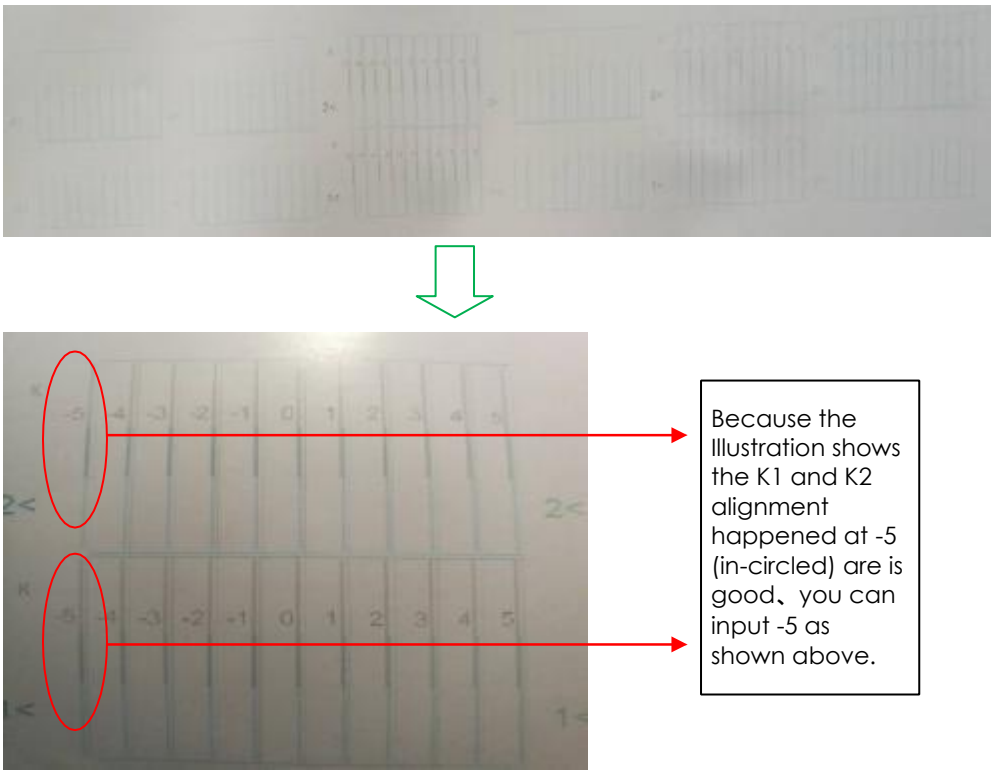


After repeated calibration and confirm the Y- align is very good. Please have to tighten the mechanical screw to fix the printhead.

4.9.3 Printhead Left Align

- On the printer tab select from left to right、then click the color offset to print the illustration as shown below. Further below shows how the print out should look like. The Illustration shows the K1 and K2 alignment happened at -5 (in-circled) are is good. Please note that this time C is the reference printhead in aligning all other printheads.

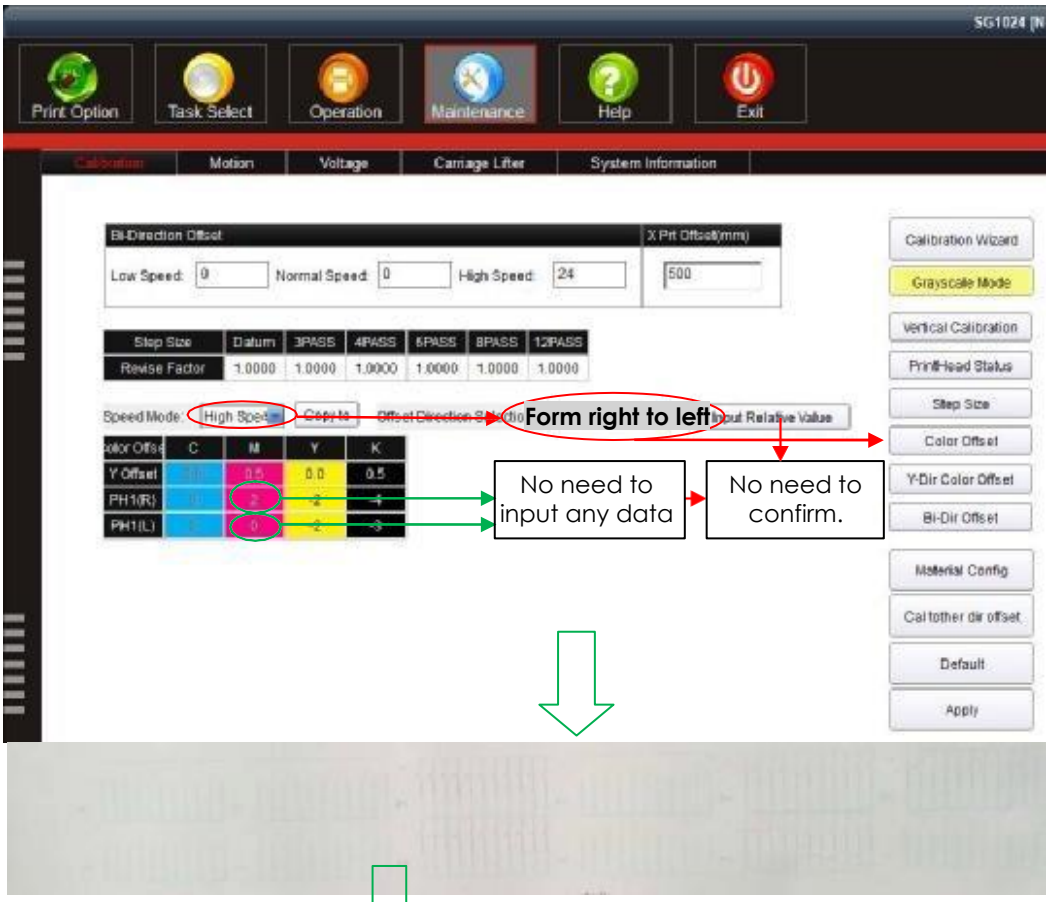


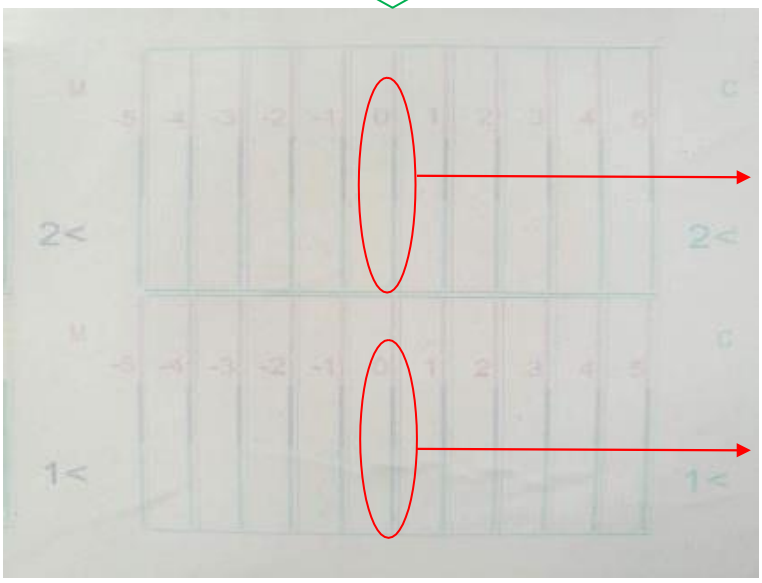


- Basically the navigation, voltage and temperature are repeat set most optimum value.

4.9.4 Printhead Right Align

- On the printer tab select right to left, then click the color offset to print the illustration as shown below. Further below shows how the print out should look like. The Illustration shows the M1 and M2 alignment happened at 0 (in-circled) are is good. Please note that this time C is the reference printhead in aligning all other printheads.
- Basically, the navigation, voltage and temperature are repeat set most optimum value

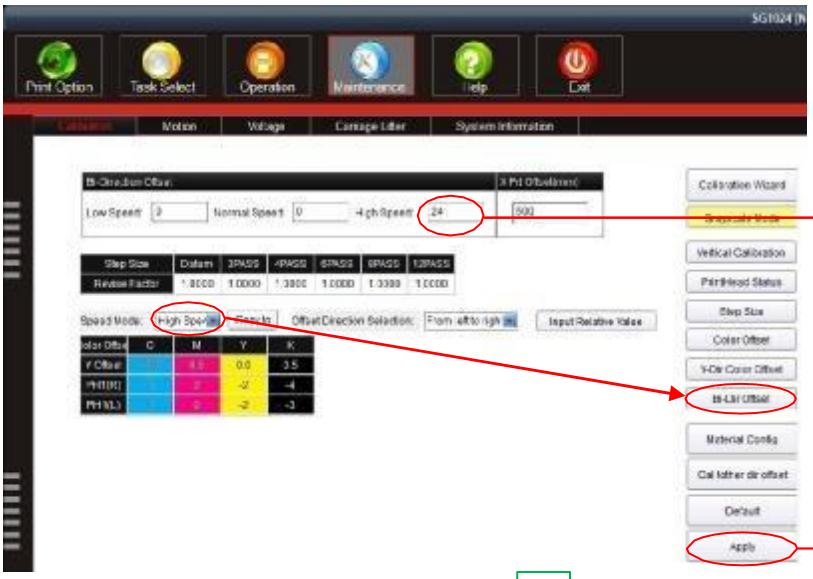




Because the Illustration shows the M1 and M2 alignment happened at 0 (in-circled) are is good, you not need to as shown above .

4.9.5 Printhead Bi-Dir Align

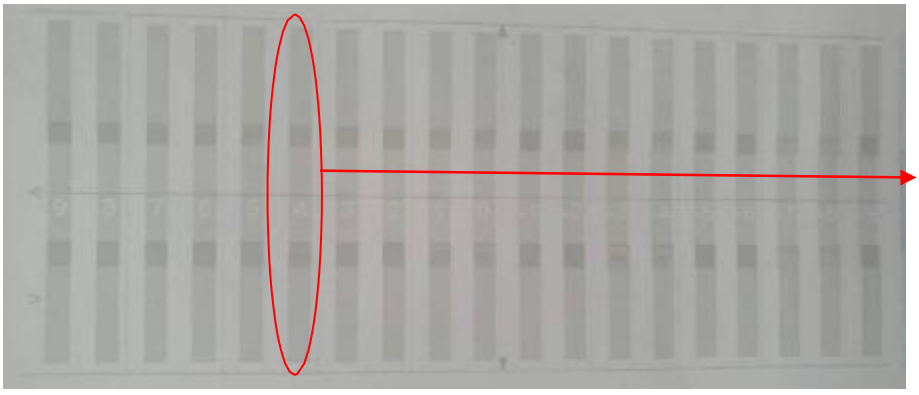
- On the printer tab select Bi-Dir Offset Align option then click send print as shown below. Further below shows how the print out should look like, the Illustration shows the Bi-Dir alignment happen at 4 (in-circled). This time you align the left and right printing directions.



Because the Illustration shows the BiDir alignment happened at 4 (in-circled) are is good、you can add 4 to the original number is 29.

Click here to confirm all new data.

Bi-Dir Align

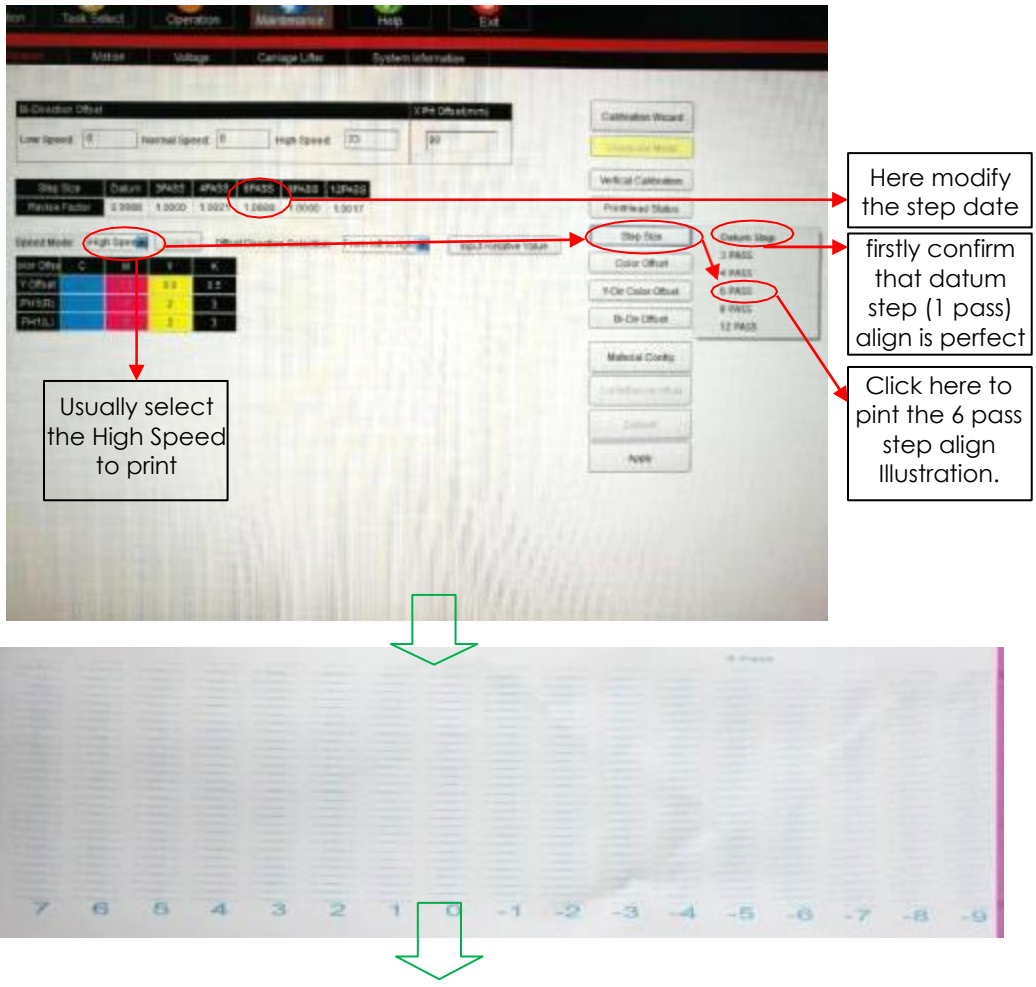


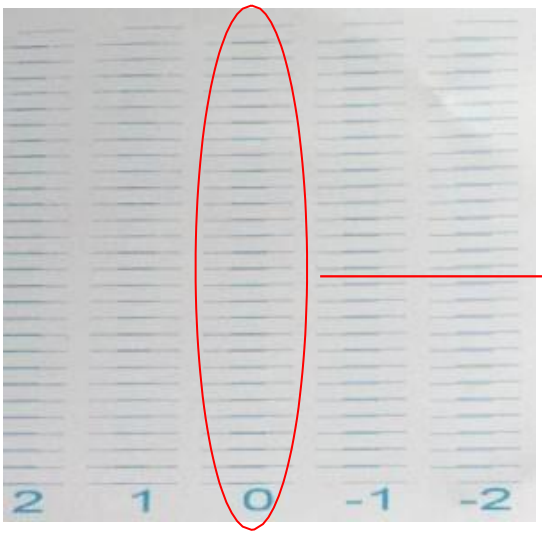
Because the Illustration shows the Bi-Dir alignment happened at 4 (in-circled) are is good, you can Add 4 as shown above.

- Basically the navigation, voltage and temperature are repeat set most optimum value

4.9.6 Printhead Step Align

- On the printer tab select Step Size option and choose the pass what you want then send print as shown below. Further below shows how the print out should look like. The Illustration shows Black scenarios.
- For example 6 pass illustration as show below, the Cyan color lines are the standard lines, so the black and blue lines coincide at the 0 position (in-circled) for the purpose of better understanding how this ,if the black and blue lines don't coincide at the 0 position, you have to repeatedly modify the Revise factor till they coincide completely by many time printing the illustration!
- But the most important thing is that you have to confirm the black and blue lines coincide completely at the 0 position while printing datum step (1 pass) as below. Because you firstly confirm that datum step (1 pass) align is perfect, then the other pass step align are significative!



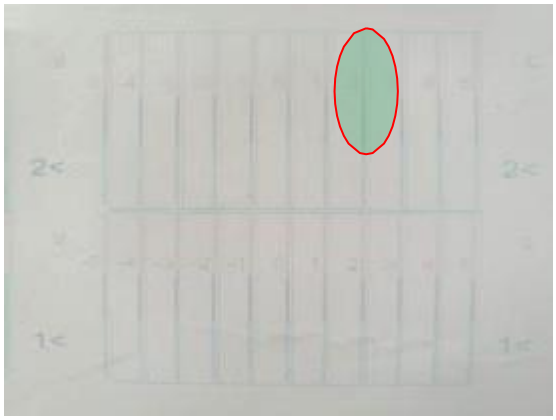


the Cyan color lines are the standard lines, so the black and blue lines coincide at the 0 position (incircled), show the 6 pass align is perfect , if they coincide at the -1 position, you need to minus 1 from the original number

4.10 Printhead Voltage and Temperature Settings

This section will describe the necessity to calibrate the Voltage and Temperature settings for each printhead.

- By looking on the Left or Right Align printed samples respectively you can determine what need to be done to get a better print quality.
- First you need to see the magnified printed sample for each printhead. Lets take the illustration sample below.



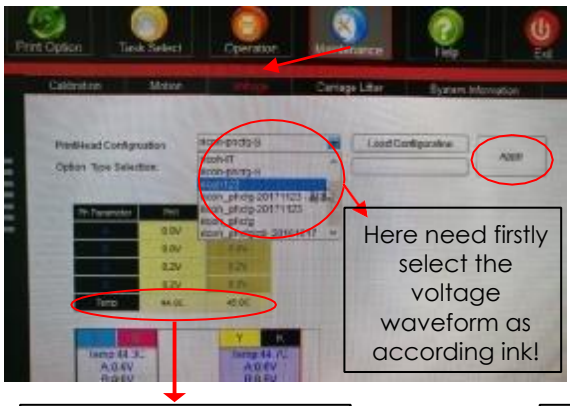
- Assuming the green shaded area will be view over a magnifying lens at least 40X (100X magnification is better) the vertical lines are actually a group of dots pre arranged according to printhead nozzle design. For the case of Recho head it should look like below

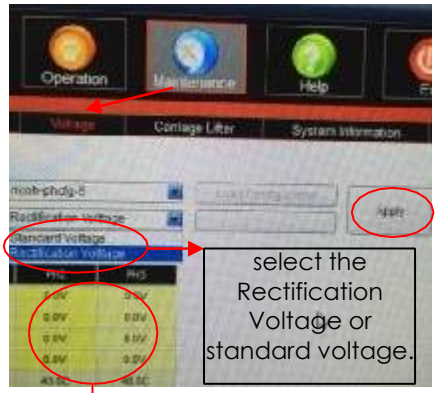
Low Voltage or Low Temperature Settings

GOOD

High Voltage Setting or High Temp Settings

- Sometimes getting the best dot print quality is a painful process so it needs patience. All you can do is play with temperature and voltage settings.
- The recommended Voltage setting range is controlled by POLAROID operated software so there's no chance you set the voltage beyond the recommended range. While the recommended temperature setting is 40-45°C in most cases ink manufacturers have their recommended temperature settings.
- When changing the Voltage, you need firstly select the voltage waveform as according ink! Usually include standard voltage、so you no need change the voltage value. But if you want to change it very much according to the actual condition, you firstly select the Rectification Voltage, then do small change in yellow area, finally click Apply button as below figure 2!
- Temperature settings click setting icon on the figure1 finally click Apply button!





Note: The actual reading for both Voltage and Temperature will appear only when click print printhead status or click Flash button to flash about all heads

- To change the temperature setting simply over write the existing value with your desired value then click Apply button. While for Voltage you need to click the select Standard Voltage or Rectification Voltage to update the Voltage setting to your desired value.
- Other factors than can influence print quality are;
  - ✓ Room Temperature
  - ✓ Humidity
  - ✓ Ink Viscosity
  - ✓ Negative Pressure Settings
  - ✓ Carriage Printing Speed

  Note: In most difficult cases playing with Negative Pressure Setting and printing at slower speed can help improve the print quality significantly.

Chapter 5 - Operation of the Machine

5.1 Brief Introduction

This chapter introduces the details of the operating instructions of the machine from starting up to shutdown procedure.

5.2 Starting-up Activities

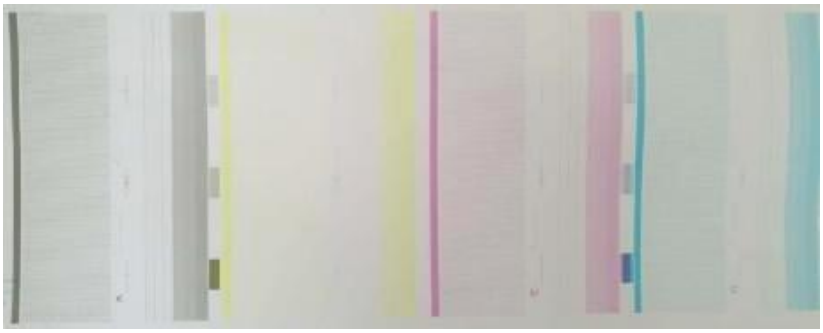
It is highly recommended to do housekeeping before starting to operate the machine. Maintaining good housekeeping helps improve the quality of the output as well as the safety of operator. Below is the check list of activities that operator should do prior to operation of the machine.

- Turn on the ventilating and lighting system inside the printing room.
- Check and clear for any traces of ink spillage on the machine and the floor.
- Check if the Waste Ink Bottle is already full and replace if necessary
- Check if the main power voltage is stable and correct by multimeter 、 but you'd better install the voltage regulator
- Check if there is enough inks for printing and flush solution for cleaning the print head.
- Check and ensure that the printing platform along the print head carriage path is free from loose parts or obstructing object
- Removed the Print head Capping installed on the Printer Carriage protection position.
- Turn on the Main Power Switch and power-on the PC.
- Turn on the Printer Power.
- Check the Negative Pressure setting.
- Open the electromagnetic switch of all secondary ink tanks.
- Perform Solvent Flushing procedure on the Print head.
- Perform Ink Priming procedure on the Print head.
- Finally clean the printheads.

5.3 Print head Jetting Check

Check the jetting status of each Print head periodically before printing、and after using the machine.

Click here to print printhead status illustration.



Note: Above Illustration show only four colors: black, yellow, magenta and cyan, light magenta and light cyan are excluded due to space constraint, please take note that all printheads must print the same.

5.4 Working on RIP POLAROID Edition Software
Basic Elements of the Software. For example 4.7.1 Section.

5.5 Shutdown Procedure (the machine will be not operated for more than 4 days)

- Shut-off the UV lamps.
- Shut-off the electromagnetic switch of all secondary ink tanks.
- Shut-off the power for machine and PC.
- Disconnect the printhead input line from the Ink Supply line.
- Connect the printhead input line to the syringe filled with clean applicable flushing solutions.
- Slowly push the flushing solution out of the Print head to gradually remove the ink presence on the Print head.
- Continue flushing the print head until a clear flushing solutions are jetting out of the printhead nozzles.
- Re-connect the printhead input tubings to ink supply line.
- Do the same procedure on other Printheads.
- After completing the flushing of all the Print head, prepare the Print head Capping material.
- Pour Flush solution to the lint free cloth on top of the prepared print head capping material.
- Install the Print head Capping into the bottom of the Print head Carriage securing it with the cling wrap which is wrapped-around the print head carriage
- Wipe-off any ink contamination.
- Turn off the Main Power switch.
- Close the left case cover.
- Switch-off the ventilation and lighting in the printing room if necessary.
- Perform Housekeeping if necessary.

5.6 Overnight Shutdown

- Shut-off the UV lamps
- Shut- off the electromagnetic switch of all secondary ink tanks.
- Shut-off the power for machine and PC
- Close the machine covers
- Do housekeeping if necessary

Chapter 6 - Service and Maintenance Procedure

6.1 Brief Introduction

This is to describe the various service and maintenance procedure to be observed in using this T-REX PLUS UV machine.

6.2 Flushing a Selected Print head

- Disconnect the connection of the Ink Tube Inlet from the Ink Supply line, insert the tubing of the Syringe with the compatible solvent inside.
- Slowly push the solvent out of the printhead and check if all the nozzles are jetting well.
- Continue flushing out until all the printhead nozzles are showing straight jetting of flushing solution.
- Reconnect the Ink input tubing to the supply line, Do Ink prime by activating the toggle switch.
- Click the Auto Clean Mode on the POLAROID driver software to wipe clean the printhead nozzles.
- Wipe the printheads with a lint-free cloth to removed excess ink residue near the nozzles.

6.3 Replacing the Print head

- Turn-off the printer power.
- Perform the Flushing procedure on the Print head that needs to be replaced.
- Remove the 100pins Print head flexible flat data cable.
- Remove the two print head fixation screws.
- Remove the input and bleed tubes from the Print head's ink supply and bleeding port.
- Safe keep the old Print head.
- Install the new Print head to the Print head accordingly.
- Replace the two fixation screws of the Print head.
- Connect the Ink supply and Ink bleed tubing to the new Print head's accordingly.
- Install the Print head Connection Card on the carriage and tighten fixation screws.
- Install the 100pins Print head flexible data cable, take note of the correct cable connector
- orientation when connecting the flat data cable and power cable on the printhead driver board to Printhead Control Board.
- Perform Flushing procedure to make sure that all jets are working well.
- Turn on the printer power.
- Perform Ink Priming
- Wipe the Print heads with a lint-free cloth to removed excess ink residue around the Print heads nozzle.

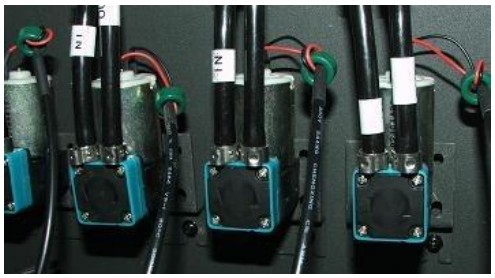
6.4 Maintenance of Ink Supply and Vacuum Line System

- Check the ink supply line system specifically the connectors, plugs and valves for any traces of leakages or broken plastic tubing.
- Check and drain any traces of ink or solvent flow from the ink protect tank. If overflow happens, clean the affected line immediately. Ink dripping or starving will happen on the print head as a result of unstable vacuum line system.

6.5 Changing Defective Ink Pump and Filter

Usually the ink pump stops pumping the ink when the secondary tank is full of ink. The level sensor will energize the LED on the Print head Control Board when the secondary ink tank is full.

If the LED doesn't light after 2 minutes of pumping, then most likely the pump is defective or there's a leak somewhere along the input line. Please take note of the polarity of the power supply cable for the ink pump, usually the red wire is connected to positive "+" while the black is to negative "-".
Change the ink and solvent filters every three months or approximately 800 operational hours to ensure continuous ink and solvent flow into the system



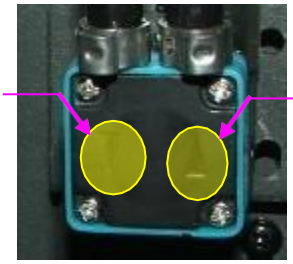
Ink Pump

Ink Filters

6.6 Changing Defective ink and Vacuum Pump

If the time for the ink to reach the secondary ink tank is longer than 2 minutes, the pump might be defective or it might be a leaking problem. When changing the Ink Pump, take note of the polarity of the power supply cable and the direction of the arrow head for tubing connections.

Air Pump



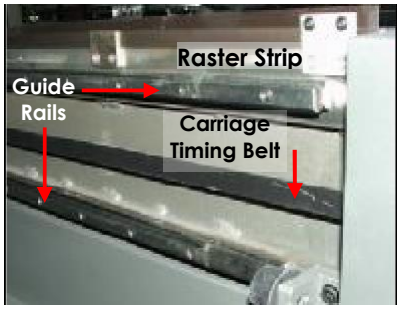
Arrow head

Likewise, when the ink priming pressure becomes weak and the negative pressure will go down below -2.0 reading, the air pump is defective or there might be some leakage somewhere in the vacuum line system or the 4/2 way valve is malfunctioning. Usually, the vacuum pump can attain 20-30KPa pressure when you do ink priming. When changing the vacuum pump, you must take note of the power supply cable and flow direction of air is determined by the arrow head on the pump.

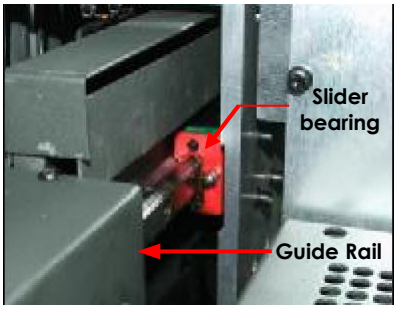
6.7 Maintenance of Printer Moving Parts

Clean and lubricate all moving parts on a weekly basis. Apply enough light duty grease or oil whichever is applicable in the contact surfaces. Excessive grease will help accumulate more dirt and might caused some untimely stoppage of some moving parts.
While excessive oil specially carriage rails and slider bearing might drip on the printed image or unprinted surfaces and will affect printing quality or ink adhesion on the media. It might be a safety risk if it will fall on the floor.

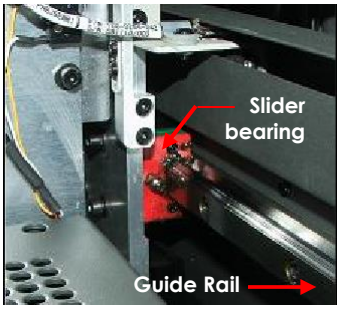
6.7.1 Beam X-axis guide rails and slider bearing should be clean and applied with enough light duty grease on contact surfaces. Raster strip should be clean with IPA moisten clean cloth. Both should be done weekly.



Guide Rail and Raster Strip



Carriage Left Slider bearing



Carriage Right Slider bearing

6.7.2 Beam Worm gears, support shifter, guide rails and slider bearing should be clean and applied with enough light duty grease on contact surfaces. These Should be done weekly.

Worm Gear and Guide Rail

Worm gear and Beam Center

6.7.3 Home position of printheads carriage and protection position of all printheads

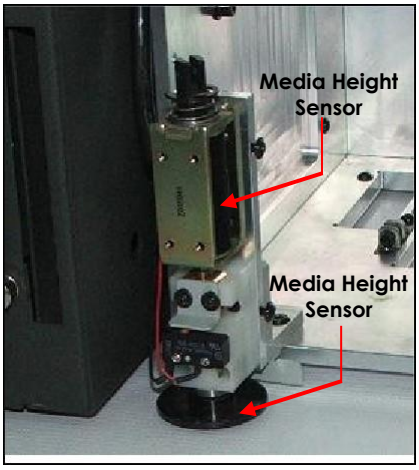
Home position is also called printhead cleaning position where you do ink purging/ priming then wiping the excess ink off the printhead nozzles by your hand. protection position protect the surface of all printhead from dry and solidify for less than 4 days.

handle | Status of cleaning printhead | Status of stop or printing

Protection parts for each printhead | No printhead

6.7.4 Media Height Auto Adjustment System should be clean and lubricate applicable parts weekly.

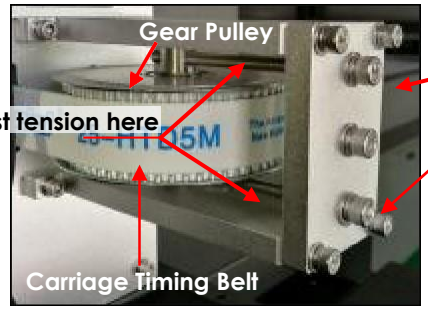
Media Height Adjustment System



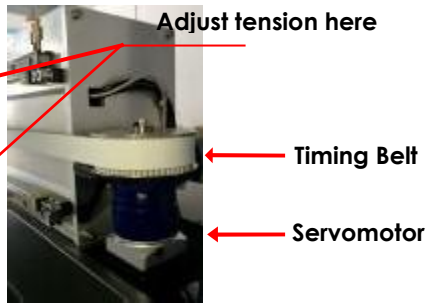
Media Height Sensor Assembly

6.8 Maintenance of Timing Belts

Timing belts should be check monthly for traces of damages, misalignment and loose tension. Carriage timing belt tension can be adjusted thru two bolt tension adjuster at the left end of the beam. The X-axis servomotor timing belt and printhead wiping mechanism tension and can be adjusted by loosening their respective mounting brackets.



Carriage Timing Belt Tension Adjuster



X-axis Servomotor

Chapter 7 - Appendices

Appendix A Material Safety Data Sheet for UV Inks

SECTION 1: Chemical Product And Company Identification

PRODUCT NAME:	VUV-Yellow/Magenta/Cyan /Black/LightMagenta/LightCyan
PART NO:	VUV-Y /VUV-M/VUV-C/VUV-K/VUV-LM/VUV-LC
SUPPLIER:	POLAROID

SECTION 2 : Composition/ Information of Ingredients

INGREDIENT NAME	CAS NO	CONTENTS	HEALTH RISK
Organic Pigment		2.0-6.0 %	
Ester Resin		0.1-5.0 %	
Vinyl Resin		1.0-8.0 %	
Cyclohexanone	108-94-1	1.0-5.0 %	Xn 36
2-Butoxethyl acetate	112-07-2	60-80 %	Xi 20/21
DE-Acetate	112-15-2	10-20 %	Xi 37/41
N-Methyl Pyrolidinone	872-50-4	1.0-5.0 %	Xn 36

SECTION 3 Hazard Identificatiion

HEALTH:	Harmful if inhaled or adsorbed through skin and irritating to eyes
FIRE:	Product is not classified as flammable.

SECTION 4 First Aid Measures

GENERAL ADVICE:	Please call hospital emergency in case of any accident that is not instructed how to handle
INHALATION:	Take the victim to the place for fresh air at once
INGESTION:	**C**all hospital emergency
SKIN:	Wash skin with clean water immediately
EYES:	Make sure to remove any contact lenses from the eyes before rinsing. Rinse at least 15 minutes. Call hospital emergency if still feel uncomfortable

SECTION 5 Fire Safeties

EXTINGUISHER:	Use Foam, Carbon dioxide (CO2) Powder.
PROTECTION EQUIPMENT:	Wear mask and safety glasses

SECTION 6 Handling ink spillage

PERSONAL SAFETY:	Use protective gloves and mask; avoid contact with skin or eyes.
SPILL CLEANUP METHODS:	Apply toilet paper
ENVIRONMENTAL PRECAUTION:	Avoid pouring waste ink into tap water drainer and soil.

SECTION 7 Handling and Storing

USAGE PRECAUTIONS:
Keep container sealed.
Provide good ventilation.
Avoid spilling, skin and eye contact. Avoid inhalation of vapors.

STORAGE PRECAUTIONS

- Keep in cool, dry, ventilated storage and sealed containers.
- Protect from light, including direct sunrays.

- Keep away from heat and flame.
- Store away from oxidizing material, alkalis, acidic.

SECTION 8 Exposure Controls and Personal Protection

INGREDIENT NAME	CAS No	STD	LT EXP (8 hrs)	ST EXP (15min)
Cyclohexanone	108-94-1	25ppm	NE	
2-Butoxethylacetate	112-072	25ppm	NE	
DE -Acetate	112-15-2	25ppm		NE
N-Methyl Pyrrolidone	872-50-4		NE	NE

INGREDIENT COMMENTS:
OES = Occupational Exposure Standard.
PROTECTIVE EQUIPMENT:

PROCESS CONTROL MEASURES: Use engineering controls to reduce air contamination to permissible exposure level. Provide eyewash station.
VENTILATION: Provide adequate general and local exhaust ventilation.
PROTECTIVE GLOVES: Use suitable protective gloves to reduce risk of skin contact.
EYE PROTECTION: Use approved safety glasses or mask.
OTHER PROTECTION: Wear suitable protective cloth for protection against splashing or contamination.

HYGIENIC WORK HABITS: Wash hands at the end of each work shift, before eating, smoking and using the toilet.
Change cloth that becomes wet. Isolate contaminated cloth and wash before reuse. Use appropriate hand lotion to prevent aging and cracking of skin. No eating or drinking while working with this material.

SECTION 9 Physical and Chemical Properties

Existing form:	Liquid
Color:	Yellow/Magenta/Cyan/Black
Boiling degree:	191
Flash degree:	88
Auto ignition Temperature:	no data
Flammability limits (vol %):	no data
Relative density (g/cm3,25):	not determined
Solubility in water (g/l,20):	not soluble

SECTION 10 : Stability and Reactivity

Stability: Stable under normal conditions in tightly closed container decomposition if used according to specifications.
Materials to Avoid: Avoid contact with oxidizing materials, strong acids, strong bases, air or oxygen.
Hazardous Polymerization: Not relevant.
Conditions to Avoid: Avoid sources of ignition

SECTION 11 : Toxicologica l Information

INHALATION: Gas or vapor in high concentrations may irritate respiratory system.
SKIN CONTACT: Acts as a defeating agent on skin may cause cracking of skin.
EYES CONTACT: Primary irritant effect may cause severe irritation to eyes.
INGESTION: Low acute oral toxicity.

SECTION 12 : Environmenta l Information

MOBILTY: Partly miscible with water.
BIO ACCUMULATION: Bio accumulation unlikely.
DEGRADABILITY: Readily biodegradable. Do not allow product to reach ground water course or seawage system.

SECTION 13 : Disposa l Considerations

GENERAL/CLEANING: Refer to Section 7 before handing the product or containers.
DISPOSAL METHODS: Disposal must be in accordance with current national and local regulations. Chemical residues generally count as special waste.

SECTION 14 : Transport Information

GENERAL: Not regulated. Page 72
LABEL FOR CONVEYANCE: No transport warning sign required.
ROAD:
HAZARD CLASS (ADR): Not classified for transportation. The product is not subject to transport regulations of Rail, Sea, Air.

SECTION 15 : Regulatory Information

LABEL FOR SUPPLY:

VUV Yellow/ Magenta/Cyan/Black

DANGER SYMBOL:

Xn (Harmful)

RISK SYMBOL:

R-36: Irritating to eyes.
R-21: Harmful by inhalation
R-20: Harmful in contact with skin

SAFETY PHRASES:

S-25 Avoid contact with eyes.
S-26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S-28 After contact with skin, wash immediately with plenty of water.
S-36/37/38 Wear suitable protective cloth and gloves and eye/face protection
S-60 This material and its container must be disposed of as hazardous waste.

SECTION 16 Other Information

This data sheet is prepared in accordance with directive. The information on this sheet is intended to provide general guidance to health and safety based upon our knowledge of the handling, storing and using of our products. It is not applicable to other products.

Appendix B Preventive Maintenance Checklist

Item	Daily	Weekly	Monthly	Quarterly	Semi-annual	Annual
Ink Supply Level	Check and shake on startup					
Waste Ink Bottle	Check for level, dispose if full or nearly full					
Ink Filters				Change		
Ink Pumps				Check and replace if necessary		
UV Lamps			Check and change if necessary, left UV lamp and right UV lamp at the same time			
UV Lamp Filters		Check and Clean				
Flat Bed		Clean				
Conveyor						
Carriage Linear Guide Rail		Check, Clean and Lubricate				
Carriage Bearing		Check, Clean and Lubricate				
Carriage Belt					Check the tension, adjust tension if necessary	
Y-feed conveyor drive gear head oil					Oil change	Oil change
Vacuum Cleaner and Filter Bag		Check for waste ink level and Clean if necessary				Change Filter Bag
Cleaning Station		Check and Clean				
Raster Strip/Ruler	Wipe with lint free cloth before startup					
Automatic Carriage Height mechanism	Check if spring is functional (The plunger should return at up/home position)					

Note: 500 Hrs after installation, the Y-feed conveyor drive gear head oil should be changed.

Appendix C Troubleshooting Guide

Problems	Probable Causes	Solution
• One particular color is not printing	• No ink flowing to the tube line of the Print head Carriage • Empty ink supply in the Ink barrel • Clogged Ink line tubing and ink filter • Defective Ink Pump • Defective Print head Control Board • Defective Motion Control Board • Air bubbles on the ink tube	1. Fill-up empty ink barrel 2. Replace clogged ink line tubing and ink filter 3. Replace defective Ink Pump 4. Replace defective Print head Control Board 5. Replace defective Motion Control Board 6. Purge air from the affected ink tube.
1. Some Print head Nozzles are not firing 2. Print head firing is not straight	• Clogged Print head • Print head problems • Defective Print head Cable • Defective Print head Control Board	• Perform Ink Priming • Replace defective Print head • Replace defective Print head Cable • Replace defective Print head Control Board • Adjust the Print head Voltage
• Ink Starvation	• Insufficient Negative Pressure value • Print head nozzles are not working well • Insufficient ink flowing from the Disc Filter to the Print head because of clogged disk filter	• Increase the Negative Pressure value from 2.2KPa to -2.6KPa • Perform Test Print to check if all the Print head nozzles are working well, flush and ink prime as needed • Replace Filter
• Cannot achieve correct negative pressure • Negative pressure keeps on changing from time to time	• Presence of ink in the Ink Protect Tank • Defective Negative Pressure Regulator • Defective Pressure Gauge • Defective Air Pump • Possible leak in the vacuum line system (negative pressure line)	• Remove or purge any presence of ink in the Ink Protect Tank • Replace defective Negative Pressure Regulator • Replace Pressure Gauge • Replace Air Pump • Fix any air leak from the vacuum line system. • Replace Air Fittings if necessary
• Air Pump is not working • Ink Pumps are not working	• Presence of ink in the Ink Protect Tank • Ink Tank Sensor might not be working that is why ink is overflowing to the Ink Protect Tank	• Fix/replace the Ink Tank Sensor • Remove the ink from the Ink Protect Tank using the Syringe from the Ink Outlet Tube vent
• All Ink Pumps are not working	• Presence of ink in the Ink Protect Tank • Defective / Out of Position Ink Protect Level Sensor	• Remove or purge any presence of ink in the Ink Protect Tank • Replace/Fix Ink Protect Level Sensor by opening the Ink Protect Tank
• No Print at all • No presence of Printhead Voltage from RTZ software	• The Optical Cable must have been interchanged during installation	• Interchanged again the Rx/Tx connection of the Optical Cable either from the PCI card or in the Printhead Control Board
• Carriage gets in contact with media during printing	• Gap between carriage and media (printing platform) is too close. • Media suction is not working • Wrinkled / curled media	• Adjust the Printer Carriage between 2.0 – 2.5mm. • Check the 24V supply of suction fans, replace defective suction fan if necessary • Replace the media to avoid wrinkled media to be in contact with the print head during printing
• Carriage is not moving, left to right stroke	• Defective AC Servo Motor • Corrupted/Defective Servo Driver • Worn-out Timing Belt • Defective Motion Control Board	• Replace defective Servo Motor • Re-program the Servo Driver, replace if defective • Replace worn-out Timing Belt • Replace Motion Control Board

• Media is not moving, backward and forward stroke	• Defective DC Servo Motor • Defective Movement Control Board • Worn-out Timing Belt • Defective Motion Control Board	• Replace defective DC Servo Motor • Replace worn-out Timing Belt • Replace Movement Control Board\ • Replace Motion Control Board
• Ink is not drying	• Heat is not enough to dry the ink • Heater is not working • Heater controller is not working • Density or the ink limits of the image setup is too high	• Increase the heater's temperature from the printing platform as well as the front heater • Replace defective heater • Replace heater controller • Lower the ink limits of the image profile • Decrease the Ink limits of the image
• Horizontal banding	• Clogged Print head • Step alignment is not good • Print head alignment is not good	• Perform solvent flushing and Ink Priming (make a longer flushing if needed) then check tus of the Print head in Test Print. • Adjust the motor steps (see Print head g ment Procedure) • Aligned the Print head very well (see Print head Alignment Procedure)
• A particular portion of the printer is showing horizontal banding	• Feeding of the Pinch Roller is not equal	• Adjust the tension of the Pinch Roller (see Pinch Roller Adjustment Procedure)
• Inconsistent step align problem	• Feeding of the Pinch Roller is not equal • Worn-out Gear Box Assembly • Defective Motor Encoder • Worn-out Timing Belt	• Adjust the tension of the Pinch Roller (see Pinch Roller Adjustment Procedure) • Replace worn-out Reducer Gear Box Replace Y-Axis Servo Motor • Replace Timing Belt
• Vertical Banding on the right side portion of the machine	• Raster Strip might have scratches on that portion • Loose connection on the Print head Cable Data lines • Tension on energy chain assembly	• Replace the Raster Strip • Fix loosed Print head Cable Data lines • Fix/replace the energy chain • Re-setup and cabling on the energy chain
• Carriage suddenly stops during operation • X-alignment problem during printing	• Raster Strip is too dirty • Portion of Raster Strip has severe scratches • Defective Raster Strip • Defective Raster Encoder • Raster Encoder is not properly setup with raster strip	• Clean Raster Strip . • Replace defective Raster Strip • Replace defective Raster Encoder • Perform Raster Alignment
• Portion of the RIPed image was not printed	• The RIPed image dimension is almost /more than 2000in/50m. • The RIPed image file is more than 4G bytes	• Reduce the size to be RIPed to manageable size to avoid RIPing error
• Output size of the image print is not same with the defined image dimension	• Tension Roller problem • Needs to perform Output Size Compensation	• Adjust/setup the roller tension properly • See page 48 for proper procedure in using Output Size Compensation

Appendix D Glossary

Adobe Acrobat- Software package created by Adobe for converting any document to an Adobe Portable Document Format (PDF) file. Anyone can open your document across a broad range of hardware and software using the downloadable, free software Adobe Acrobat Reader, and it will look exactly as you intended—with layout, fonts, links, and images intact.
Aliasing- A defect which occurs when a graphic file does not have enough resolution to reproduce image detail and causes visible jagged lines along the edges
Attachment- When referring to e-mail, an electronic file placed within an e-mail for the purpose of sending through the Internet.
Banding- It is the horizontal, parallel lines in an ink jet print caused by a falsely aligned or defective print head. It is also the vertical lines caused by some mechanical problem.
Bi-directional Printing- Printing in which the print head alternates printing a line left to right, then the next line right to left, etc.
Bitmap Images- Computerized image made up of a collection of dots or pixels; these images appear blocky when you zoom in; also known as raster images
Bleed- Ink which prints beyond the trim edge of the page, created for the purpose of allowing ink to extend to the edge of the page after trimming. Without bleed, cutting the product becomes extremely difficult and may sacrifice the quality of the product.
CMYK- cyan, yellow, magenta, black. The subtractive primaries, or process colors, used in color printing. Black (K) is usually added to enhance color and to print a true black.
Color Bar- Strips of color used as a tool to check color accuracy and density
Color Mapping- The terminology that permits the "best match" in appearance to the "source image".
Color Separations- The process of preparing artwork, photographs, transparencies, or computer-generated art for printing by separating color into the four primary printing colors: cyan, magenta, yellow and black.
Contrast- The comparing of light and dark on an image, such as low = gray (light).
Crop- To cut off parts of a picture or image.
Crop marks- Printed lines showing where to trim a printed sheet.
Densitometer- A quality control devise used to measure the density of printing ink.
Density- The degree of color or darkness of an image or photograph.
DCM Driver Chip Module- Part of Spectra 96 chip print head. Consists of a printed circuit board with driver chips, attached to a lead frame of sprung legs that are pushed into contact with pads on the PZT.
Dithering- Creating dots to "fool the eye" into seeing shades of gray.
Dot Size- Relative size of halftone dots as compared to dots of the screen ruling being used. There is no unit of measurement to express dot size. Dots are too large, too small or correct only in comparison to what the viewer finds attractive.
Dots-per-inch- Measure of resolution of input devices such as scanners, display devices such as monitors, and output devices such as laser printers, image setters and monitors. Abbreviated DPI. Also called dot pitch.
Drop-On-Demand (DOD) / impulse- an ink jet system in which pressure pulses are generated directly in the print head by piezo crystals or heated resistors to eject drops of ink only when they are needed to print a dot
Drop Mass or Drop Volume- The size of a jetted drop of ink, usually measured in nanograms. Adequate jet-to-jet drop mass uniformity is required in many applications to eliminate banding When the specific gravity is 1, 1picoliter (pL) = 1 nanogram (ng).
Drop Velocity- The speed at which a drop of jetting fluid travels from the orifice plate to the receiving medium.

Encapsulated Postscript File (EPS)- An Adobe graphic file format for high resolution images; it translates graphic and text into code that tells a printer to print in the highest resolution possible and also has low resolution view files for quick screen viewing.
Encoder- An encoder is a device or transducer that converts linear or rotary motion information into uniformly spaced incremental signals.
First In First Out (FIFO)- A form of low-level memory (for example, a shift register. Used in the data path for temporary storage of bitmap data on its way to a print head.
Fire Pulse- A high voltage electrical signal of precise shape, amplitude, and width, causing a jet to eject a drop. Also called a drive pulse.
Firmware- Embedded software, i.e., software that is not loaded from a storage device at startup, but instead resides on the board or in the chip.
Fire Pulse Amplitude (FPA)- The peak voltage of a fire pulse.
File Transfer Protocol (FTP)- The language used to facilitate the transfer of files from a server on the Internet to another location, such as a desktop computer or another server.
GIF Graphic Interchange Format- An image format type generated specifically for computer use. Its resolution is usually very low (72 dpi, or that of your computer screen), making it undesirable for printing purposes.
Gradient- Color in shades from one starting point to another gradually blending in between. A grade change in a hue. It is a transition of color, creating a blended change between screen percentages of a single color or between two different colors
Grain- The direction in which the paper fiber lie.
Head Drive Electronics Module (HDEM)- This is the component of the Apollo PSK that creates the high voltage drive pulses. It is programmable for pulse amplitude and width, as well as rise and fall time.
Hypertext Markup Language (HTML)- A series of formatting commands that describes the components of graphics and text material presented on the World Wide Web in a consistent manner
Image Area- Portion of paper on which ink can appear.
Image- Usually a photograph that is "translated into a bitmapped" image by scanning Ink Jet Printing Method of printing by spraying droplets of ink through computer-controlled nozzles. Also called jet printing.
Initialization File- A file, usually with the extension .INI, that sets startup variables for an application program.
Large Format Printing- refers to large sized prints, typically A1 sized or larger, produced in full color utilizing full color digital ink jet printers.
Materials Safety Data Sheet (MSDS)- This is a document which describes the potential safety hazards of a chemical, liquid or solid, and instructs how to handle it safely and how to respond to exposures or spills.
Meniscus- The curved surface at the top of the water column, or at any interface between a liquid and a solid. Nozzles have a meniscus, whose shape and position are set by a slight negative pressure in the jets at rest, balanced against the surface tension of the liquid.
Meniscus Pressure Used at Spectra- the meniscus pressure often refers to an inward bubble pressure that equals the fluid pressure at a print head jet nozzle when that jet is not activated. A negative meniscus pressure is applied to inactivated jets only when the print head system is operating, helping to prevent the jetting fluid from leaking at the nozzles. More generally, meniscus pressure is the negative pressure created behind a meniscus, due to surface tension.
Portable Document Format (PDF)- An electronic document format from Adobe that allows the distribution of digital files across any platform that can display a document as originally designed and formatted without having the software application or fonts on the viewing computer.
Pigment- Particles that absorb and reflect light and appear colored to our eyes; the substance that gives ink its color.
Pixel- A single dot on a monitor or on digital image.

Print head- part of a digital printer that is directly responsible for applying ink to a substrate
Protocol- The set of conventions defining communication between electronic components, for example, and a host computer and its interface. The way information is placed on a network. The steps needed to communicate or activate an operation or exchange of information in or between computers.
Purge- Performed for a variety of print head maintenance reasons, a purge is a regulated pressure applied for a fixed amount of time at the air interface to the ink reservoir attached to the print head jetting assembly to force ink, along with air bubbles and debris if present, out the jets through the nozzles.
Raster- A line of pixels. Also, the process of rendering an image or page, pixel by pixel, in a sweeping horizontal motion, one line after another.
Rasterization- The process of converting mathematical and digital information (vector commands) into a series of dots by an output device.
Raster Image Processor (RIP)- A combination of computer software and hardware that controls the printing process by calculating the bit maps of images and instructs the printing device to create the images.. Most RIPs operate on PostScript.
Resolution- The DPI or dots per inch of a design. Measured by how many dots or pixels are in one inch of a design. The measurement of the fineness or detail. The higher the resolution the finer the detail in an image
Satellites- Small droplets of jetting fluid generated behind the main drop as the main drop detaches from the nozzle.
Substrate- Any surface on which printing is done.
Tagged Image File Format (TIFF)- A standard graphic image file format often used for storing high resolution images that can easily handle up to 24 bits of photographic image color.
Transmission Control Protocol/Internet Protocol (TCP/IP)- is an open communications protocol implemented on diverse systems and the Internet and is the preferred protocol for practical interoperability.
Varnish- A clear liquid coating applied to printed sheet for protection and glossiness.
Varnishing- a finishing process whereby a transparent varnish is applied over the printed sheet to produce glossy finish.
Viscosity- the tendency of a liquid to flow slowly or quickly resulting from the friction of its molecules

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