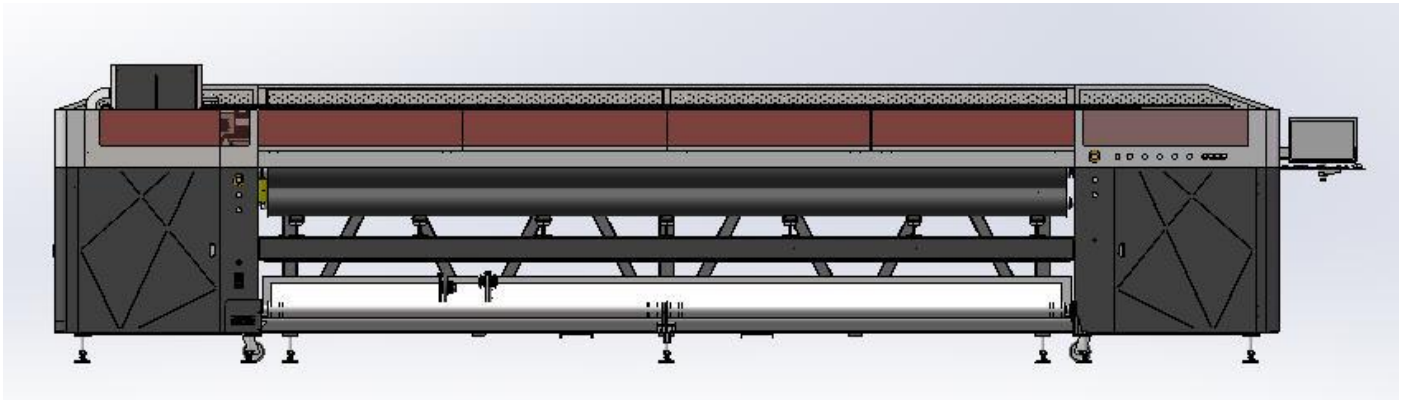


LIYU FS53 Four-Rubber-Roll UV Roll to Roll Printer Installation Guide



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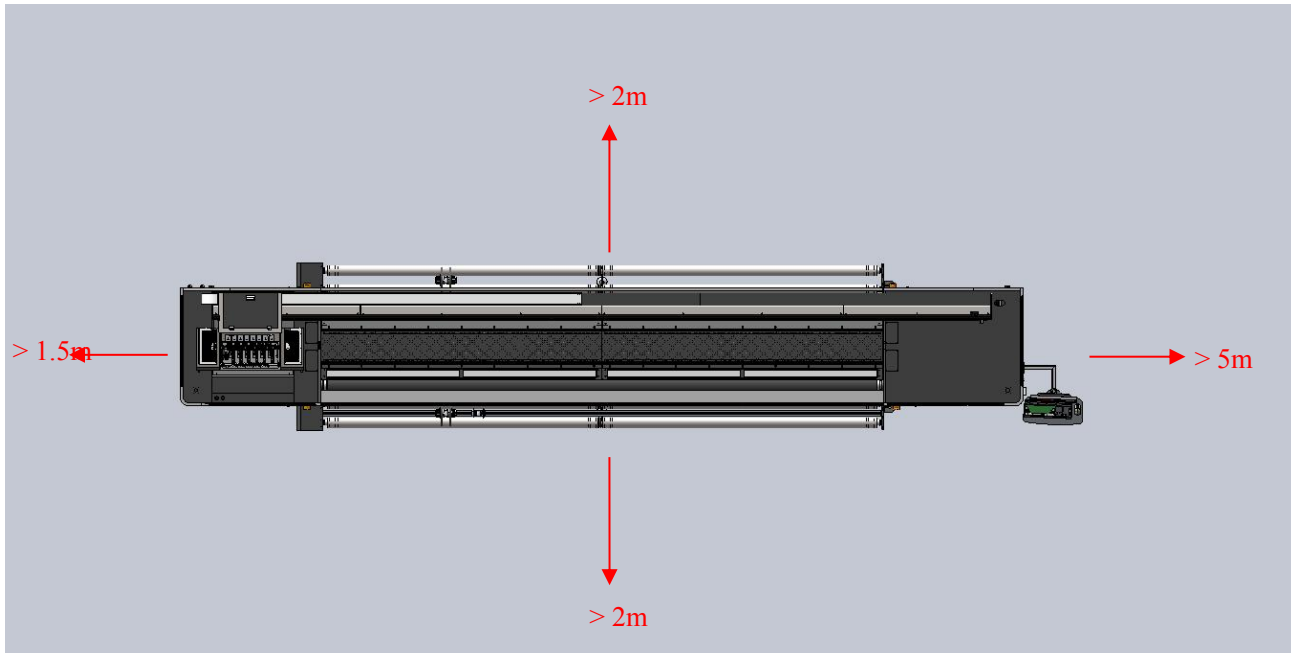
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I. Preparations before Installation

1.1 The size of FS53 printer is 8700mm×1780mm×2000mm (L*W*H). There must be enough operation space surrounding the printer for replacing the printing media and for daily operation and maintenance.

Installation and maintenance space is shown in the following figure.



1.2 The optimal working temperature and humidity of the printer are 20°C - 26°C and 40%RH~70%RH respectively.

Please try to keep the printer (machine) working under the optimal working temperature and humidity; otherwise, the printing quality may drop and its service life may reduce. Don't install the machine at the following locations:

- ✧ in direct sunlight;
- ✧ location with vibration;
- ✧ dusty places;
- ✧ location with drastic temperature variation;
- ✧ location with great air mobility;
- ✧ near the air-conditioning or heater;
- ✧ place likely to be wetted;
- ✧ place likely to produce other polluting gas; and
- ✧ unstable location (the surface shall be flat, with enough bearing capacity, the printer's net weight is about 5.6t).

II. Requirements for Power Distribution

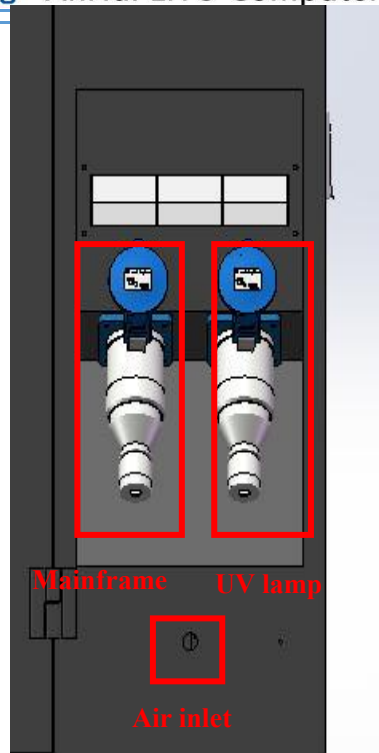
The required external circuits must be installed by qualified electricians before installing the FS53 printer. There are two necessary power lines of the printer. Please do not stretch or connect them with the extension cord, and each power line shall be equipped with an independent air protection switch. The AC input power for the machine must be stable, with a specific voltage and frequency. If you are in a location prone to low voltage, power failure or surge failure, you may use a stabilized power supply system or uninterruptible power supply (UPS) to ensure the continuous stability of the AC input power for the machine. It is recommended to adopt single-phase UPS with minimum power of no less than 8000W, voltage range of 200-240V, and frequency of 50Hz. There must be applicable plug and socket to connect the UPS to the wall socket of the location, and then connect the power lines of the machine to the UPS. The electrical parameters and reference configuration of stabilized power supply of the machine are as follows:

Mainframe: single-phase 220V \pm 10%, 50HZ, 32A

UV lamp: single-phase 220V \pm 10%, 50HZ, 32A

Stabilized power supply: single-phase 10000VA, 220V-250V

If the power supply is the standard three-phase power transformer, the machine will use only two phases. It means that the power transformer may bear unbalanced load. Please check with the electricians whether the power transformer is capable enough to bear the unbalanced load. The length of the required power lines (provided with the machine) is about 8m, and the distribution box shall be arranged on the side of the power supply of the machine as far as possible.



The stabilized power supply in the following figure is for reference only.

德力西电气

单位:mm



III. Preparations for the Air Source

Pressure roller pushed by cylinder is adopted to clamp the materials of FS53, so the machine needs external air source before installation. The maximum pressure of external air source shall be 0.8MPa, the holding pressure shall be no less than 0.6MPa (the air shall be supplied when it is less than 0.6MPa), the flow rate shall be no less than 80L/min, and a standard 8mm metal air inlet shall be equipped. The following figure is for reference only.



IV. Requirements for the Control PC

To ensure smooth printing, the minimum configuration requirements for the hardware and software of the machine are as follows:

CPU: INTEL i7 5 generation or above

Display card: with independent video memory above 1G

Memory: 16G or above

Mainboard: with PCIE X1 slot

Hard disk: 1T room or above is left, NTFS format

Operating system: Win10/Win7 64-bit Professional or Ultimate

If Caldera RIP is equipped, another computer is needed, and the configuration can be slightly lower than that of the control PC.

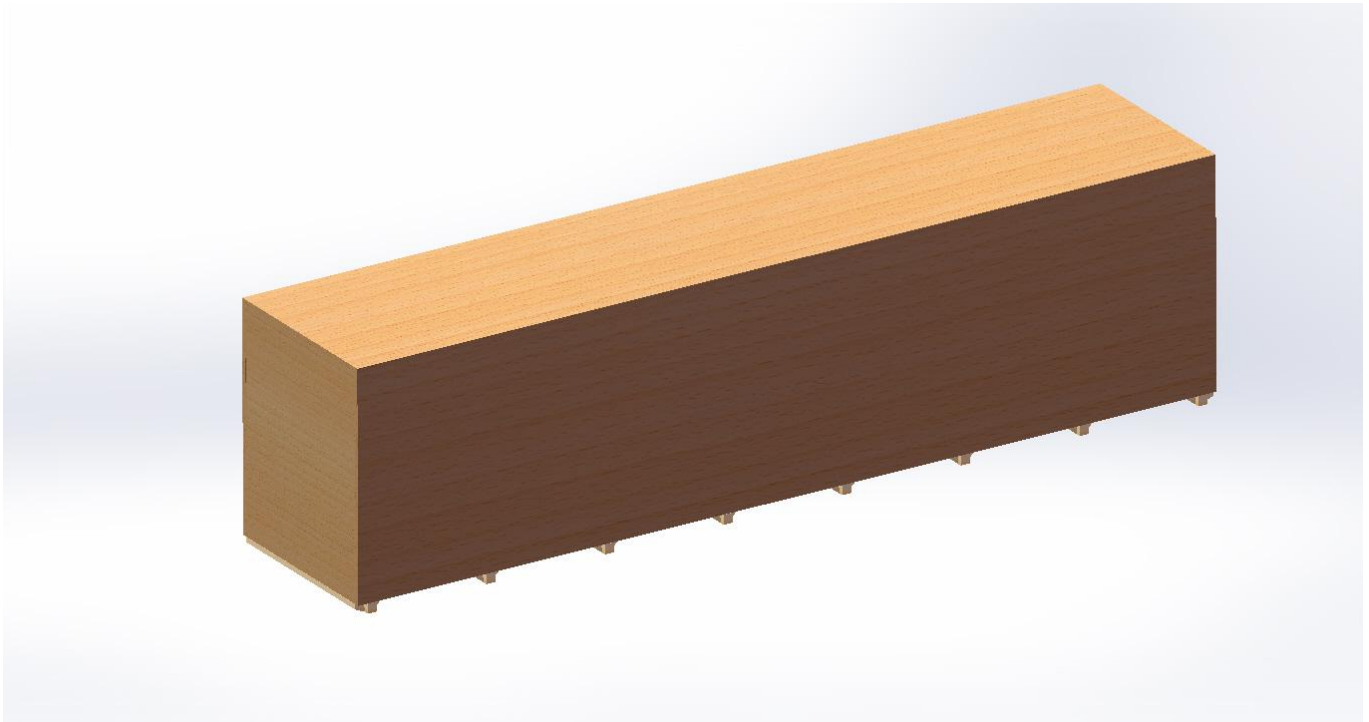
V. Requirements for Operators

Generally, operators of FS53 printer shall have at least 2 years of operation and maintenance experience of UV machine, be familiar with basic computer operation and electrical knowledge, with strong hands-on skill, learning ability, and safety awareness. No less than 2 operators shall be trained for operation, and they can operate the machine independently only after the training. Moreover, at least 2 to 3 operators are needed for feeding materials.

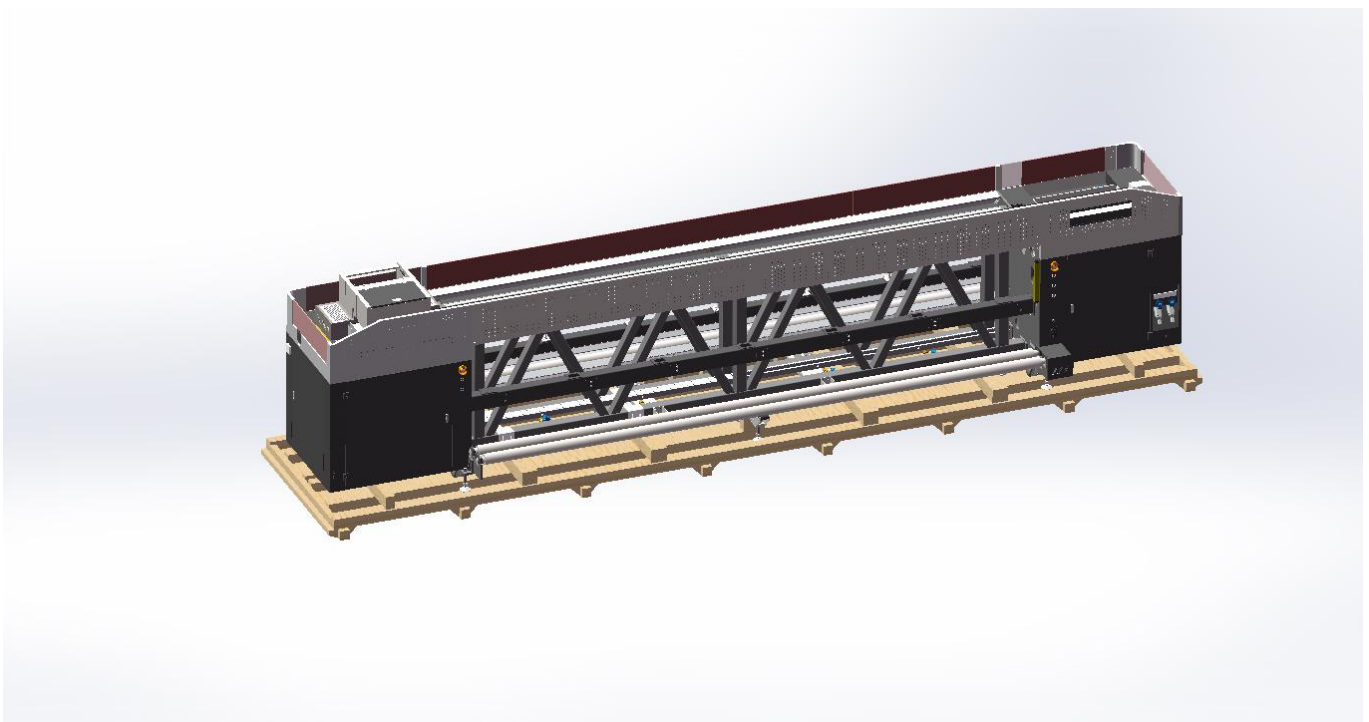
VI. Preparation for Installation Tools

Tool name	Quantity	Specification (requirement)
Internal hexagonal wrench	1	Metric
Open end wrench	1	12-14mm
Open end wrench	1	22-24mm
Adjustable wrench	1	375mm
Single chip feeler gauge	1	Accuracy: 0.02mm
Level ruler	1	Ferromagnetic finish milling bottom
Cross screwdriver	1	3*150mm
Cross screwdriver	1	6*300mm
Straight screwdriver	1	3*300mm
Straight screwdriver	1	6*150mm
Scissors	1	Large, 200mm
Multimeter	1	Digital, high accuracy
Platform adjustment tooling	1	Self-made
Magnifier	1	More than 50×

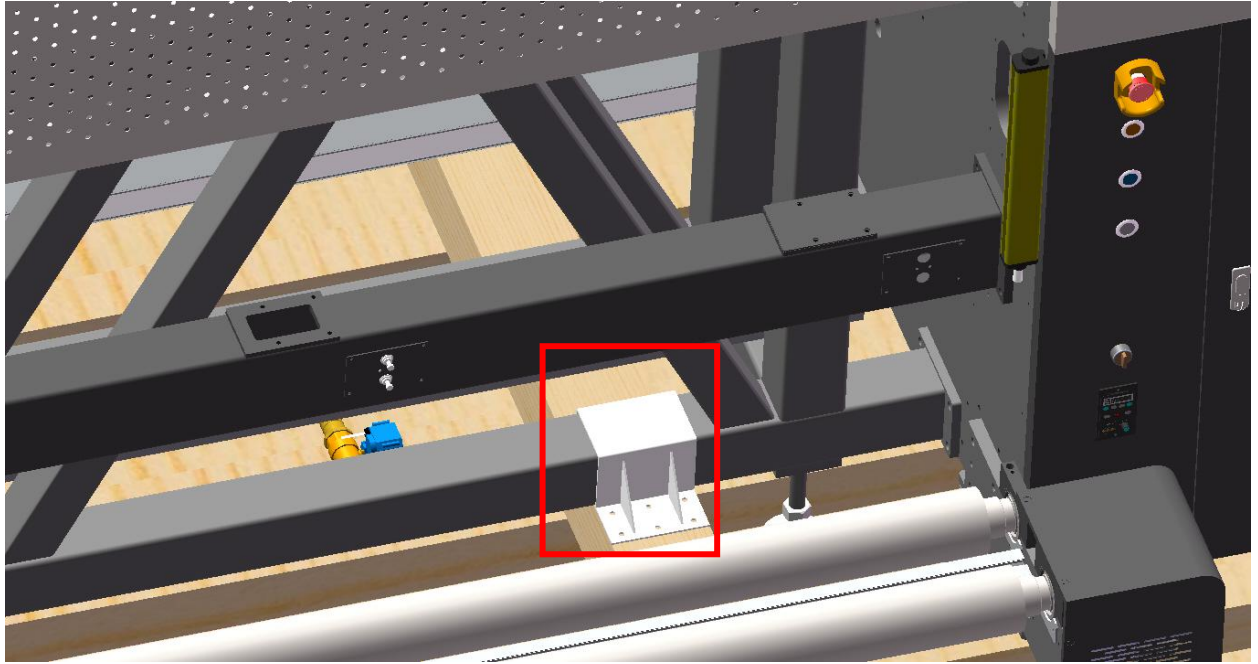
VII. Unpacking Process



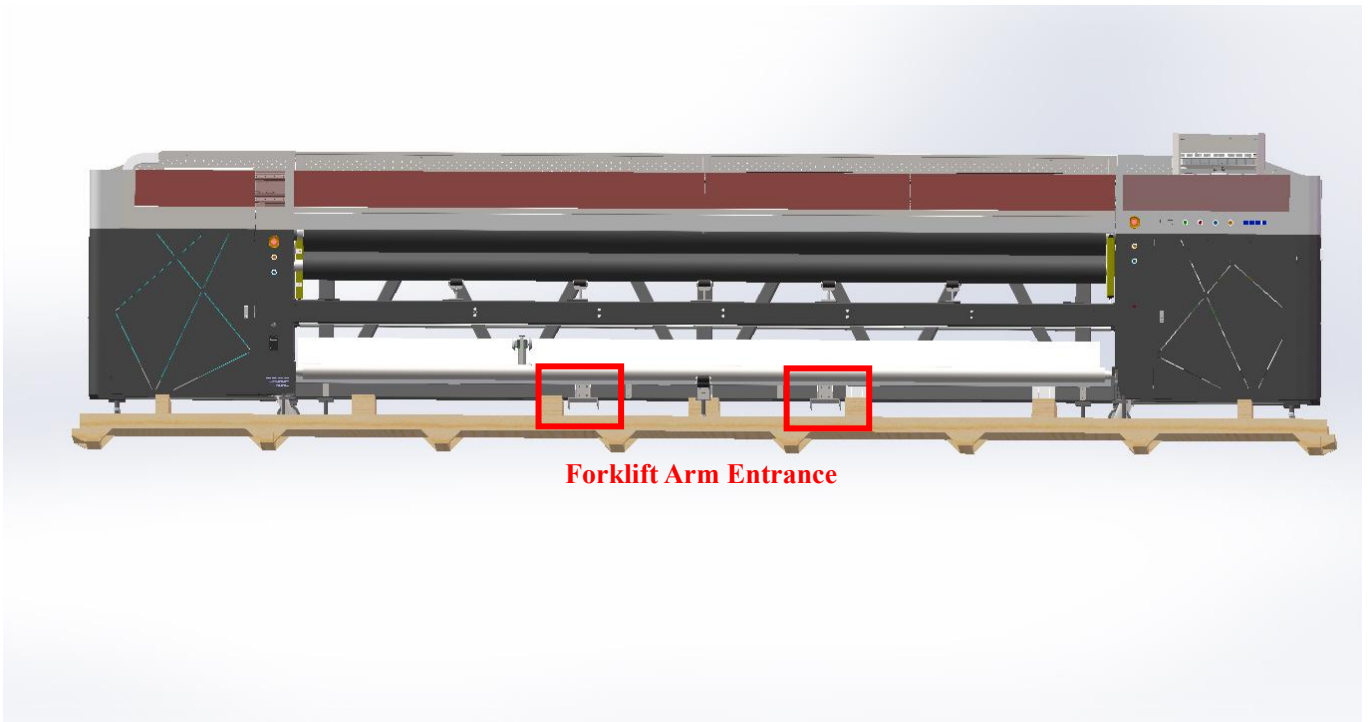
Remove the fixed bolts with electric hand drill, take down the top cap and four side plates (front, back, left, and right) of the packing box in turn, 5 sides in total.



Raise the legs and remove the fixed supports (as shown in the following figure, 8 fixed supports in total).

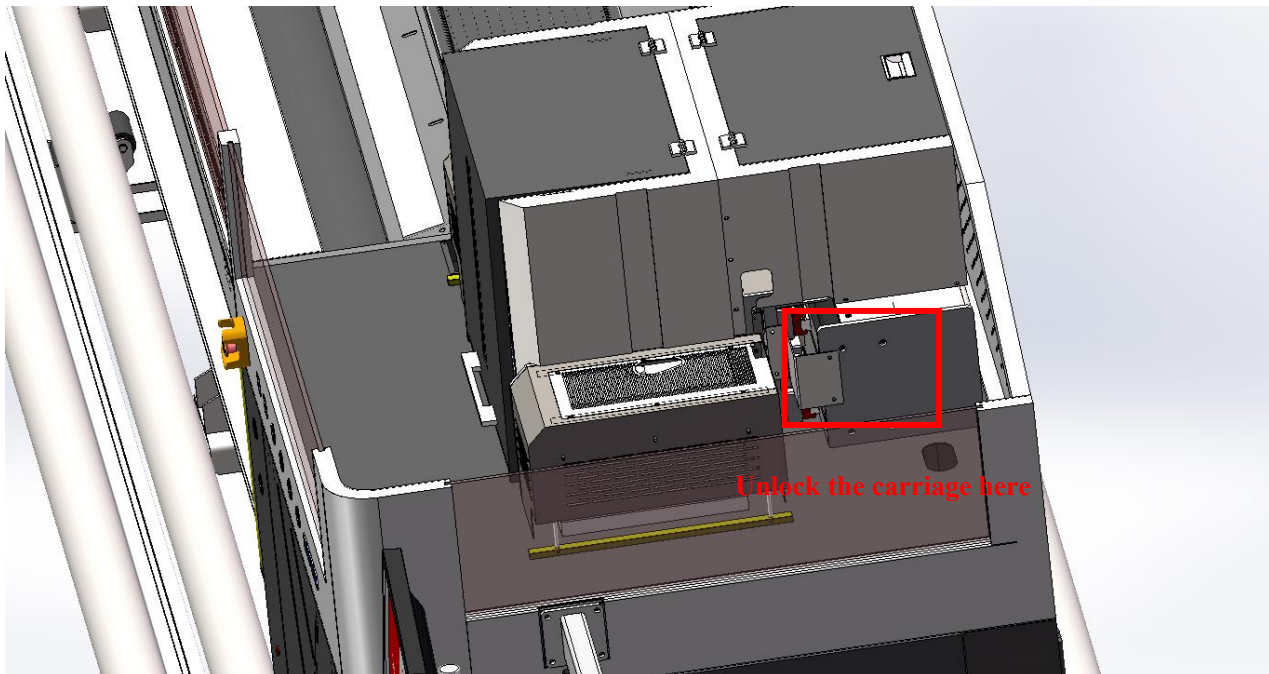


Please refer to the diagram by using the 10T forklift for handling. The operation shall be based on the actual conditions under the premise of ensuring stable unloading.



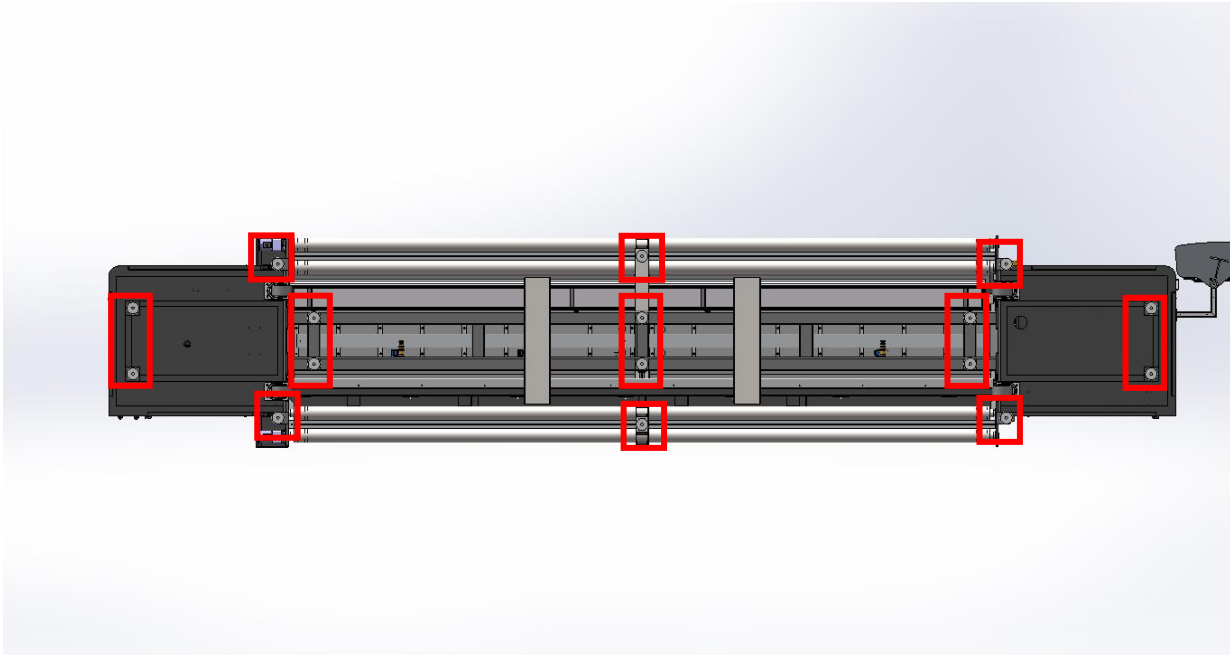
VIII. Carriage Unlocking

To prevent the carriage from shaking during transportation, in addition to the locking function of the x-direction motor, the carriage is locked on the baffle on the right side of the machine beam. Therefore, it is necessary to unlock the carriage before installing the FS53 (remove the fixed block and screw, and store them properly)! Check the table before power on to ensure that there is no foreign matter left.

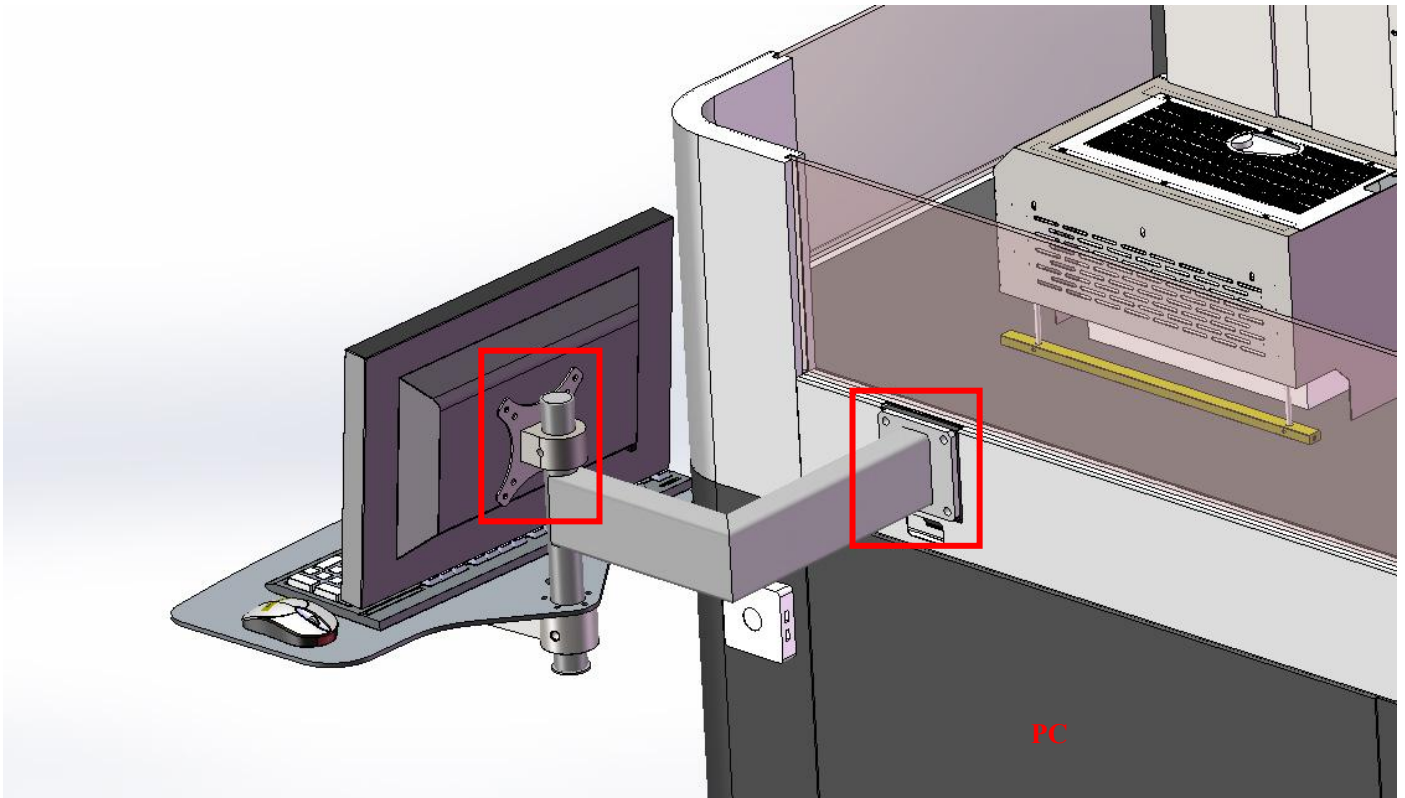


IX. Machine Leveling

Place the machine in the working area, and raise the leg. The universal wheel shall be suspended. Select the level with sensitivity higher than 0.05mm/m to adjust the legs at the bottom of the frame, which can make the level precision of the whole machine can reach within 0.1mm/m. There are 18 legs in total: 6 legs under the main beam of the machine to adjust the level; one leg at the front and back of both ends of the take-up and feeding system respectively (totally 4 legs); two legs at the two supports in the middle respectively (totally 4 legs); and two legs under the left and right boxes respectively (totally 4 legs). First adjust the level of the machine's main body, and then adjust the supports in the middle and those of boxes at both ends.

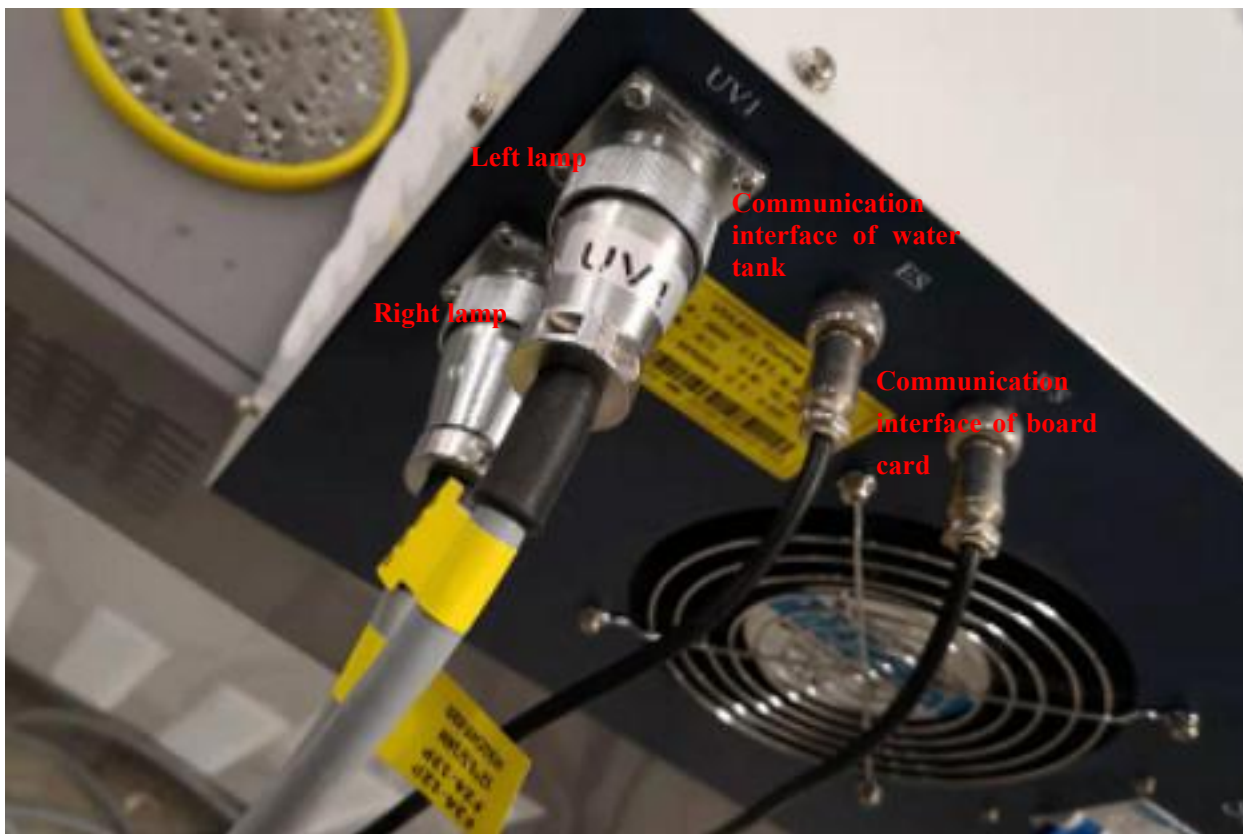


X. Installation of Console and PC



Fix the console at the corresponding position of the machine as shown in the figure, fix the display on the console with the star handle in the adapter kit, place the mouse and keyboard on the pallet of the console, and place the host in the right box of the machine. Then connect the optical cables and DB9 interface with the PCIE card in the PCIE X1 slot of the host with lines according to the *LIYU FS53 Four-Rubber-Roll UV Roll to Roll Printer User Manual*.

XI. Installation of Power Box and Water Tank of UV Lamp



Connect according to the diagram, and anti misplug design is adopted. In addition to the left and right lamps, there is a two-core interface and a three-core interface. There is a water cooling inlet and outlet of platform and lamp cap respectively. After the connection of pipeline, add some purified water and appropriate amount of coolant into the tank before power on. The liquid level shall not be higher than the circulating outlet in the tank. After checking to ensure that all interfaces are well sealed, power on the water tank. The liquid level of the tank may drop after power on, and appropriate amount of liquid can be added into. Please refer to the

introduction on the water tank for common error codes and reasons.



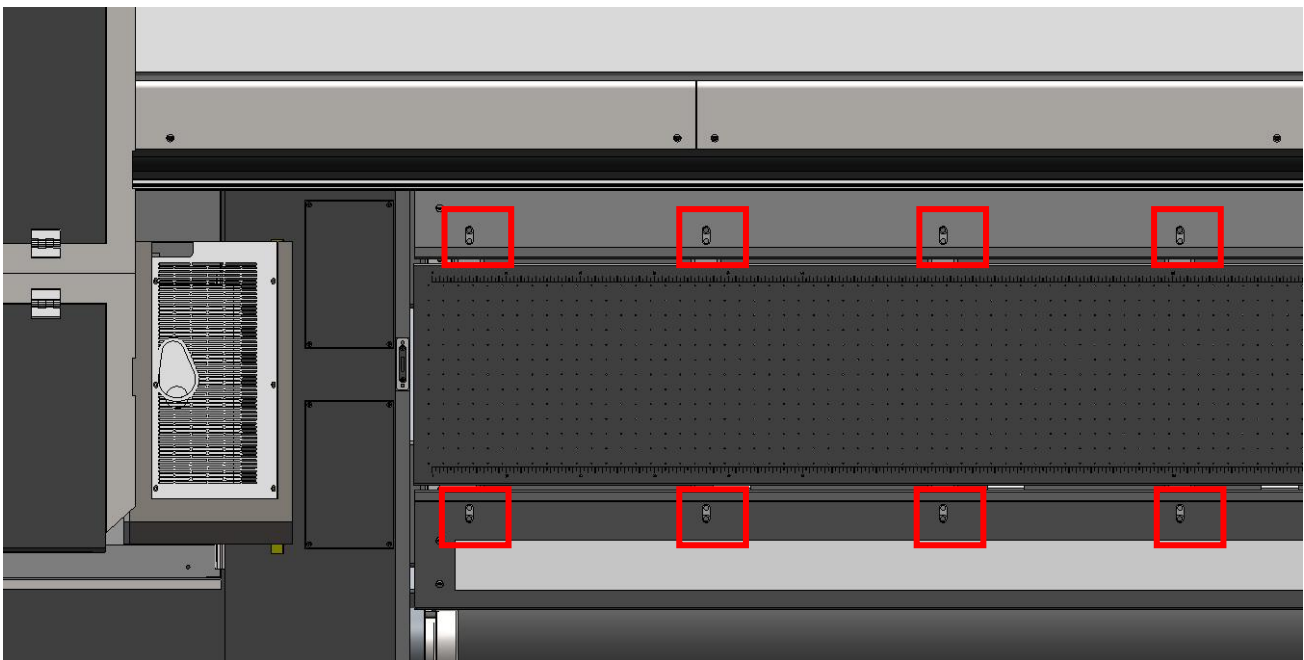
XII. Power and Air Connection



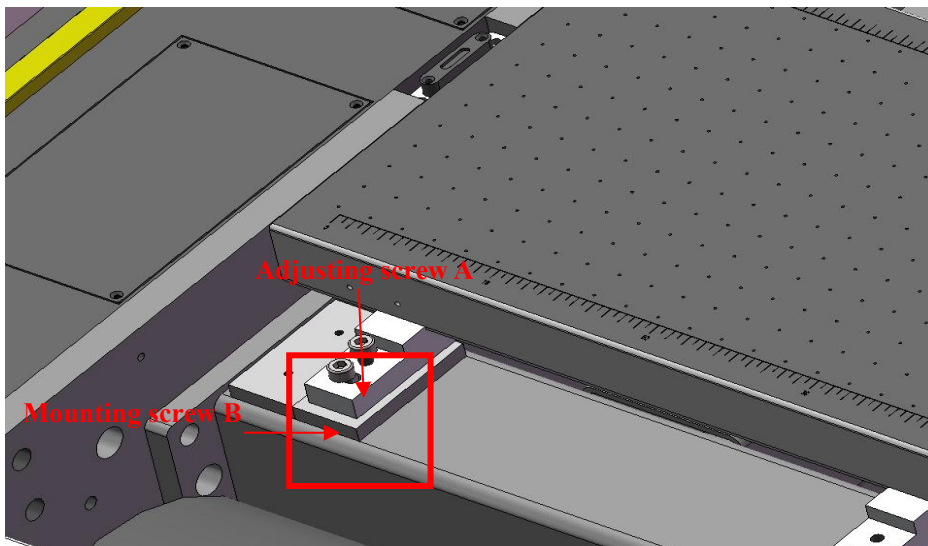
First connect one end of the two industrial connectors with the output end of the stabilized power supply according to the power distribution requirements, and then connect the plug of the industrial connectors to the machine as shown in the figure above after measuring its correct single-phase 220V output with a multimeter. And then lead the air pipe of the air compressor to the air inlet of the machine.

XIII. Platform Adjustment

Check the flatness of platform before installing each new FS53. In case of large deviation, adjust the legs and adjusting screws of the platform. There are totally 36 adjustment points of the whole platform, located on the front and back sides (18 on each side). The tolerance between two adjacent points on the same side shall not exceed 0.1mm, and the tolerance of the whole surface shall not exceed 0.3mm.



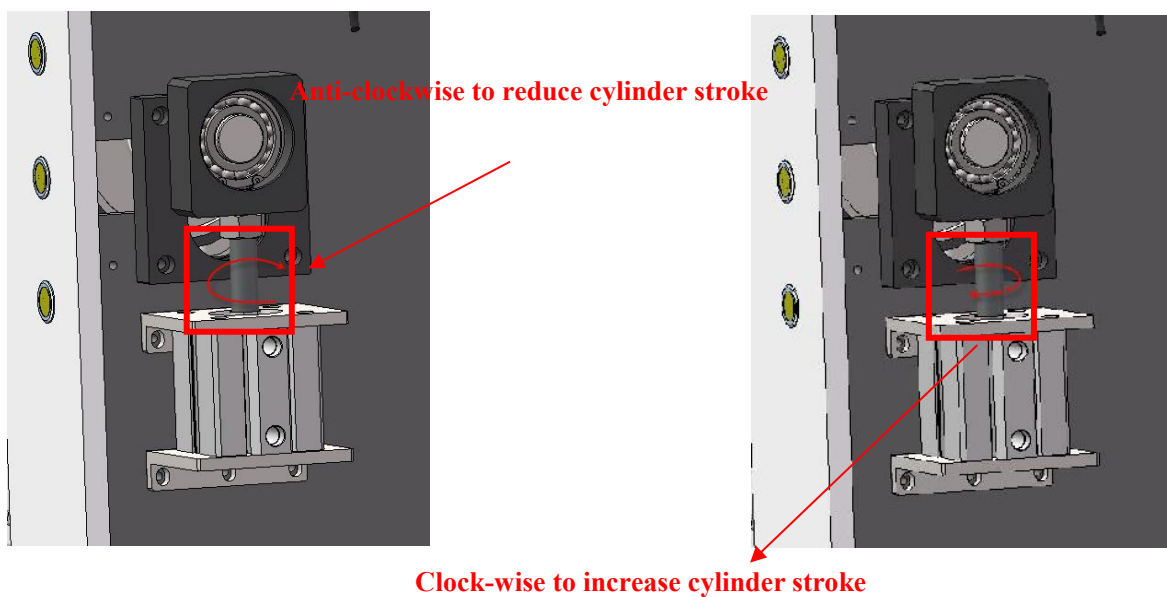
Adjustment Points of the Platform



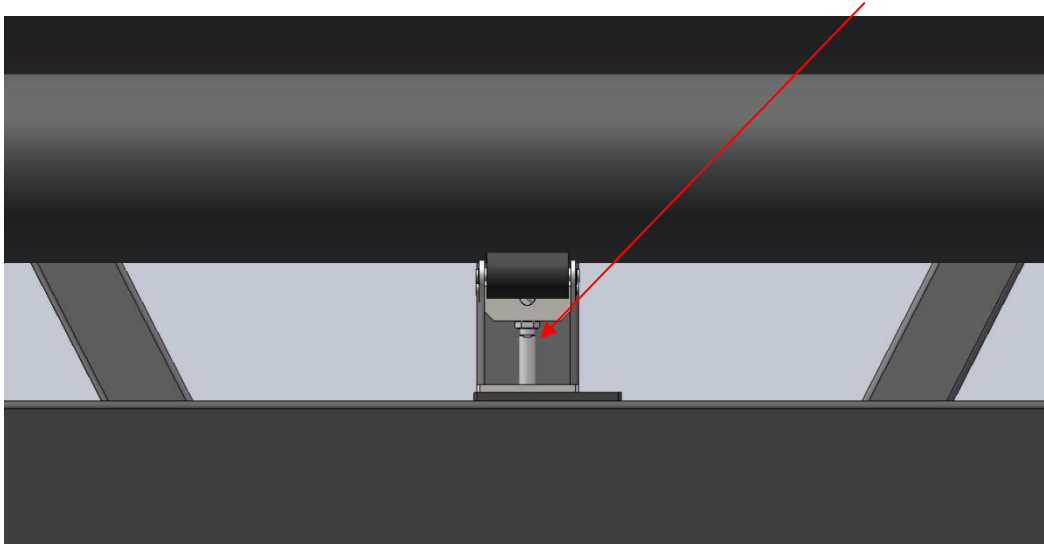
Adjusting Screws of the Platform

XIV. Balance Adjustment of the Tension of Rubber Roller

Check the width of the upper and lower rubber rollers when pressing and the tension of each point before installing each new FS53. In case of large deviation, adjust as follows: Please adjust the effective length of the cylinder screw rod to control the stroke of the lower rubber roller when the cylinders on both ends are raised. Ensure the consistency of the full-length pressing width of the two rubber rollers when pressing and the tension by adjusting the stroke of 5 small cylinders in the middle of the lower rubber roller and the air pressure. Prickly heat powder is usually selected as auxiliary measuring tool for pressing width inspection; and 3P cloth strip with a width of 6- 8cm is usually selected for tension inspection. To adapt to more kinds of materials, the tension of each point shall be balanced. The tension shall not be too large (it may be unable to pull the cloth strip) or too small (it may be too easy to pull the cloth strip). The total pressure of FS53 printer is generally set at about 0.5-0.6MPA. The pressure of large cylinders at the front and back is usually between 0.2-0.4MPA, and that of small cylinders in the middle is usually between 0.2-0.6MPA, which shall be adjusted according to the actual situation.

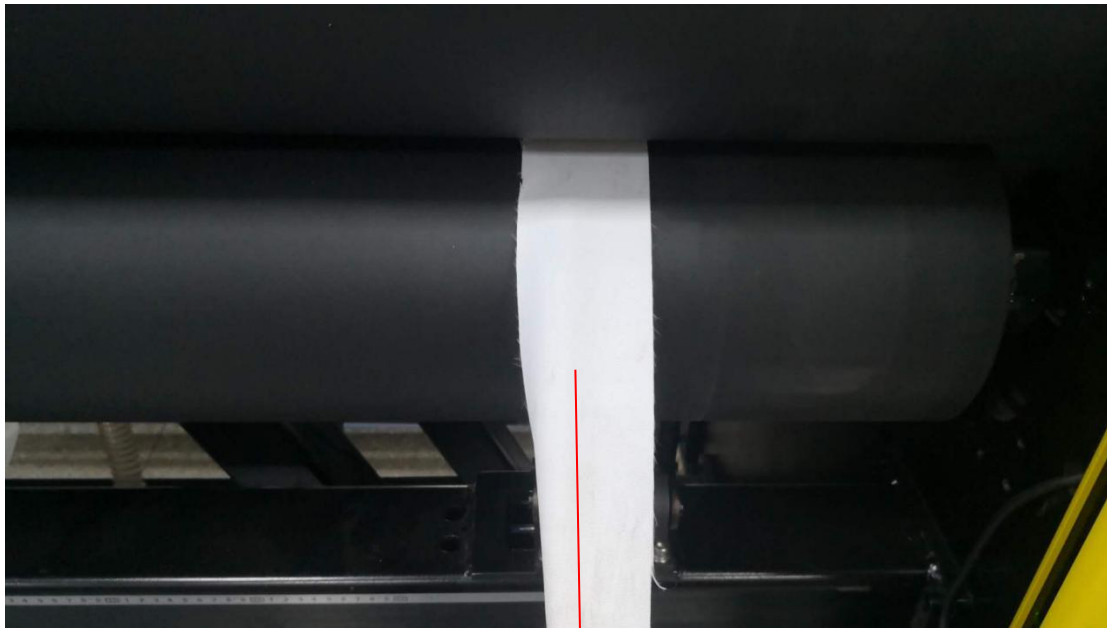


Adjust the travel nut of cylinder
till no gap between rubber rollers

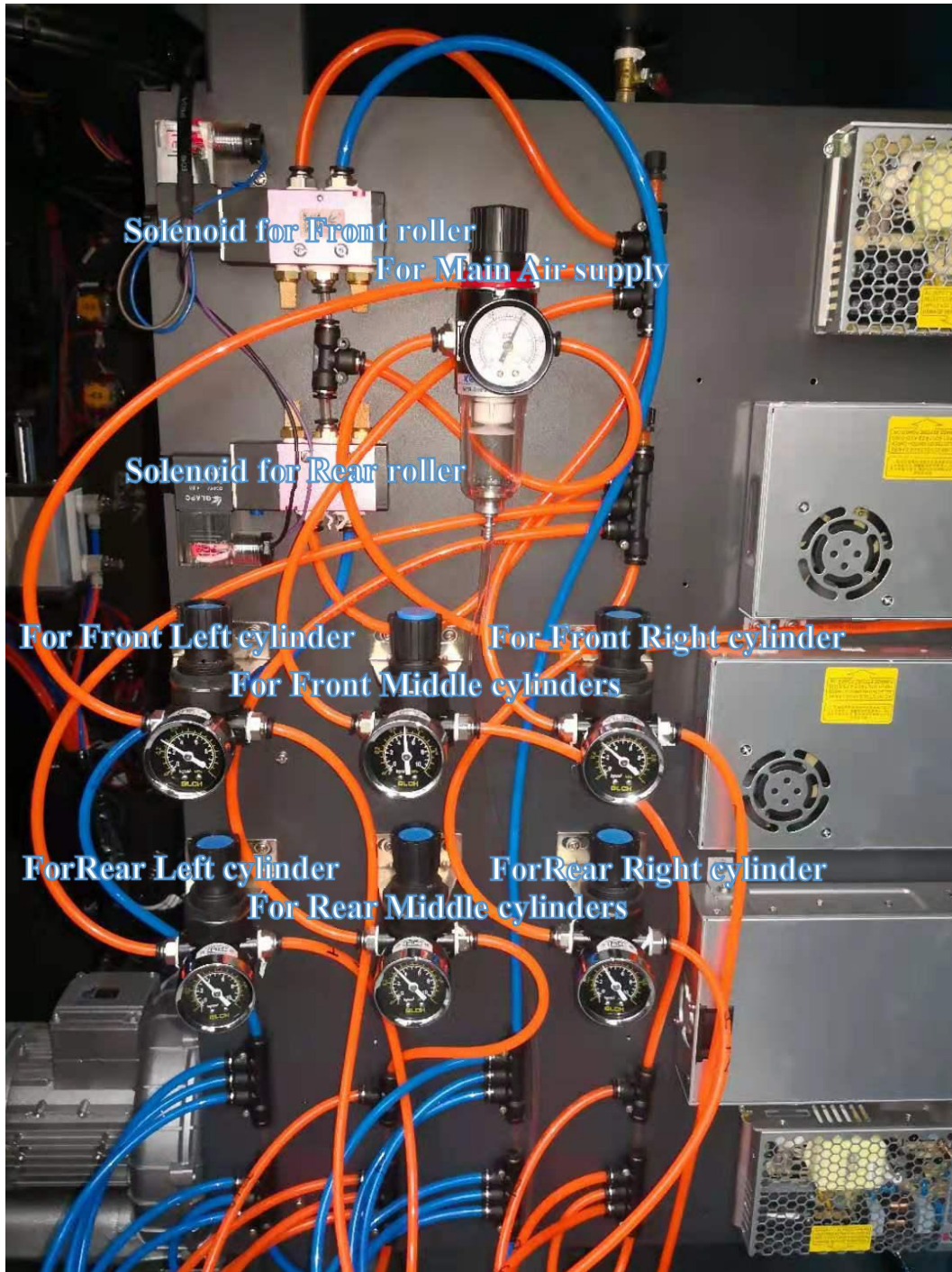


Pressure width is consistent

Adjust the stroke and pressure of each cylinder to make all pressure are relatively uniform. The machine of 5m has higher requirements than the one of 3m. The pressure balance adjustment is required, provided that the pressing width is proper. The tension test should be carried out at the left, center, and right as well as the corresponding position of the cylinder to ensure that the tension is relatively uniform. The stroke and pressure of the cylinder should be adjusted together to achieve the best results. Generally, for materials with a printing width of 5m, the larger supporting force should be applied in the middle.



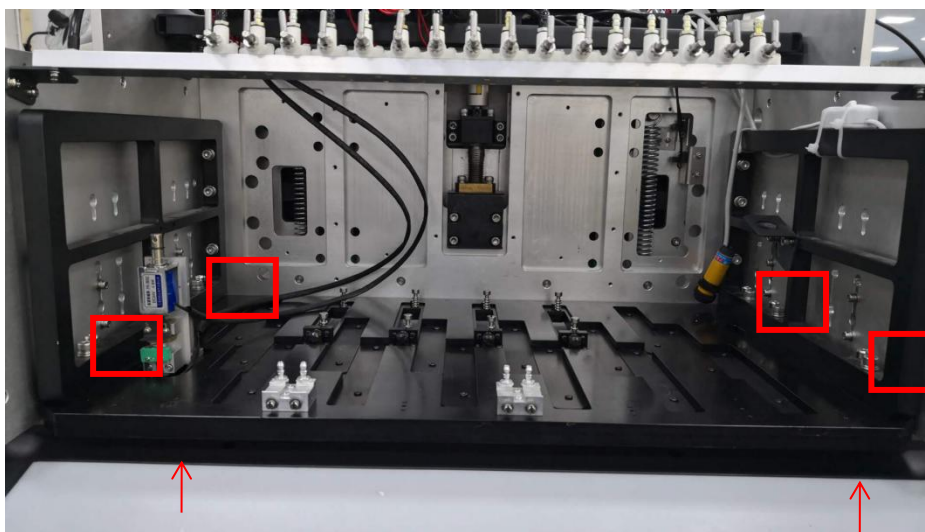
Pull and feel the tension



Notes: Though the above steps have been done before delivery, due to various factors such as transportation, the machine needs to be re-tested and fine-tuned on site according to the actual material characteristics. Please note the initial position and air pressure values before adjustment.

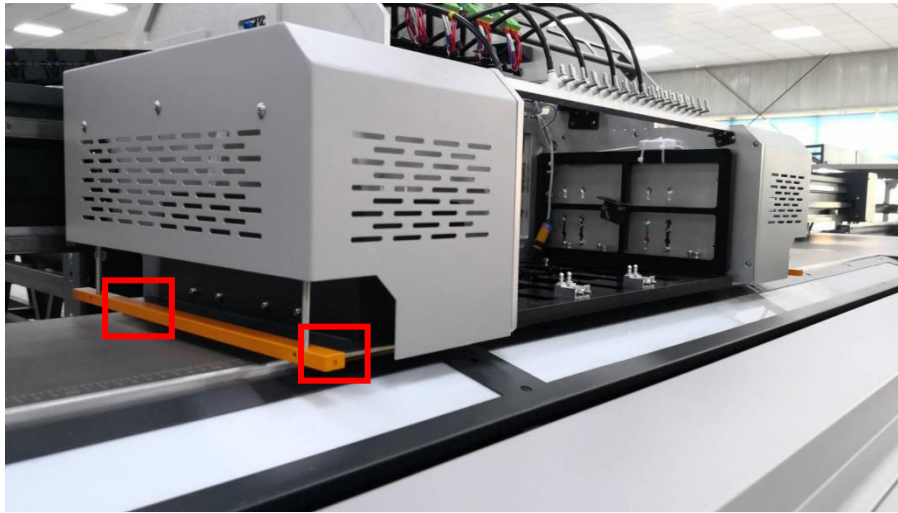
XV. Check and Adjustment of the Baseboard of Print Head

Move the carriage, measure left back, left front, right back, and right front with a gauge at the same position on the platform, and fasten the lock screw and jackscrew to control the tolerance within 0.15mm (including the tolerance of the baseboard of print head).



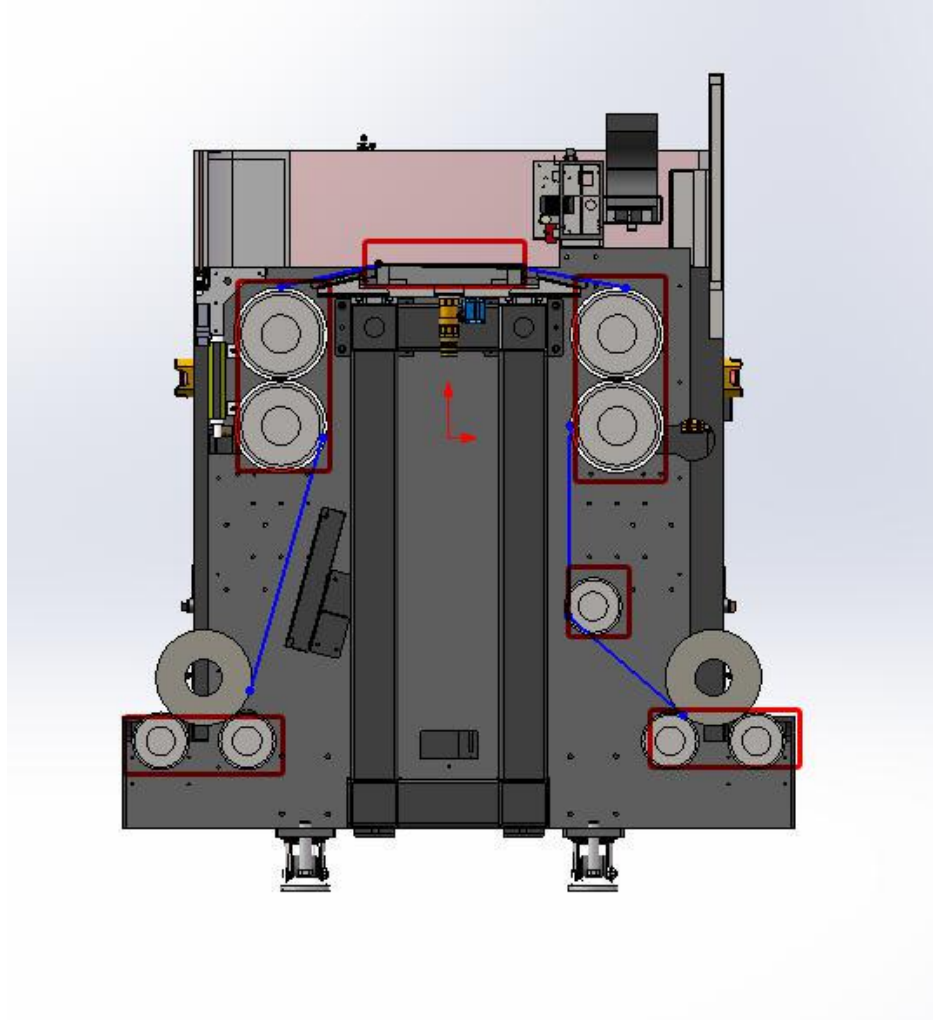
XVI. Anti-collision Check and Adjustment of the Carriage

Adjust the set screw of the anti-collision curtain and the jackscrew of the anti-collision bar to make the left and right anti-collision parts as much as possible the same height and slightly lower than the baseboard of the print head by about 0.1mm, so as to have a good anti-collision effect. After being adjusted, check and tighten all screws and jackscrews to prevent loosening.



Notes: Because of the transportation, all the above checks and adjustments must be rechecked after moving the machine to ensure it runs well.

XVII. Material Loading



The method mentioned above is recommended for FS53. If it is necessary to distinguish the inside and outside of the material for printing, please turn the material 180° and put it on the double feeding roller. The feeding method for machine with air shaft is similar to this. When feeding, press and fit the pressure roller, adjust them to the right torque value, and slightly tension the material to ensure that the material tightness is basically the same from left to right; then feed the material to the front of the machine, adjust the material on the station, pull the material with even force from the left, center, and right, and press the front pressure roller. The following picture shows the status of the 5m soft film material after being loaded.



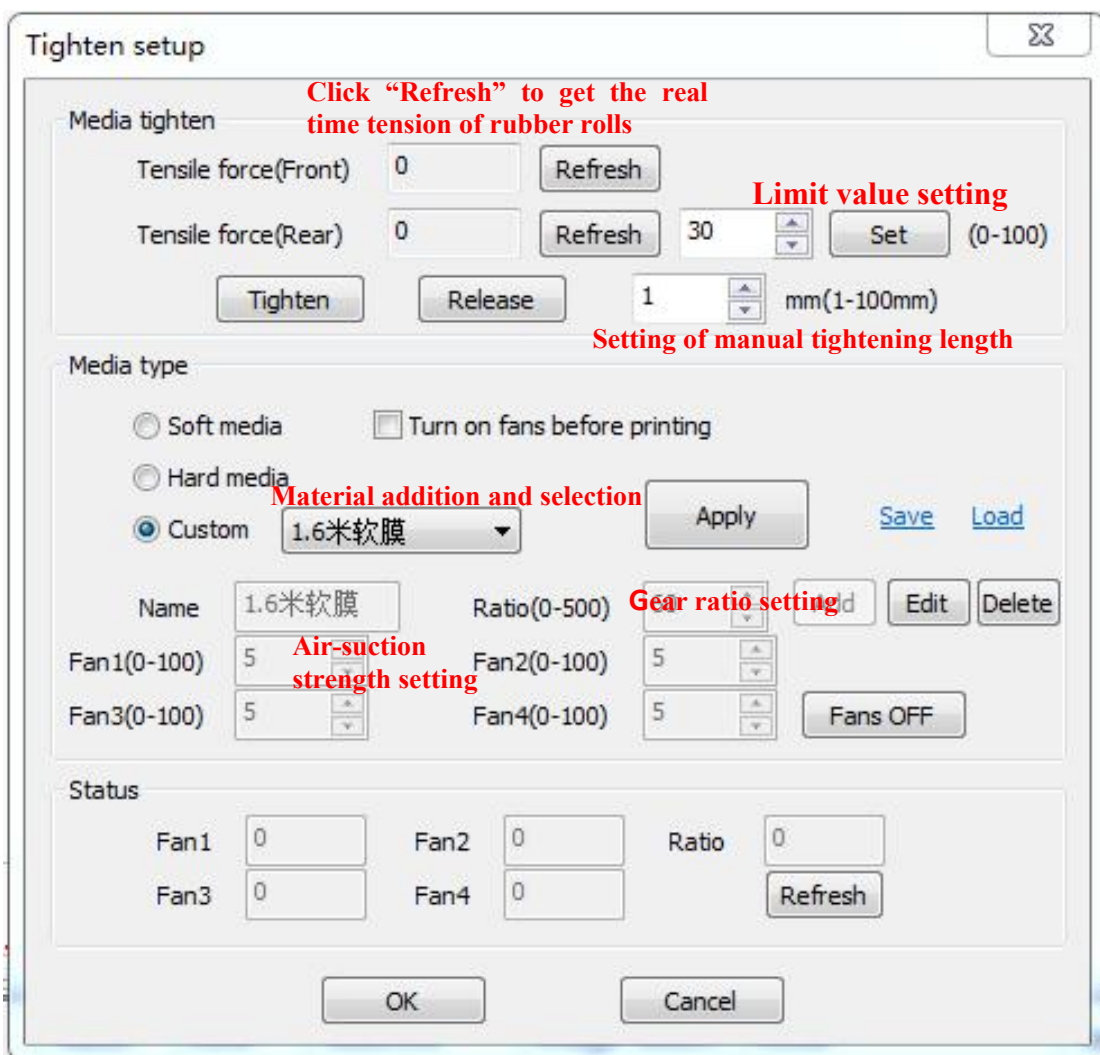
Introduction to the control mode of feeding roller

1. Synchronous torque at the rear feeding roller can make the material reverse and tighten, and opening direction (left or right) depends on the load direction of the material.
2. Synchronous torque at the front take-up roller is used for material rolling. The opening direction to the left means to roll up material, and the right means to roll and reverse—for placing material.
3. The torque controller is to adjust the speed and torque of the motor. Rotate to the right to increase the torque and speed, and rotate to the left to reduce torque and speed.

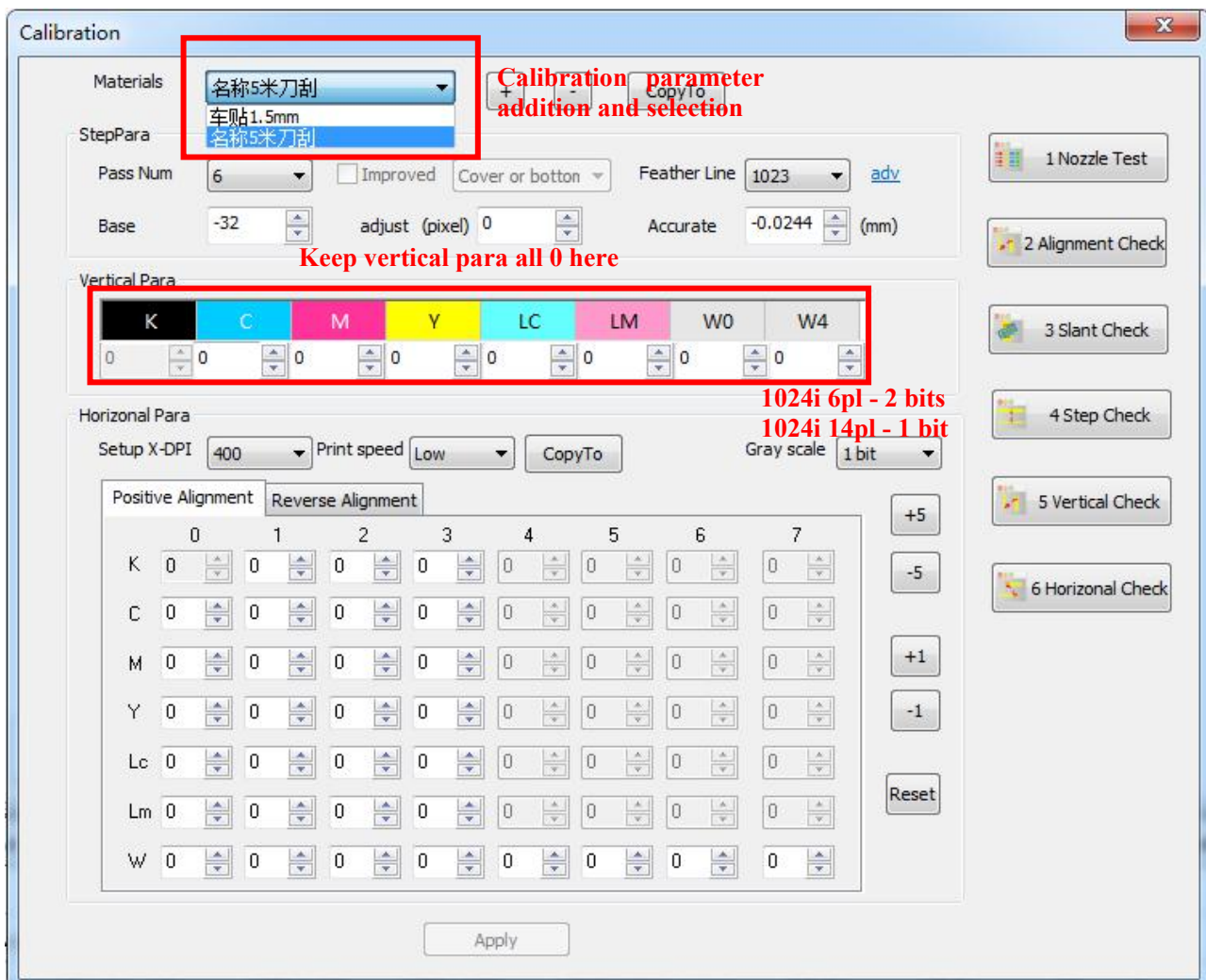
Notes: The media feeding and take-up motor shall not rotate with a fast speed. Otherwise, the motor may vibrate and the materials may even slip and fall. Generally, the motor can be adjusted to the trend of rotation.

XVIII. Material Parameter Setting

For each new material (strictly, including those with different width and thickness), the corresponding material type should be added to the “Tension Setting” interface, and parameters such as gear ratio, air-suction strength, and limit value should be preset. These parameters should then corrected by printing test, and then saved for future calling.



For roll to roll printer, there may be some differences in print height between different types of materials. In particular, when using some materials that are of poor quality and easy to warp or bulge slightly, it is probably necessary to raise the carriage slightly. We are used to printing the most materials at the same height. Nevertheless, in view of the slight difference in material thickness, the calibration value will be slightly different. Therefore, the software has the function of adding "Printing Medium". Here, only the thickness of material will affect the bidirectional calibration value, which has nothing to do with the same material of different widths. So there is no need to add as many materials as the "Tension Setting".



Notes: the FS series printer adopts a new method for material management. After adding a new material, you should firstly go to the “Tension Setting” interface, create the corresponding matching parameters (gear ratio and air-suction value) and save it for future calling, then go to the “Calibration” interface, and create a new calibration value matching the current parameter in the calibration interface for future calling. When using a material, select the corresponding material type in the “Tension Setting” interface and apply the preset parameters, then go to the “Calibration” interface, and select the corresponding calibration parameters before printing.

XIX. Configuration Parameters for Common Printing Material

The parameters in the following table can be used as reference value when the machine is debugged at the customer’s site. Due to the differences in the media and the environment, it is usually necessary to slightly adjust the parameters, which should be debugged and saved according to the on-site actual printing situation. The debugging method is available for all materials. In case of new material, find the suitable parameters according to the debugging method and save them before starting production.

Media name and specification	Gear ratio	Adsorption motor parameter	Average torque	Limit value for reference
5m inner light coated banner	15	30	40-60	60
5m outer light coated banner	15	30	40-60	60
5m soft film/22s summer	50	5	5-10	30
3.2m soft film/22s summer	45	5	4-8	30
3.2m pearl cloth	15	10-15	15-25	40
15.2m carriage sticker	14	60	20-30	40
1.6m interior light piece	12	60	20-30	50

Notes: generally, the limit value should be between 30 and 70 according to different materials. If the limit value is too low, the rubber roll may respond too slow, leading to the problem of wrinkle for the feedings; if it is too high, it may cause problems like excessive material deformation, stepping change, and motor overload. For soft materials, the limit value is generally set around 30, while for wide width and hard one is about 60 and for narrow width one is around 30-45. The correct parameters shall be subject to print the current material continuously and stably. As a rule, the average torque change of the servo of front and rear rubber rolls is small and relatively stable with correct parameters. If the torque has a continuous tendency to increase or decrease, it may be that the gear ratio is not set properly.

XX. Operation Precautions and Troubleshooting

1. Material feeding: Materials should be centrally loaded as far as possible. Try to ensure that both ends are aligned with consistent degree of tightness as far as possible. There shall be no obvious collapse in the middle and both ends. Whether or not the material can be fed smoothly will directly affect the feeding stability during printing.
2. When calibrating the parameters in the software, please use hard materials as much as possible to calibrate in the same area in the middle of the materials to improve the accuracy.
3. After retensioning or returning materials, it is necessary to check the stepping calibration value before printing, especially for soft materials.
4. Soft film printing: after feeding the material, use the preset gear ratio and adsorption value, and then adjust the tension to an appropriate state (too loose tension may cause wrinkle of the material during printing, and too tight may cause the excessive deformation of the soft film). For soft films, it is normal that the accuracy is generally slightly lower in the middle because both sides of the material will be deformed, which are affected by the tension. The deformation of the soft film on the platform should be controlled at about 3mm. Since the characteristics of soft films change more significantly in winter, it is important to ensure that they are printed at a relatively constant temperature whenever possible.

5. Ink breaking of the print head: when the machine is placed overnight, bubbles may occur inside the nozzle due to the temperature change, negative pressure, and other factors. It is especially important to press ink and exhaust for the first time after starting up and preheating, and attention should be paid to the discharge of bubbles before starting printing.
6. Material deformation: since the material may be affected by own characteristic, environment temperature, and other factors, the printed material will inevitably have certain dimensional deviation. If this happens, try to correct it by printing the standard size under the proper tension parameters, and by the built-in “dimension compensation” function of the RIP software. The room temperature shall be relatively constant as far as possible to avoid frequently adjusting the compensation values and tension parameters, especially for soft materials.
7. Ink empty: If the system detects the “Ink Empty” alarm, pause printing without delay and add enough ink to avoid a great deal of bubbles by the ink path and unnormal negative pressure. Negative pressure malfunction will caused ripping ink and other malfunctions, once this happens, close the valve body in time, troubleshoot the causes such as ink empty, air leakage, and repower on the negative pressure control panel before re-vent the print head (if necessary). In addition, it is necessary to pay frequent attention to or take the initiative to check to ensure that there is sufficient ink in the main ink barrel to avoid various effects caused by ink empty.
8. Tensioning function with a button: The button is designed to replace the manual tensioning. This button may be pressed after being familiar with the material parameters, so as to avoid over tensioning. Switch back to the normal operation status in time after tensioning, otherwise, the material may jump during feeding or the stepping changes. Apply the “manual tensioning” in the software to select the proper parameters before determining the proper one.
9. Material returning: The gear ratio is active when using the material returning function with a button. Since servo overload may occur during the material returning with a long distance, it is necessary to manually relax the material with software before continuing returning or after the rubber rollers are separated when over tensioning occurs in material returning. In case of servo overload or an error, restart the printer to restore to the normal operation.

10. Waste ink: Since the tray below the flash spray position of the carriage is equipped with a manual valve, the water ink will flow into the waste tank after opening the valve, and an alarm will be sent when the waste tank is nearly full, it is necessary to clean it in time to avoid pollution. Besides, the waste ink shall be treated according to the relevant regulations of the local environmental protection department.