MeMeTech

Auto Doffer Series

Ring Spinning Intelligent Auto Doffing Robot

Operating Manual

Contents

Foreword

Thanks for your purchase of this product!

Please read this operating manual carefully before installing and operating the machine.

To extend the service life of the machine and make the machine run well, please pay attention to the daily maintenance of the machine.

Precautions for Use

1. Do not make modification to reduce the mechanical safety performance without the Company's permission.

2. The possibility of continuous design change of the product is not excluded, so the maintenance instructions provided in this manual may not be completely consistent with the actual machine.

3. For safety reasons, maintenance can only be done by well-trained and technically qualified personnel, using the original parts from the Company. Do not attempt to troubleshoot or repair the machine without the necessary experience.

4. Safety and protection laws and regulations vary in different countries and regions, and should be strictly observed in operation and maintenance of the machine. Please refer to further safety instructions in this manual. You need to explain the safety and accident requirements of this manual clearly to your operation and maintenance personnel and be sure to comply with them.

5. All the technical details, dimensions and instructions in this manual are not binding and therefore the users may not protest or claim for any rights. The machine may be technically improved during research and development without prior notice.

6. Please carefully keep all the attached documents and do not lose them. The Company reserves the copyright for all documents. Do not copy and circulate them to your company's staff. All information shall not be disclosed to any other organizations and individuals without the written permission of the Company.

7. This manual contains no warranty of any kind, expression of position or other implication.

Part 1 Safety Precautions

1.1 Overview

(1) All documents, especially safety-related documents, must be accessible to operators.

(2) Only correct operation according to the information provided in this manual can ensure safety and effectiveness.

(3) Only authorized and trained personnel are allowed to operate the machine.

(4) The national and local safety regulations shall be observed.

(5) If the machine has an accident or a certain operation of the machine has posed a potential danger, be sure to immediately notify MeMeTech in writing.

1.2 Safety

1.2.1 Electrical Safety

(1) When turning off the machine, turn off the main power switch of the machine to ensure safety.

(2) Only qualified electricians receiving the technical and safety training may enter the electrical and electronic areas for work or inspection.

(3) Live-line work may be required for testing and troubleshooting some units. This work requires special attention and care. The operating tools should have insulated handles and be in good conditions. The operation personnel must be trained strictly and pass the examination. Special persons should be assigned to monitor the operation. During operation, the operators should stand on dry insulating objects, and wear insulating protective articles such as insulating gloves and electrician's insulating shoes.

Note: Do not conduct live-line work outdoors in humid environment or rainy, snowy or foggy days!

1.2.2 Description of Maintenance Work

(1) Observe the maintenance rules for the machine.

(2) During maintenance, the main switch or safety switch shall be turned off to prevent the equipment from being turned on by others by accident.

1.2.3 Dress Code

(1) There are many electric parts on this machine, and the danger caused by these moving parts cannot be completely eliminated, but the accidents can be greatly reduced through proper dressing.

(2) Do not wear loose clothes (coat with loose cuffs, scarf, tie); wear a hat if the operator has long hair.

(3) Do not wear necklaces, rings, bracelets, watches and other wearable accessories at work.

(4) Do not put tools in the open chest pocket, these tools may fall into the machine.

1.2.4 Description of Machine Modification and Replacement of Wearing Parts

This machine is manufactured and inspected in accordance with relevant technical specifications. User's modification or transformation may cause safety accidents. When replacing spare parts, users should use the products from MeMeTech or the manufacturer designated by MeMeTech. Installation of spare parts produced by other manufacturers will change the performance of the machine and reduce the reliability of the machine. MeMeTech shall not be liable for any consequences caused by modification, transformation or use of parts not approved by MeMeTech.

1.2.5 Precautions for Use of Batteries and Charger

1.2.5.1 Power Supply Conditions

(1) Rated input voltage: AC220V; input voltage range: AC180V--240V; input frequency range: 50-60Hz

(2) Power: ≥1500W (it can meet the requirements for charging 4 batteries of 2 doffers simultaneously);

(3) Wiring mode: single-phase + PE grounding protection;

1.2.5.2 Precautions for Use of Batteries

(1) A special battery charging area should be provided. The charging area should be protected against direct sunlight, and well-ventilated and unblocked; it must be far away from open flame and high temperature heat source, and at least 10 meters away from combustible and inflammable objects. This area should be equipped with fire extinguishing equipment.

(2) Battery operating environment: charging temperature: 0-45℃, discharging temperature: -20-55℃.

(3) Electric switch lock, fuse block and other devices prone to spark should be insulated from the batteries.

(4) The battery is fully charged in the factory, and the users can usually use the battery directly on the machine. If the battery is used for a long time (more than 2 months), the battery should be charged: Plug the charger into the battery box and then connect it to 220v AC power supply. After the charger light turns green, continue charging for 1-2 hours to complete charging.

(5) When the doffer is running, it is best to charge the battery after about 85% of the battery has been used (the doffer has the function of low battery reminder). Do not charge after the battery is exhausted to prevent from shortening the battery life due to overdischarge.

(6) Use the charger matched with the machine; otherwise, the lithium battery will be damaged or the safety risks will be caused.

(7) It is necessary to charge the battery fully before storage if the doffer is not used for a long time. Do not store it for a long time at low battery.

(8) If the continuous charging time of the lithium battery exceeds 6 hours and the charger light does not turn color or the battery is hot, immediately stop charging and send it to the after-sales service department. Do not continue charging if the charger light does not turn color.

(9) Lithium battery should stay away from combustion source, heat source and flammable and explosive gases, avoid direct sunlight in hot season and be protected from violent vibration, collision and short circuit of positive and negative terminals.

(10) The battery should be handled with care during use to avoid damaging the internal components. Do not knock, throw or step on the battery.

(11) Do not connect the battery in series or parallel; do not mix the battery with batteries from other manufacturers or different types of batteries.

(12) Do not disassemble or modify the battery during use.

(13) Do not make the battery in contact with water and corrosive liquids, which could result in battery short circuit, leakage, heating, smoking, fire and explosion and other dangerous phenomena; store it in a dry, cool and ventilated environment when not in use.

(14) The battery shall not be used in case of peculiar smell, heat, deformation, discoloration or any other abnormal phenomena.

(15) The battery is consumable. After charging and discharging over time, the capacity of the battery will be gradually reduced, resulting in the reduction in the operating duration of the doffer, which is a normal phenomenon. However, if the battery capacity falls below 60% (more than 600 cycles) of the standard value during the warranty period, the battery will be regarded as failure. Please contact MeMeTech in time. After the warranty period expires, the battery will not be covered within the warranty scope (warranty period of 12 months) even if the battery capacity falls below 60% of the standard value, which is normal loss.

(16) If the lithium battery is beyond the warranty period, the lithium battery shall be handed over to the professional maintenance personnel for comprehensive inspection to ensure no potential safety hazard before continued use.

1.2.5.3 Precautions for Use of Charger

(1) Do not use the charger for other purposes.

(2) Do not disassemble and modify the charger.

(3) Do not connect and disconnect the power plug by wet hands.

(4) Do not charge in lightning weather.

(5) Do not place any articles (such as liquid and metal) on the charger.

(6) Avoid using the charger in direct sunlight.

(7) Keep good ventilation and heat dissipation conditions when the charger is working.

(8) Do not use the charger in an unstable environment with excessive smoke, dust and humidity.

(9) Do not connect the charger to the mains supply for a long time when the output terminal of the charger is not connected to the battery pack.

Part 2 Product Introduction and User Instructions

2.1 Product Introduction

2.1.1 Standard PLC is used to control transmission parts, so that the machine can complete a series of operations such as drawing, doffing, trimming, getting on, getting off, stopping halfway and continuing to draw yarns according to the instructions, so that the whole doffing process is continuous and the doffing efficiency is stable.

2.1.2 The machine is reliable and safe, light and simple in operation, and has complete functions, including doffing, emergency stop, auto reversing, shutdown, etc.

2.1.3 The machine has limit protection and drive alarm protection, and provides fault information for maintenance personnel to detect and repair.

2.1.4 The machine uses 48V power supply and has the function of power management. The doffer automatically turns off the power supply to save power when it does not work for a certain period of time. The machine has the function of too low supply voltage prompt to remind the staff of charging in time and prevent the battery from being exhausted and the battery life from being reduced.

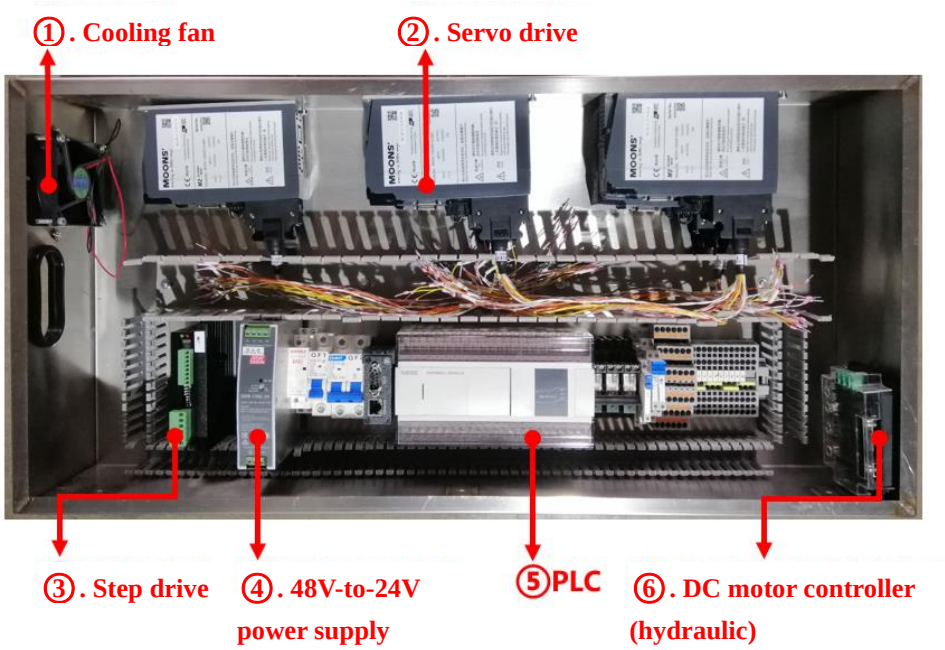
2.1.5 The on-site modification cost is low, and the normal production will not be affected.

2.1.6 The machine has low repair and maintenance costs and fewer wearing parts.

2.1.7 The machine has fewer oiling parts and long interval for convenient maintenance.

2.1.8 The machine has the detection function of spindle blade drawing to avoid the contamination of yarns by the drawn spindle blade.

2.2 Main Electrical Components



2.3 User Instructions

2.3.1 The product shall not be modified without MeMeTech's permission.

2.3.2 All technical details, instructions, mechanical structure and indicators of this manual will change with the later upgrade of the machine, and therefore the users may not protest or claim for any rights.

2.3.3 MeMeTech has the right to stop any service for the intelligent doffer used for other purposes.

2.3.4 Two doffers are used as a group, and divided into left-hand and right-hand doffers, which can be exchanged with each other.

2.3.5 A group of intelligent doffers serve 10,000 spindles of the spinning frame. If there are too many spindles served, MeMeTech shall have the right to shorten the warranty period. We will not provide warranty for serious overload operation.

2.3.6 For vulnerable components, MeMeTech will provide an appropriate quantity of spare parts along with the machine. For the excess parts, MeMeTech will provide compensation according to the basic cost.

2.3.7 MeMeTech will not provide warranty for device damage caused by human causes or collision.

Part 3 Preparations for Doffer

The preparations for the doffer are prerequisites for the doffer to give full play to its performance. Only enough preparations for the doffer ensure less problems occurring on the machine. The preparations for the doffer include modification of spinning frame, debugging of doffer, etc.

3.1 Modification of Spinning Frame

3.1.1 Modification of Upper Guide Rail for Spinning Frame

(1) Replace the original upper guide rail supports with the general rail supports from MeMeTech, and add head and tail guide rails.

(2) Adjust the joints at both ends of the guide rail smoothly.

(3) Replace rusty, falling or slippery screws.

3.1.2 Modification of Lower Guide Rail

(1) Replace the original lower guide rail supports with the general guide rail supports from MeMeTech, and add head and tail guide rails.

(2) Level the fixed round pipe below with the special workpiece provided by MeMeTech.

(3) Replace rusty, falling or slippery screws.

3.2 Inspection of Spinning Frame

3.2.1 Inspect the coupling screws between the spindle bearing plate and the rack, and tighten all the coupling screws.

3.2.2 Check the flatness of the spindle blade, try to keep the height consistent, check for looseness, and ensure that it is installed in place.

3.2.3 Clean the thread wastes on the spindle blade in time to ensure that the height of the bobbin is appropriate when drawing yarns.

3.2.4 Adjust the turns of tail yarn and halching to ensure that the mantissa can be effectively left on the spindle blade when the yarn is drawn.

3.3 Debugging of Doffer

The doffer has been debugged by our service technician, and cannot be changed later without permission.

3.3.1 Adjustment of clamping mechanism

(1) Suitable clamping force, drawing all the bobbins with small bite force.

(2) Reasonable clamping position, clamping in the center, and appropriate height.

3.3.2 Adjustment of bobbin hanging structure

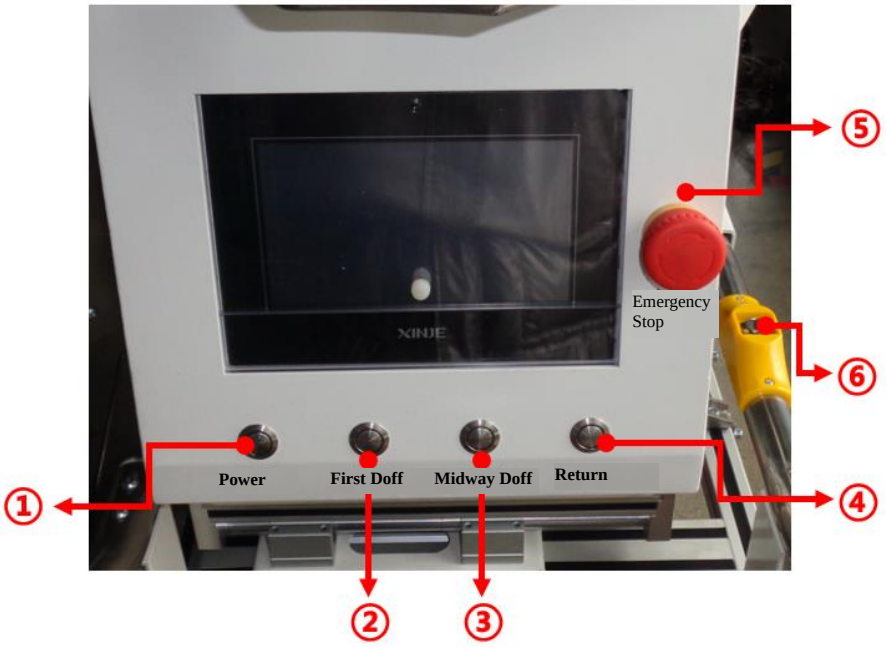
3.3.3 Adjustment of doffer body level

3.3.4 Adjustment of photosensitive label and sensor position

3.4 Reinforcement or Replacement of Spindle Hooks

Part 4 Operation Procedure and Maintenance Specification of Doffer

4.1 Introduction and Instructions of Operation Buttons



① Power button: long press this button to turn on the working power supply of the machine. After the working power supply is turned on, all parts of the doffer are charged, and each axis returns to zero and enters the standby state.

② First Doff button: Only when the doffer body lands on the rails, First Doff button will work. When the doffer body lands on the rails, press this button, and then the doffer starts to run;

③ Midway Doff button: After the doffer completes the first doffing, if the emergency stop button is pressed or the doffer is powered off and restarted to require doffing again, press Midway Doff to continue doffing.

④ Emergency Stop button: In case of abnormal situation or demand for emergency stop when the machine is in operation, press this button, and then the machine will stop running. (Note: under any circumstances, including pressing the emergency stop button before starting, the mechanical shaft will not be actuated, and the machine will not have any response when pressing any other button). When the emergency stop button is pressed and the machine needs to resume operation if the fault has been removed, turn the button to restore the button to the normal state to remove the emergency stop of the machine.

⑤ Return button: Return button works only when the doffer is restarted and lands on the rails.

⑥ Lift button (Located on the side handle): Lift button is used for lifting or lowering the doffer body.

4.2 Safe Operation Specification for Intelligent Doffer

(1) Ensure that the spinning frame is completely stopped, turn up the fender and the balloon separator.

(2) Put the empty yarn basket into the doffer body.

(3) Before starting and when the doffer body is not raised, push the doffer body to the side of the spinning frame, prop the front side of the doffer against the track, and then push it hard to the side of the guide rail along the track.

(4) Check the empty bobbins in the bobbin box, deal with inverted and disorderly bobbins, take out the empty bobbins wrapped with tail yarns, and lead the bobbin before putting it on.

(5) Put the bobbin box on the doffing structure, and fully match the position of the support, and pull the fan-shaped frame baffle.

(6) Start the doffer and wait for the lifting of doffer body and the completion of mechanical shaft operation.

(7) Lean the doffer body on the track, press the lifting handle button, wait for the doffer body to fall, and then check whether the walking wheel is put on the track.

(8) Press First Doff button to start doffing.

(9) Gently arrange the bobbins by hand during doffing, observe whether there is any disorderly bobbins in the bobbin box, and deal with it in time.

(10) During doffing, if not necessary, doffing workers should be about 2 meters from doffer and should not face the inner side of the doffer.

(11) During doffing and return, pay attention to the impact of circulating suction on the doffer, draw the circulating suction pipe in advance, and then the return speed will gradually accelerate. The doffing workers should avoid injury.

(12) The doffer automatically returns to the starting point after doffing. After the doffer body rises automatically, pull the doffer off the track, the doffer will be automatically powered off, and the the whole doffing process is completed.

(13) In case of emergency during doffing, press the emergency stop button to stop, release the emergency stop button, and then the doffer will continue to run.

(14) When the spindle drawing alarm is given during doffing, please observe whether any spindles are drawn. If so, please remove the spindles first, then press the emergency stop button and release again, and the trolley will operate according to the original procedure.

(15) When the bobbins are not hung in the doffing process, press the emergency stop button first, check the bobbins for seizing and handle it, release the emergency stop button, and then press the midway doff button.

(16) Do not put hands into the yarn basket to take yarns or throw the yarn into the basket in the doffing process.

4.3 Operation Instructions for Man-machine Interface

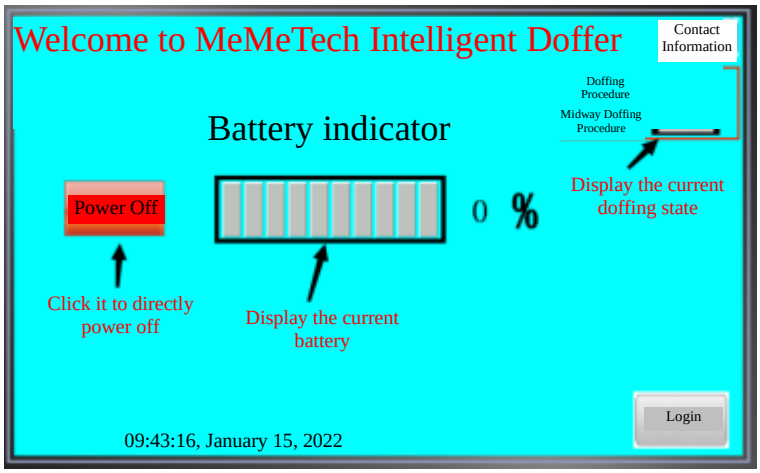
4.3.1 Overview

The display screen of the doffer is the operating terminal for debugging and fault checking.

Be sure to touch with your hands! Use of sharp hard objects easily causes trouble!

4.3.2 Introduction to Interfaces

Main display interface



This interface mainly includes battery indicator/power-on display button/system entry button.

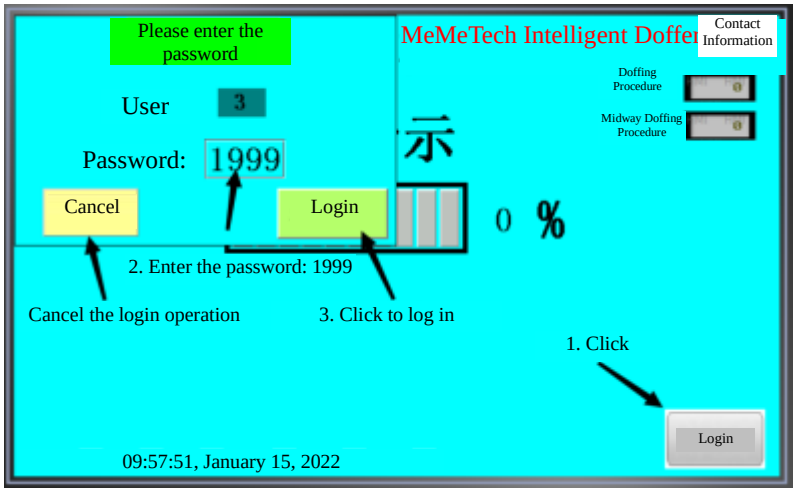
Power Off: Click this button to directly power off. Meanwhile, the doffer has the function of timed shutdown. The doffer will automatically shut down if there is no axis motion within the set time.

Battery indicator: displays the current battery level. When the battery is lower than 20%, the prompt "Replace battery" will pop up on this page. Operator can judge whether the battery is replaced according to the battery indicator.

Doffing state: displays the doffing state of the current system. When the machine is abnormal and cannot be handled, you can inform our staff of the parameter value displayed in this state. We can infer the possible problems of the machine according to the parameter value.

Login: Click this button and enter the user code and password to enter the operating system of the machine.

System login interface

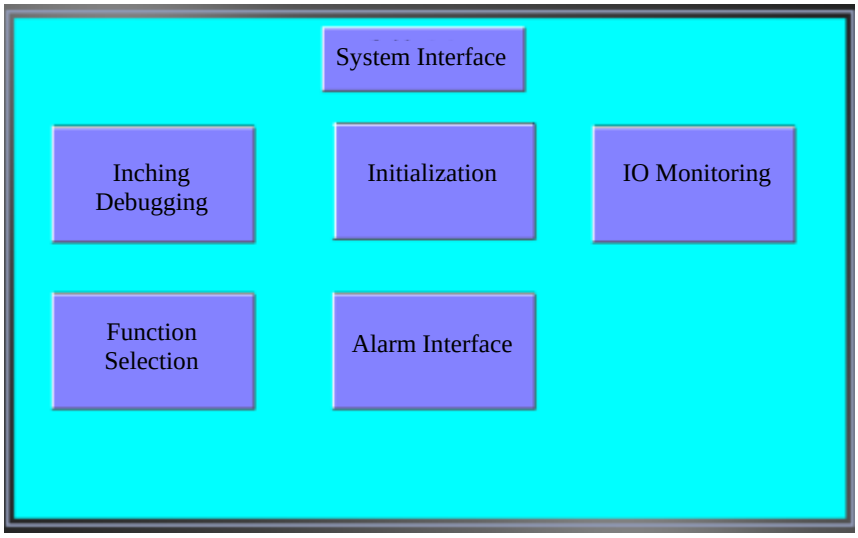


① Click the icon "Login".

② Enter the user password 1999 on the pop-up page.

③ Click "OK" to enter the operating system of the machine. Click "Cancel" to cancel the operation of entering the operating system.

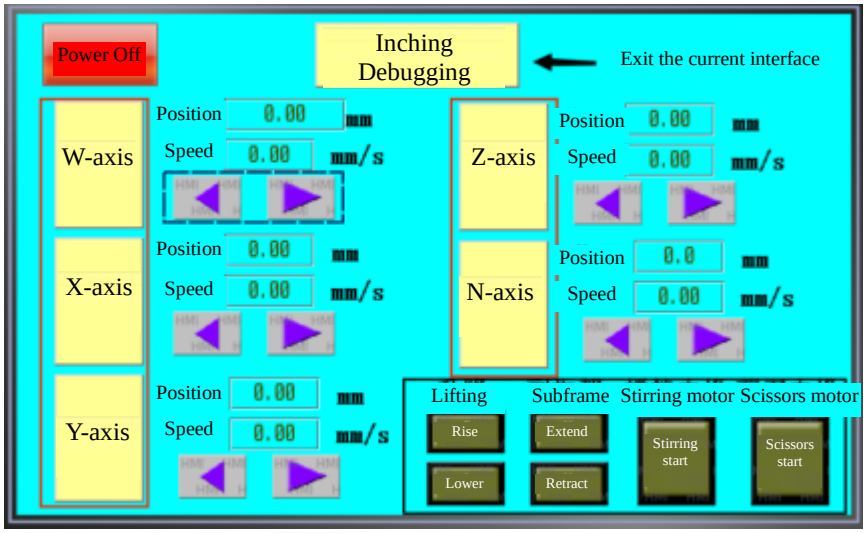
System selection interface



System Interface includes: Inching Debugging, Initialization, IO Monitoring, Function Selection and Alarm Interface. Operators can enter different interfaces to perform operations as required.

Inching Debugging interface

In the "System Interface", click "Inching Debugging" to enter the "Inching Debugging" interface:



This interface can be used to display and adjust the current position, speed and other information of each axis of the machine, and perform inching or testing on the main actuator of the machine.

In this interface, click "Inching Debugging" to exit the current interface.

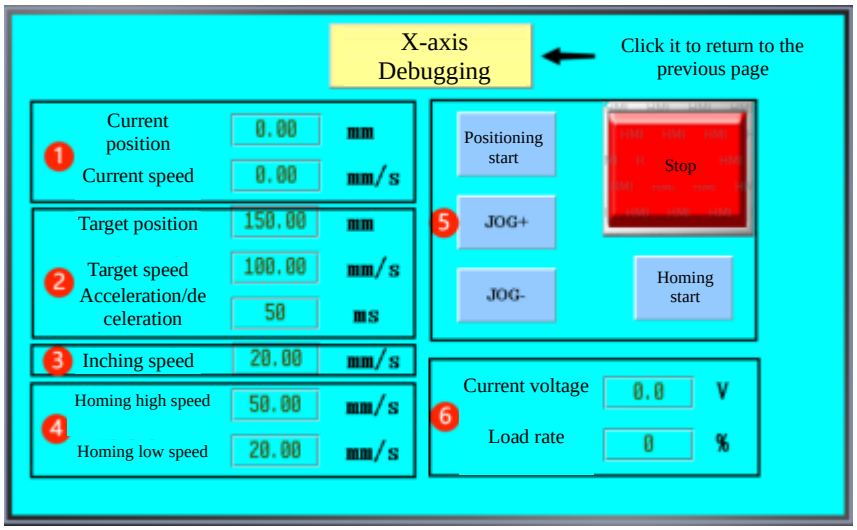
Click the icon in the red rectangle box to debug each axis.

The buttons inside the black rectangular box are the lifting test, subframe forward/backward test, stirring motor test and scissors motor test buttons of the trolley.

The buttons in the dotted box can be used to operate the forward/backward movements of the shaft.

Note: Do not operate in this interface during doffing!!

Uniaxial inching interface



Area ①: Display the current axis position and speed.

Area ②: Set the locating position, speed, acceleration and deceleration data.

Area ③: Set the inching speed.

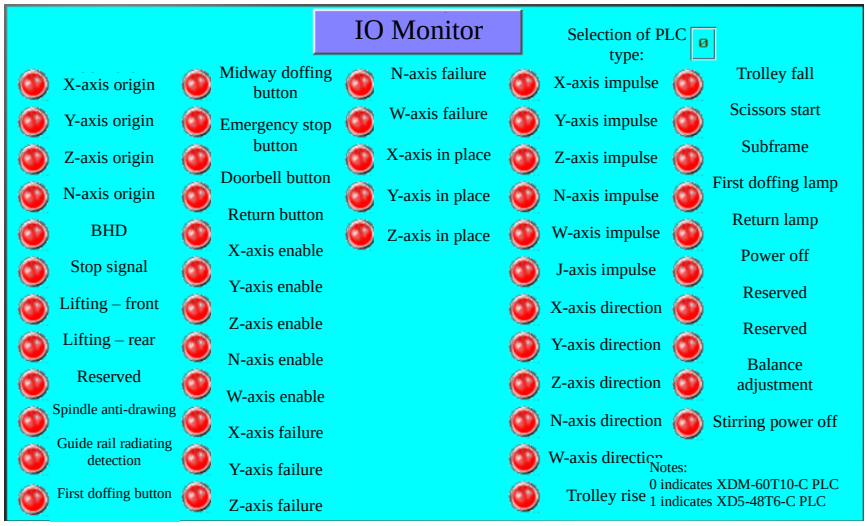
Area ④: Set the homing data.

Area ⑤: Function operation area. Positioning start button: positioning movement according to the parameters of Area ②. JOG+/JOG- button: inching movement according to the parameters of Area ③;

press it to move, and release it to stop moving. Homing start: movement according to the parameters of Area ④; ensure that the origin sensor of each axis is normal. Stop button: stop the current movement.

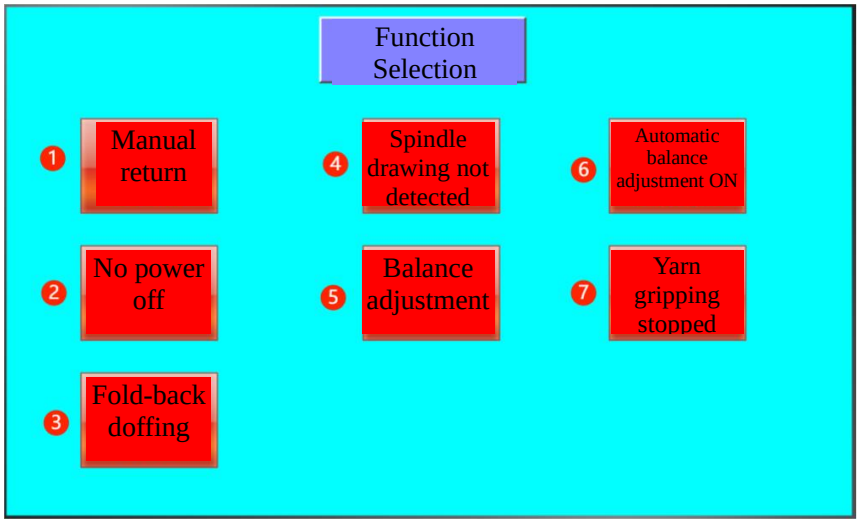
Area ⑥: Reserved.

IO monitoring interface



Click “IO Monitor” to go to the monitoring interface and check whether the input and output are normal.

Function selection interface



① Manual/automatic return mode: Select the manual return function, the doffer will not automatically return after doffing, and you need to press the return button on the panel; select the automatic return function, return will be enabled automatically after stop for several seconds.

② The function of this button indicates whether the doffer will be automatically powered off when there is no operation.

③ The function of this button indicates the doffing getting-on position, namely, getting on after returning to the getting-on position or getting-off after doffing.

④ The function of this button indicates spindle drawing detection during the process of yarn gripping. When the spindle is drawn if the function is enabled, the doffer will stop immediately; when the spindle is drawn if the function is disabled, the doffer will not stop. Ensure that the spindle is not drawn when the function is disabled. Otherwise, scissors and other structures may be damaged.

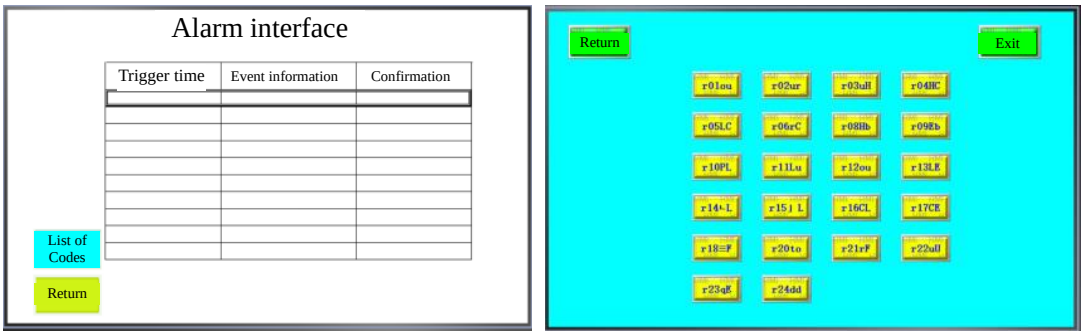
⑤ Manual hydraulic cylinder balancing: When the front and rear hydraulic cylinders are not balanced, click this button to balance, and the function will be automatically disabled after the adjustment is completed.

⑥ When the automatic balance is enabled, the front and rear hydraulic cylinders will be automatically balanced if imbalance is detected when the doffer completes doffing and rises.

⑦ The function of this button indicates whether the doffer stops immediately when pressing the yarn gripping button.

(Important parameters and necessary operation parameters for the doffer are saved in initialization)

Alarm interface



The alarm name and time are recorded, and the cause of the problem can be found according to the frequency of the alarm.

Click "Return" to return to the previous page. Click "View Codes" to view the cause and processing of the alarm according to the name of the alarm code.

Part 5 Introduction of Doffer Debugging and Parameter Settings

This section mainly includes the following items:

X-axis Debugging W-axis Debugging Y-axis Debugging Z-axis Debugging N-axis Debugging Yarn Drawing Settings

5.1 Introduction of Axis Debugging

5.1.1 X-axis Debugging

X-axis mainly affects the following objects: X-axis yarn placing position (as back as possible), X-axis yarn gripping position, and X-axis yarn drawing parameter settings.

X-axis moves forward and backward with the X-axis sensor as the reference. you can set the homing speed parameters in the X-axis debugging interface. At the same time, homing can be tested, and the stopping position of the axis is defined as -10.00. All positions will be set on this basis. At this point, you can check whether the X-axis is close to the end of the X-axis, and whether the X-axis does not hit the X-axis module in the homing process. The X-axis zero position is changed by moving the X-axis sensor. Fix the sensor after confirming the X-axis zero position.

5.1.2 W-axis Debugging

W-axis debugging mainly affects parameters such as W-axis zero, W-axis forward/return speed setting, and W-axis return position. W-axis zero is separated from BHD sensor, and the two sensors have different functions. Functions of W-axis zero sensor: ① determine the function of W-axis zero, ② return limit protection function. Functions of BHD sensor: ① Function of BHD when gripping yarns, ② function of judging the last gripping.

W-axis zero is confirmed by the following method: determine Y-axis sensor zero (introduced below), then hang the guide rail, return W-axis to the origin by the touch screen, observe whether the location of yarn gripping is appropriate after stop, and adjust the position by moving W-axis zero sensor. It should be noted that Y-axis first gripping position is Y-axis zero position. BHD position debugging is performed together with Y-axis yarn gripping position debugging to ensure that the yarn can be gripped in each gripping.

5.1.3 Y-axis Debugging

Y-axis mainly affects the following parameters: Y-axis yarn placing position centering, Y-axis pending gripping position, and Y-axis synchronous yarn drawing setting.

Move Y-axis to the middle position of the yarn when the power is off, move the sensor to the edge of

the lighting bracket to basically determine the position of the sensor, redetermine the zero position of the Y-axis when the power is on, adjust the position of the sensor appropriately, and then return to the origin on the touch screen.

S9F integrates the zero point of Y-axis with the yarn setting position, that is, the zero position is the yarn placing position, and the first gripping position is the zero position. Y-axis pending gripping position can be debugged together with the BHD sensor.

5.1.4 Z-axis Debugging

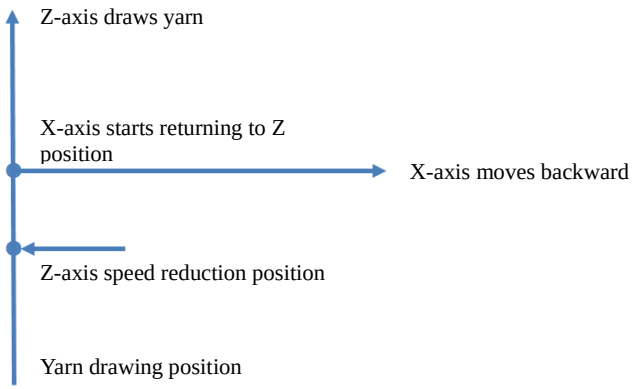
S9F does not adopts multi-section interpolation mode for yarn drawing any longer, and Z-axis turnover block has also been adjusted. The position of Z-axis turnover block is basically determined. The reference position is 33mm-35mm from the lower end of the turnover bracket to the lower surface of the aluminum plate of the Z-axis fixing seat. At the same time, the position of the sensor is basically determined. The reference position is 452mm from the center of the sensor to the lower surface of the aluminum plate of the z-axis fixing seat. It can be fine-tuned according to the actual situation during debugging.

5.1.5 N-axis Debugging

N-axis is the yarn gripping motor. When debugging, return to the origin first. It should be noted that the largest gripper opening position is the homing position. During debugging, first put the empty bobbin on the gripper, and then inch N-axis to grip the bobbin. Ensure that the yarn can be drawn when the yarn is gripped, and that the yarn will not be gripped too tightly. Then, send the current value of the yarn gripping angle to the parameter setting page. The general setting range of N-axis yarn gripping angle is 100-130 degrees. If the setting exceeds this range, please consult our technician.

5.1.6 Yarn Drawing Settings

S9F has changed the position of yarn drawing from the original multi-section XZ interpolation drawing to XZ coordination mode. XZ moves independently and coordinates with each other on the track to reach the purpose of yarn drawing. The schematic diagram is as follows:



As shown in the figure above, Z-axis begins to draw the yarn, and then decelerates at a certain position.

Then X-axis begins to move backward at a constant speed according to Z-axis position to achieve the purpose of XZ yarn drawing. The end position of Z-axis yarn drawing is not zero. If it is zero, the gripper will be very warped.

5.2 Parameter Settings

(Taking the field parameters of a customer as an example, the actual parameters vary with different working conditions)

Acceleration/deceleration settings: Generally, it can be set to 50-300. If the acceleration/deceleration value is larger, the motor will be started more gently, and it will take more time to start it; if the acceleration/deceleration value is smaller, the motor will be started faster, and the vibration will be increased, and it will take less time to start it.

Parameter Settings 1

The parameters in the figure are explained as follows:

(1) X-axis pending gripping position, indicating the position of X-axis when the yarn rod is in the center of the gripper during yarn gripping.

(2) Y-axis pending gripping position, indicating the position of Y-axis when waiting for BHD signal.

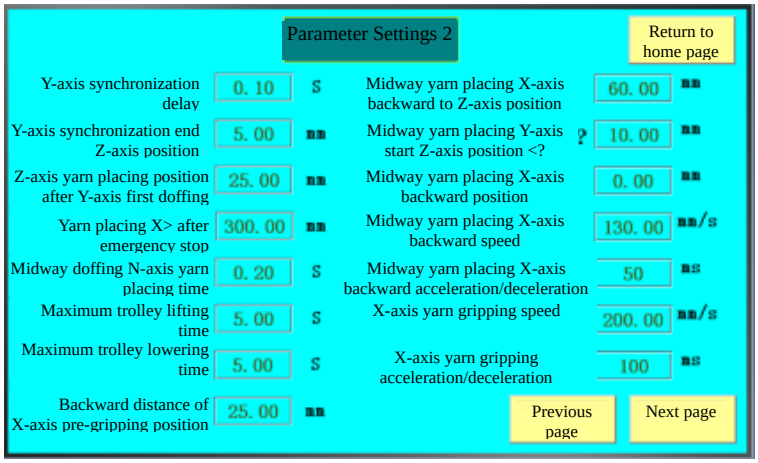
(3) Z-axis pending gripping position, indicating the position of Z-axis when waiting for BHD signal.

(4) Y-axis first gripping position, indicating the position of Y-axis during the first gripping.

(5) Y-axis yarn placing position, indicating the position of Y-axis when putting the yarn, generally ensuring that the yarn is put in the middle.

(6) Z-axis yarn gripping position, indicating the lowering position of Z-axis during the yarn gripping.

Parameter Settings 2



The parameters in the figure are explained as follows:

(1) Y-axis synchronization delay, indicating that Y-axis starts synchronization 0.1s delay after BHD is on.

(2) Y-axis synchronization end Z-axis position, indicating that Y-axis synchronization ends after Z-axis yarn drawing is less than 5mm.

(3) The parameters "Z-axis yarn placing position after Y-axis first doffing" and "Yarn placing X> after emergency stop" are reserved.

(4) Midway doffing N-axis yarn placing time, indicating XYZ is going to the pending gripping position 0.2S after N-axis puts yarn when pressing the midway doffing button.

(5) Maximum trolley lifting/lowering time, indicating the maximum time of the trolley when lifting/lowering. It will stop prematurely when it senses the sensor.

(6) Backward distance of X-axis pre-gripping position, indicating that X-axis will not arrive at the X-axis pending gripping position first in the figure above and will stop at the backway of the X-axis pending gripping position when waiting for BHD signal. The purpose is that the gripper will not break the yarn when W-axis moves forward, helping to improve the tailing.

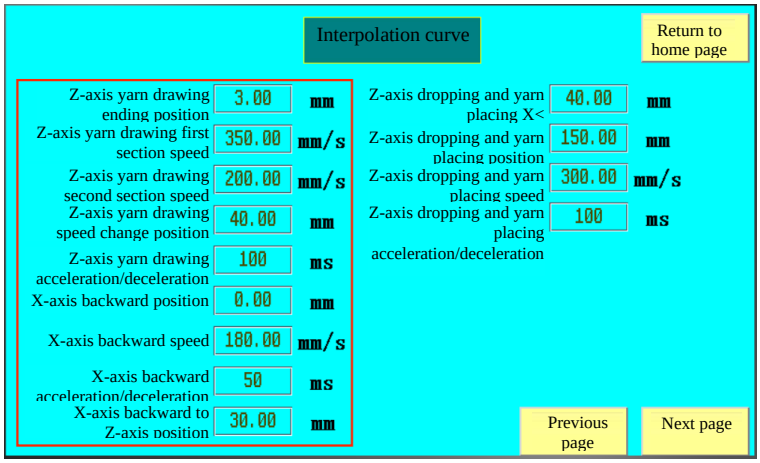
(7) Midway yarn placing X-axis backward to Z-axis position: indicating that Z-axis yarn drawing position is smaller than this value when X-axis moves backward when pressing the midway doffing button in case of emergency stop.

(8) Midway yarn placing Y-axis start Z-axis position <?: indicating that Z-axis is smaller than this value during midway doffing and Y-axis is positioned to the yarn placing position.

(9) Midway yarn placing X-axis backward speed/position/acceleration and deceleration: indicating X-axis backward data during midway yarn placing.

(10) X-axis yarn gripping speed/acceleration and deceleration: indicating the speed parameter of X-axis from pre-gripping position to pending griping position.

Interpolation curve



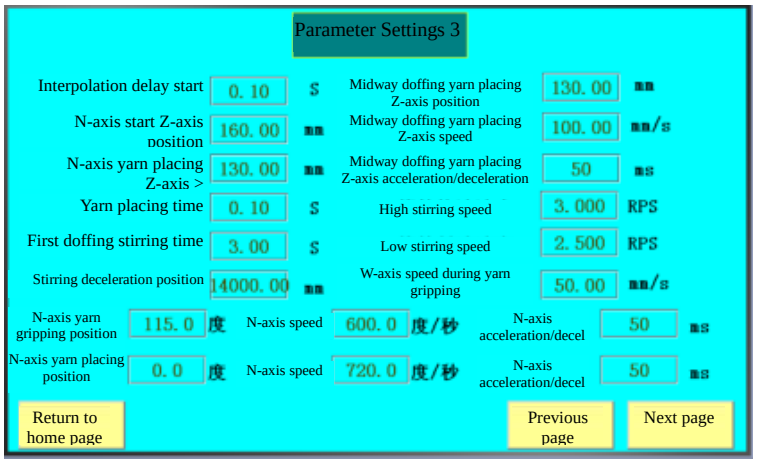
The parameters in the figure are explained as follows:

(1) The parameters in the box are shown in the yarn drawing setting introduced above. They mainly indicate the coordination relationship between XZ during yarn drawing.

(2) Z-axis dropping and yarn placing X<, indicating that Z-axis starts to drop and put yarn when X-axis position is less than 40mm.

(3) Z-axis dropping and yarn placing position/speed/acceleration and deceleration, indicating the parameter during Z-axis dropping and yarn placing.

Parameter Settings 3



The parameters in the figure are explained as follows:

(1) Interpolation delay start, indicating that the yarn gripping process will start 0.1s delay when Z-axis arrives at the yarn gripping position.

(2) N-axis start Z-axis position, indicating the yarn gripping position when Z-axis drops to grip the yarn.

(3) N-axis yarn placing Z-axis >, indicating gripper release position when Z-axis puts the yarn.

(4) Yarn placing time, indicating that XYZ goes to the pending gripping position 0.1s delay when putting yarn.

(5) First doffing stirring time, indicating the working time of the stirring motor after pressing the first doffing button.

(6) Midway doffing yarn placing Z-axis position/speed/acceleration and deceleration, indicating Z-axis yarn placing parameters when the midway doffing button is pressed.

(7) Stirring deceleration position, indicating the position of W-axis when the stirring motor slows down.

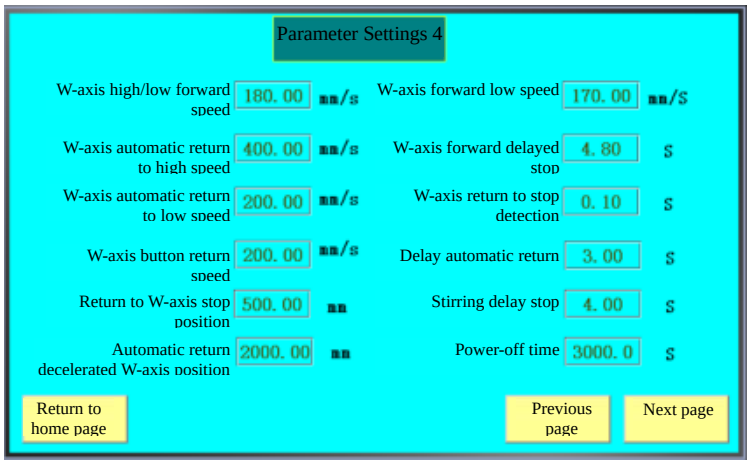
(8) High/low stirring speed, indicating the high and low speed of the stirring motor during doffing.

(9) W-axis speed during yarn gripping, indicating that the axis starts to grip yarn when BHD is on and W-axis speed is more than 50. It mainly avoids the phenomenon that BHD is too close to grip yarn when pressing the midway doffing button.

(10) N-axis yarn gripping position/speed/acceleration and deceleration, indicating the rotation angle of the cam when the gripper clamps.

(11) N-axis yarn placing position/speed/acceleration and deceleration, indicating the angle position of the cam when gripper puts the yarn.

Parameter Settings 4



The parameters in the figure are explained as follows:

(1) W-axis high/low forward speed, indicating the speed when W-axis moves forward and decreases to low speed when gripping yarn.

(2) W-axis automatic return to high/low speed, indicating that W-axis automatically returns to the high speed after doffing and returns to the low speed at the stop position.

(3) W-axis button return speed, indicating the return speed from panel to button.

(4) Return to W-axis stop position, indicating that W-axis returns to the start/stop position after doffing.

(5) W-axis forward delayed stop, indicating the delayed time of W-axis moving forward after the last gripping.

(6) W-axis return to stop detection, indicating the time of detecting the stop label when W-axis returns.

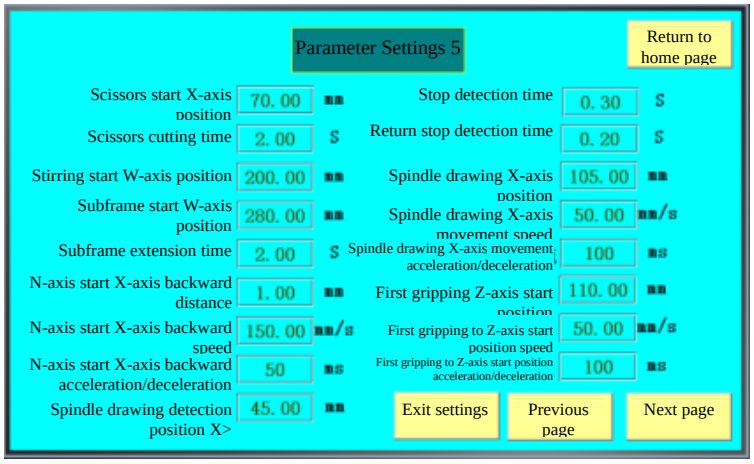
(7) Delay automatic return, indicating that W-axis automatically returns 3S pause after the last gripping.

(8) Stirring delay stop, indicating the time when the stirring motor stops at the last gripping.

(9) Power-off time, indicating the time of automatic power-off after the doffer has been stored for a

certain time.

Parameter Settings 5



The parameters in the figure are explained as follows:

(1) Scissors start X-axis position, indicating X-axis position when the scissors cut the yarn.

(2) Scissors cutting time, indicating the working time of scissors motor.

(3) Stirring start W-axis position, indicating W-axis position when the stirring motor is started.

(4) Subframe start W-axis position, indicating W-axis position when the subframe is extended.

(5) Subframe extension time, indicating the time required for the extension of the subframe. At this time, W-axis waits.

(6) N-axis start X-axis backward distance/speed/acceleration and deceleration, indicating the X-axis backward distance parameter during yarn gripping.

(7) Spindle drawing detection position X>, indicating that the spindle drawing sensor will be on and alarm if X-axis position is more than 45mm.

(8) Stop detection time, indicating that the last gripping BHD is on for 0.3s indicates the last gripping.

(9) Return stop detection time, indicating the time of stop and label detection when returning.

(10) Spindle drawing X-axis movement speed/position/acceleration and deceleration, indicating that X-axis moves forward a little after the spindle is drawn to facilitate the removal of the spindle.

(11) First gripping to Z-axis start position/speed/acceleration and deceleration, indicating that Z-axis is directly positioned to Z-axis pending gripping position after the completion of power-on homing.

Note: The above parameters are for reference only, and can be adjusted according to the actual situation.

5.3 Precautions

5.3.1 Labelling Methods

To ensure that the doffer head and tail can get on, the following labeling requirements are specified: attach 150mm long label between the spindles 5 and 6 towards the direction of the spindle 1, attach the small square label between the spindles 15 and 16, attach 150mm long label between the 5th and 6th spindles from the bottom towards the direction of the last spindle, and attach the small square label between

the 15th and 16th spindles from the bottom. If the long label cannot be directly attached to a screw, change the screw to a countersunk screw (recommended practice), or attach a normal square label to the middle position and a 150mm long label to the nearest position away from the screw position.

5.3.2 Parameter setting is that Y-axis out-of-sync position is greater than Z-axis yarn drawing stop position; otherwise, the axis cannot get out of sync to result in collision near the subframe.

5.3.3 At present, the return speed of the servo W-axis cannot exceed 420mm/s, and it is recommended that the maximum return speed be set to 400mm/s. Too high speed will lead to the phenomenon that W-axis cannot stop in time when the emergency stop button is pressed.

5.3.4 In order to improve tailing, it is suggested to press the emergency stop button when N-axis has put the yarn, and press the emergency stop button when XYZ goes to the pending gripping position or XYZ is in the pre-gripping position, and avoid pressing the emergency stop button when the gripper grips the yarn.

5.3.5 If possible, wear gloves to avoid accidentally touching the scissors when drawing the spindle.

5.3.6 If the gripper is too tight, the bearing of the gripper will be damaged or the motor will alarm. If the N-axis sensor is removed, the gripping angle should be determined again.

5.3.7 There are potential safety hazards during battery charging. Avoid large amounts of combustibles around, and provide fire extinguishers around.

5.3.8. Stop charging and using the battery immediately when the battery heats up.

5.3.9. The network cable for electricity reading can be plugged into any axis.

Part 6 Common Faults and Alarm Analysis

6.1 Missed Drawing Fault

6.1.1 10 yarns are missed or not drawn during doffing.

(1) Check the position of the reflective sticker nearest to the spindle not drawn. If the distance is more than ten spindles, it means that the reflective vest drops.

(2) Check whether there is anything blocking or dirt on the nearest reflective sticker nearest to the spindle drawn.

(3) Whether the sensing position of the yarn gripping sensor is blocked by cotton wool and other objects.

6.1.2 Some yarns are not drawn during doffing

(1) Draw the full yarn that is missed by hand. If it is difficult to draw by hand, it means that the bobbin is tightly occluded with the spindle tip. Do not draw such bobbin of the doffer in the debugging process. It is necessary to replace the bobbin with poor top bearing.

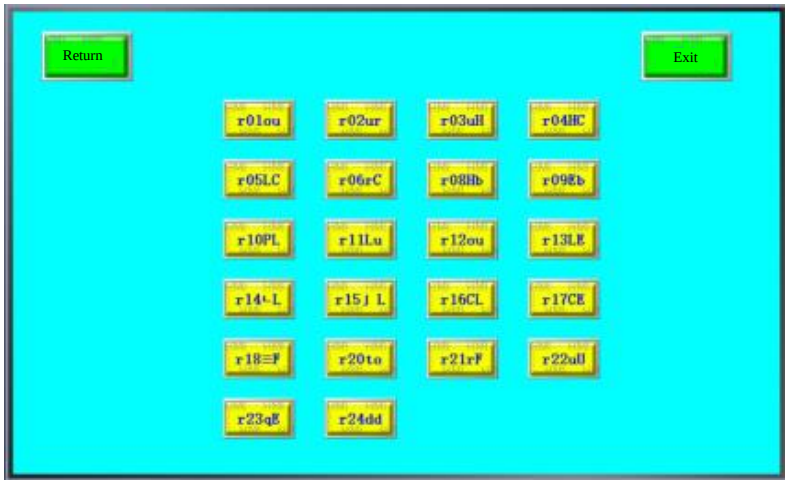
(2) Draw the full yarn that is missed by hand. If it is not difficult to draw by hand, it means that the yarn bobbin is not tightly occluded with the spindle tip. Then check whether the gripper of the doffer is abnormal: check whether the rubber is in good condition, whether the gripper arm is bent and deformed, and whether the distance between the two ends of the gripper arm and the bobbin is equal.

6.2 Bobbin Hanging or Seizing Failure

6.2.1 Check whether the forward and backward positions of the subframe are changed. Refer to Chapter 8 "Debugging Methods and Standards for Bobbin Tubes " for adjustment.

6.2.2 Check whether the debugging position of bobbin tubes is normal. Refer to Chapter 8 " Debugging Methods and Standards for Bobbin Tubes " for adjustment.

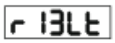
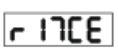
6.3 Alarms and Processing



Alarm code description and processing methods are as follows:

Alarm Code	Description	Alarm Type	Processing Method
r0 lot	Drive overtemperature alarm	The temperature of the drive radiator and power element exceeds the specified value. 1. The operating temperature of the drive exceeds the specified value; 2. Overload.	1. Reduce the operating temperature of the drive, and improve the cooling conditions; 2. Increase the capacity of the drive and motor, prolong the acceleration and deceleration time, and reduce the load.
r02ur	Internal voltage alarm	The internal voltage of the drive is lower than normal value.	Check the voltage of the power supply, and contact the manufacturer if there is any problem.
r03uH	Drive overvoltage alarm	The drive DC bus voltage is too high. M2DC series: higher than 90VDC 1. The supply voltage exceeds the allowable input voltage range; 2. The regenerative discharge resistor is disconnected; 3. The built-in regenerative absorption resistor is too small to absorb the regenerative potential; 4. The external regenerative discharge resistor does not match, leading to the	1. Check the input voltage. 2. Check whether the internal and external absorption resistance settings are reasonable; 3. Test the external resistance; ∞ indicates disconnection, please replace the external absorbing resistor; 4. If the above problems are not solved, please contact the manufacturer.

		inability to absorb the regenerative potential; 5. Drive failure (circuit failure).	
r04HC r05LC r06rC	Overcurrent	1. Driver failure; 2. Short circuit of motor cables U, V and W; 3. Motor burnout; 4. Poor electrical cable contact; 5. Too high input pulse frequency; 6. The load is too heavy, the effective torque exceeds the rated torque, and the operation lasts for a long time; 7. Poor gain adjustment results in oscillation and vibration. The motor vibrates and abnormally sounds; 8. Mechanical collision, sudden heavy load, and twisting winding occur; 9. The electromagnetic brake is in the action state; 10. In the wiring of multiple machines, the motor cable is connected to other shafts by mistake, resulting in wrong wiring.	1. Remove the motor cable and connect the servo. If the fault still occurs, replace with a new drive; 2. Check whether the motor cables U, V, and W are short-circuited, and whether the connector wires have burr. Correctly connect motor cables; 3. Check whether the sequence of the motor cables U, V, and W is correct. U-red, V-yellow, W-blue; 4. Check the insulation resistance between the motor cables U, V, and W and the grounding cable of the motor. If the insulation is poor, please replace with a new motor; 5. Increase the capacity of the drive and motor. Prolong the acceleration and deceleration time, and reduce the load; 6. Check whether the connector plugs of motor U, V and W falls off; 7. Check whether the gain parameters are adjusted properly; 8. Measure the voltage of the brake terminal; 9. Correctly connect the motor cable and the encoder cable to the corresponding shafts.
r08Hb	Hall signal error	Hall sensor error	1. Check whether the encoder is correctly connected; 2. Check whether the motor model is correctly set for the drive. 3. After troubleshooting, power on the drive again to eliminate the alarm.
r09Eb	Encoder signal error	Encoder signal error	Check whether the encoder is correctly connected. After troubleshooting, power on the drive again.
r 10PL	Position error overrun	The position error exceeds the setting of “position error alarm threshold” in parameter P-44(PF)	1. Check whether the setting of “position error alarm threshold” in parameter P-44(PF) is too small; 2. Check whether the gain parameters are debugged reasonably; 3. Check whether the motor model matches the actual load and whether the acceleration/deceleration is too large.

	Drive low voltage alarm	DC bus voltage is too low (below 12VDC) 1. The supply voltage is low. Instantaneous power failure occurs; 2. The power capacity is insufficient. The supply voltage drops due to the influence of impact current when the main power supply is switched on; 3. Drive failure (circuit failure).	Measure the input voltage of V+ and V- 1. Increase the supply voltage capacity and replace the power supply; 2. Connect the power supply correctly according to 4.2 Connection Method of P1 Drive Power Cable; 3. If the above problems are not solved, please contact the manufacturer.
	Stall alarm	The motor speed exceeds the limit P-20(VM).	Check whether the motor speed command is within a reasonable range 1. Avoid excessive speed command; 2. Check the input frequency of the instruction impulse, the electronic gear and the electronic gear ratio; 3. In case of overshoot due to poor gain adjustment, please adjust the gain; 4. Correctly connect cables to the encoder according to the wiring diagram.
	Forward prohibition limit Reverse prohibition limit	Forward prohibition limit and reverse prohibition limit	1. The external limit switch has been triggered; 2. The limit function settings of X5 and X6 are incorrect.
	Reverse prohibition limit	The reverse limit function is triggered.	1. The external limit switch has been triggered; 2. The limit function settings of X5 and X6 are incorrect.
	Drive overload	Drive output current reaches motor rated current P-17(CC) 1. The input pulse frequency is too high 2. The load is too heavy, the effective torque exceeds the rated torque, and the operation lasts for a long time; 3. Poor gain adjustment results in oscillation and vibration, and the motor vibrates and sounds abnormally; 4. Mechanical collision, sudden heavy load, and twisting winding occur.	1. Whether the gain parameters are debugged reasonably; 2. Whether the motor model matches the actual load and whether the acceleration/ deceleration is too large; 3. Check whether the sequence of the motor cables U, V, and W is correct. U-red, V-yellow, W-blue; 4. Increase the capacity of the drive and motor, prolong the acceleration and deceleration time, and reduce the load.
	Abnormal communication	Check the communication error between the drive and the host computer.	1. M Servo Suite is trying to establish communication with the drive (this is a normal alarm); 2. Check communication line and address, and check whether the baud rate is set

			correctly.
r 18EF	Parameter save failed	Parameter save failed	Please try to save again
r20to	Safe torque OFF	Safe torque OFF (STO) is activated. The input optocoupler in at least one of safe input 1 and safe input 2 is Open.	Verify that the input wiring status of safe inputs 1 and 2 or safety sensor setting is triggered.
r2 IrF	Regenerative potential release failure warning	The regenerative energy exceeds the capacity of the regenerative discharge resistor. 1. Due to the large load inertia, regenerative energy in deceleration is formed, resulting in the rise of bus voltage, and the insufficient energy absorption of the regenerative discharge resistor results in the rise of abnormal detection value; 2. The motor speed is too high to fully absorb renewable energy within the specified deceleration time.	1. The built-in regenerative absorbing resistor is too small to absorb the regenerative potential; 2. The external regenerative discharge resistor does not match, so that the regenerative potential cannot be absorbed; 3. Reduce the running speed of the equipment and increase the acceleration and deceleration time.
r22uH	Undervoltage warning	Drive undervoltage, lower than 16VDC 1. The supply voltage is low. Instantaneous power failure occurs; 2. The power capacity is insufficient. The supply voltage drops due to the influence of impact current when the main power supply is switched on; 3. Drive failure (circuit failure).	Check the input voltage. 1. Increase the supply voltage capacity and replace the power supply; 2. Connect the power supply correctly according to 4.3 Connection Method of P1 Drive Power Supply; 3. If the above problems are not solved, please contact the manufacturer.
r239E	Non-Q program warning	The drive is running in Q mode, but no Q program is running	1. Check whether there is a Q program; 2. Check whether the working mode is correct. 3. Check whether the Q program is incorrectly written and cannot run circularly.
r24dd	When the motor is not enabled, command it to run and alarm	When the motor is not enabled, the running command is received.	Please enable the motor before sending the running command.

Other common faults are shown below:

Fault Symptom	Cause	Action
The motor moves in only one direction	Loss of direction signal	Find the pulse direction line of the corresponding axis according to the circuit diagram

The spindle drawing sensor is abnormal	Damage to or wrong angle of spindle drawing sensor	Replace the sensor and realign the angle of the sensor
Y-axis is always in sync	Y-axis out-of-sync parameter is incorrectly set	Reset the detection parameters
The doffer does not stop immediately during the return process when pressing the emergency stop button	W-axis return setting is too high	Change the return speed, to a maximum of 400mm/s.
Abnormal sound of stirring motor	Machine seizure, or low current setting	Check whether the machine is seized, and increase the drive current
The stirring motor is not running	No signal or drive failure	Determine the fault according to the rule that the drive's red and green lights blink alternately (the fault is marked on the drive surface). Inspect the control line from PLC to drive.
W-axis fails to move forward when pressing Midway Doff	The guide rail radiating sensor signal is lost	Check whether the sensor has a signal, or the sensor is not radiating the guide rail.
No battery indication	No communication or no parameters configured	The communication cable is damaged, or the Ethernet module parameters are not set.

Part 7 User's Routine Maintenance and Cleaning

7.1 Service Time and Maintenance Methods for Wearing Parts of Doffer

Part Name	Estimated Service Time	Judgment Basis for Replacement	Maintenance Method
Gripping arm rubber gasket	As appropriate	The sag in the yarn gripping part is more than 0.5mm and cannot rebound, and there are many yarns leaking	Replace
Scissors	As appropriate	Yarns cannot be cut off at the blade	Replace
Eccentric wheel	As appropriate	The groove ground on the cam surface is more than 0.2mm, and yarns leak seriously	Replace
Synchronous belt	As appropriate	The teeth are deformed, damaged and incomplete	Replace

7.2 Oiling Parts and Intervals of Doffer

Part Name	Oiling Interval	Maintenance Method
Thread cutter	Weekly	Fill with sewing machine oil or spindle oil

Scissors push rod bearing	Weekly	Fill with sewing machine oil or spindle oil
Push rod copper sleeve	Weekly	Fill with sewing machine oil or spindle oil
Guide wheel	Quarterly	Grease

7.3 Parts to be Cleaned and Cleaning Intervals of Doffer

Part Name	Cleaning Interval	Cleaning Method
Main drive wheel and driven wheel	Simply clean once in each shift	Remove yarns, cotton and other foreign matters entangled on the wheels
Battery position	Simply clean once in each shift	Remove cotton and other foreign matters from this position
Scissors blade	Simply clean once in each shift	Clear the thread ends
Bobbin dropping structure	Simply clean once in each shift	Remove cotton and other foreign matters
Sliding block of XYZ movement module	Simply clean once in each shift	Remove cotton and other foreign matters
Synchronizing wheel of XYZ movement module	Clean the end cover once a week	Open the end cover of the synchronizing wheel and pick out foreign matters such as cotton
Side roller/universal wheel	Simply clean once in each shift	Remove yarns, cotton and other foreign matters entangled on the wheel
Lifting position	Simply clean once in each shift	Remove cotton and other foreign matters

7.4 Parts to be Maintained and Inspected and Maintenance and Cleaning Intervals of Spinning Frame

Part Name	Cleaning Interval	Maintenance Method
Lower guide rail	Inspect every time you sweep the machine	Remove the cotton and other sundries on the lower guide rail, and check whether the screws at each position are loose
Upper guide rail	Inspect every time you sweep the machine	Check whether the screws at each position are loose, whether the track is bent, whether the magnetic point is loose, and whether there are other sundries.
Spindle hook	Inspect every time you sweep the machine	Fix the spindle, and tighten the loose screws
Spindle blade tail yarn	Regular cleaning	Spindle blade tail yarn

7.4.1 If the equipment does not run normally due to improper cleaning and maintenance or improper operation, the Company will provide the paid after-sales service even if it is within the warranty period.

7.4.2 If the protective sheet metal parts for protecting the cutting structure and the cutting motor are bent due to casual collision caused by the doffer's operation, please contact the after-sales service for purchase and replacement in time.

7.5 Maintenance Specification for Intelligent Doffer

7.5.1 The doffer must be serviced by professional electrician and mechanic under the guidance of professional worker.

7.5.2 If the cause for electrical failure cannot be determined, please contact MeMeTech in time. Professional personnel will provide guidance for maintenance, and electrical maintenance and wiring operation shall not be carried out blindly.

7.5.3 Any electrical equipment shall be deemed to be charged before confirming that it is uncharged.

7.5.4 In case of two consecutive trips or fuse disconnection, it is necessary to find out the reason before power-on.

7.5.5For electric safety, batteries shall not be charged in the workshop. Charging area shall be set up in the room, kept away from combustible materials and provided with fire extinguishers (water base fire extinguishers).

7.5.6 The doffer shall be maintained regularly, the universal wheel shall be cleaned, and the scissors shall be oiled regularly and properly to avoid getting oil into the cutting motor and causing the motor to be burnt out.

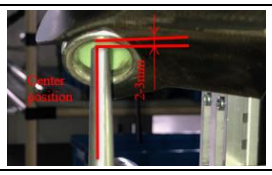
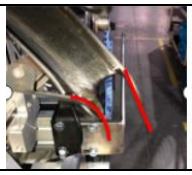
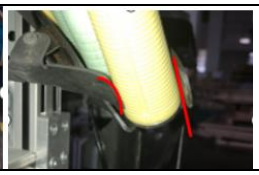
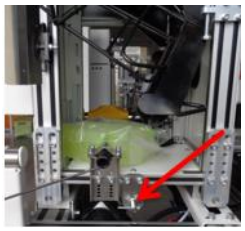
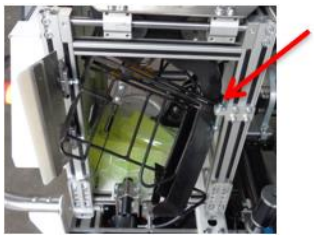
7.5.7 Do not clean the electrical parts of the doffer with air source to prevent water vapor from entering the circuit board.

7.5.8 Doffer shall be stored in dry place during holidays. Proper rain and moisture protection measures shall be taken.

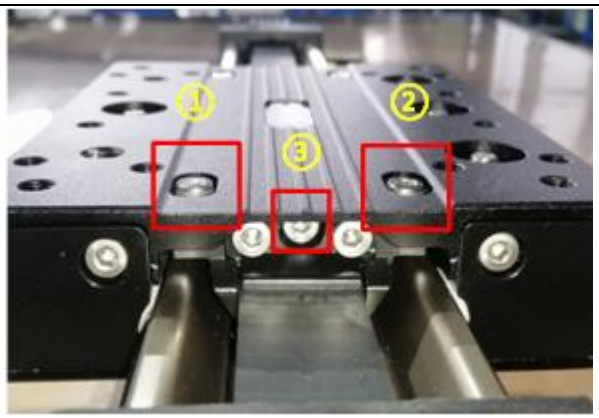
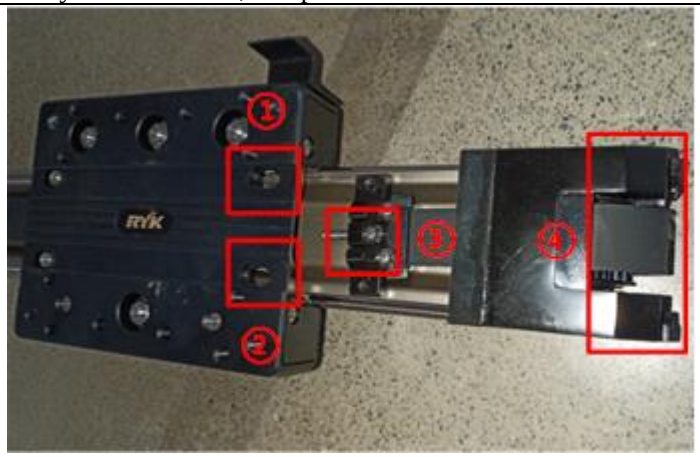
7.5.9 Mechanics and electricians shall maintain the doffing robot every half a month, tighten the mechanical screws and the wires on the terminals in the electrical cabinet to avoid loose screws or poor electrical wire contact.

Part 8 Special Tutorials

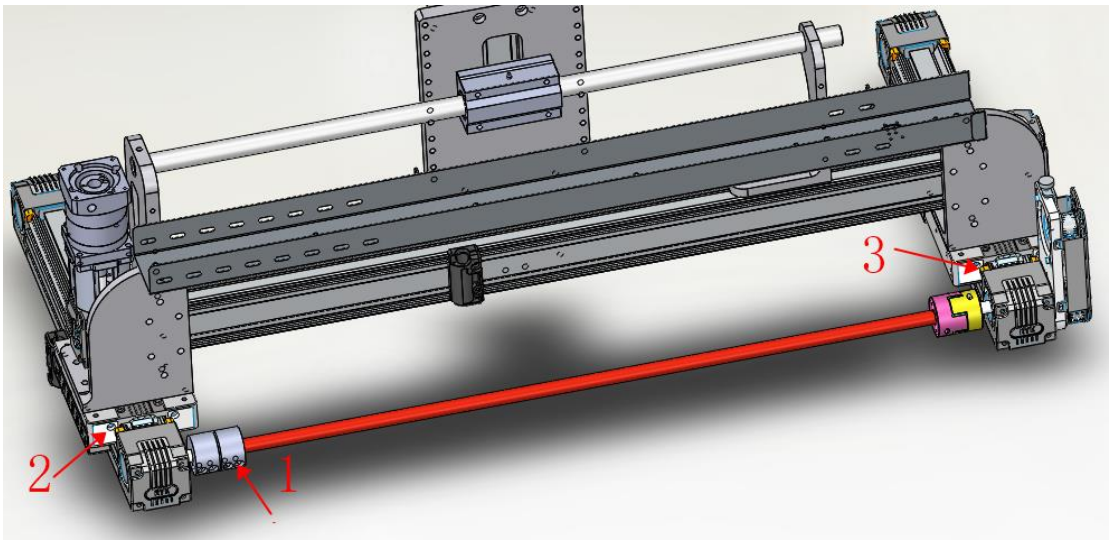
8.1 Debugging Methods and Standards for Bobbin Tubes

<table>
<tr><td rowspan="6">Steel spindle blade</td><td rowspan="3">Bobbin outlet</td><td>  </td><td colspan="2">   </td></tr>
<tr><td>Adjustment standards for bobbin outlet position:
1. The spindle tip is 2-3mm from the inside edge of the bobbin orifice;
2. Adjust the spindle tip to the center of the bobbin orifice;</td><td colspan="2">Adjustment standards for tightness of bobbin outlet:
1. The upper baffle piece of the torsion spring seat and the bobbin tube shall be adjusted to be tangent to the center of the bobbin, and the torsion spring seat shall be adjusted to the position below the center of the bobbin and roughly parallel to the bobbin. After previous bobbin is pulled out by hand, the next bobbin can fall to the same position of the previous one;
2. Adjusting tool: the adjustable wrench can be used to bend the torsion spring seat and the upper baffle piece of the bobbin tube;
3. Inspection method: the bobbin does not drop by beating the bobbin tube by hands, the bobbin is hung smoothly and not held back after getting on, indicating that the clamping force of the torsion spring seat at the bobbin outlet is appropriate;</td></tr>
<tr><td colspan="2"> 
Figure 1 (Inner and outer positioning adjusting screws)</td><td colspan="2"> 
Figure 2 (Upper and lower positioning adjusting screws)</td></tr>
<tr><td colspan="4">Adjustment method for position relations of bobbin outlet:
1. Adjust the inner and outer position relationship between the bobbin outlet of the bobbin tube for the doffing robot and the spindle using the adjusting screw as shown in Figure 1;
2. Adjust the upper and lower position relationship between the bobbin tube and the spindle for the doffing robot using the adjusting screw as shown in Figure 2;</td></tr>
<tr><td rowspan="2">Upper retaining hook</td><td>  </td><td rowspan="2" colspan="2">Adjustment standards for upper retaining hook:
1. Use an inverted bobbin discharged by the bobbin tube. This inverted bobbin is discharged to the torsion spring of the upper retaining hook, as shown in the picture on the left. There should be a gap of 0.5mm-1mm between the upper retaining hook and the bobbin, so that the inverted bobbin can be discharged smoothly. If the gap is more than 0.5mm-1mm, it is difficult to straighten the bobbin when hanging the spindle, which will affect the bobbin to fall the spindle. If the gap is less than 0.5mm-1mm, the torsion spring of the upper retaining hook easily blocks the inverted bobbin, resulting in seizing.
2. Bend the upper retaining hook by hands. If both hands cannot adjust it to the standard position, use a vice to assist adjustment.</td></tr>
<tr><td>  </td></tr>
<tr><td rowspan="2">Stop piece</td><td>  </td><td colspan="2">Adjustment standard for stop piece:
Discharge the bobbins inside the bobbin tube, and a bobbin is damped at the stop piece when falling freely to the inlet of the bobbin tube. When the second bobbin is placed, the first bobbin is discharged smoothly, and the second bobbin is damped by into the stop piece;</td></tr>
<tr><td>  </td><td colspan="2">1. A bobbin can be discharged freely to the bobbin outlet, indicating that the stop piece is overbent downward and needs to be inched upward to the state that a bobbin cannot be discharged;
2. If the first bobbin cannot be discharged normally when the second bobbin is placed, it is necessary to bend the stop piece downward to adjust until the first bobbin can be discharged normally and the second bobbin is damped;</td></tr>
<tr><td>Bobbin tube channel</td><td>  </td><td colspan="2">When the doffer is used to doff different varieties of yarns, it is necessary to manually place the yarns of the next color in the bobbin tube in advance after fully discharging the yarns of the last color, so as to avoid no bobbin in the bobbin tube and prevent bobbins from being discharged from the bobbin box directly, resulting in bobbin seizing in the channel. If the previous stack of bobbins is used up in the channel, manually place bobbins in the channel to doff the next stack.</td></tr>
</table>

8.2 Tensioning, Cleaning and Replacement of Module Synchronous Belt

Tensioning	 Loosen screws at 1 and 2, and turn screws at 3 clockwise to tension the synchronous belt. The tensioning method is the same at both ends. Then tighten screws at 1 and 2.
Cleaning	  Remove the four screws on the end cover of the module, remove the end cover to expose the synchronous belt, and pick out the cotton wool and other foreign matters inside it.
Replacement	 1. Remove the screws at 1, 2 and 3 to take out the locking block of the synchronous belt. Then disassemble the locking block at 3 to separate the synchronization belt from the locking block; 2. The disassembly method of the other end is the same as Step 1. After both ends of the synchronous belt are separated from the locking block, the synchronous belt can be pulled out. For the convenience of pulling out, the end cover at 4 can also be removed. 3. Connect the new synchronous belt along the synchronizing wheel and the profile of the module, lock the locking block with both ends of the synchronous belt and then install it on the sliding block, and adjust the tension.

8.3 X-axis Synchronization Adjustment Method



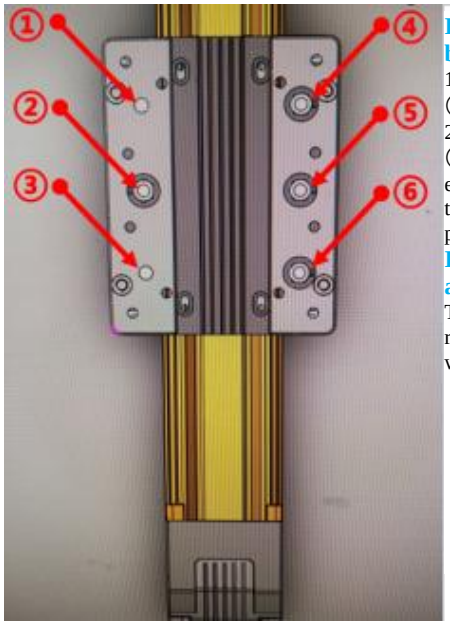
①Loosen the screws at the position 2 of the coupling device;

②Pull Y-axis to make the sliding blocks at the positions 2 and 3 of the X-axis close to the end face of the synchronizing wheel seat of the X-axis. If it is not in place by pulling, repeat several times.

③After performing Step ②, keep the sliding blocks still, and then lock the screws at the position 1 of the coupling device.

④If the X-axis is still out of sync soon after adjustment according to the above steps, check whether there is cotton stuck in the synchronous belt. If any, clean it; or check the inner hole of the coupling for wear failure. In case of wear failure, replace the coupling.

8.4 Tightening Method of Shaft Roller



I. Gap adjustment method of module sliding block:

1. Tighten the screws of the positioning wheels ① and ③ on the sliding block;
2. Adjust the screws of the four eccentric wheels ②, ④, ⑤ and ⑥ to adjust the gap between the four eccentric wheels and the optical axis on both sides of the module to be consistent with that between the positioning wheel and the two sides of the module.

II. Reasonable judgment criteria for gap adjustment:

The does not swing to the left and right, the reciprocating movement of the sliding block is smooth without shaking and seizure.

8.5 Instructions for Use of Hydraulic System

Warning! Do not remove the oil pipe joint while the hydraulic motor is working. Doing so could result in a risk of high-pressure oil injection.

8.5.1 Adjustment Method for Insufficient Lifting Force

If you feel that the thrust of the hydraulic cylinder is not enough, open the plug screw of the pressure regulating valve for the valve block A, and then adjust the manual pressure regulating valve with an Allen wrench. Adjust clockwise, and the pressure increases, which means that the thrust increases; adjust counterclockwise, and the pressure decreases. You should adjust by 1/4 turn once and can adjust for several times until the design thrust is reached. If the tension of the actuator is not enough, open the plug screw of the pressure regulating valve for the valve block B and adjust the manual pressure regulating valve with an Allen wrench. The principle is the same as the above.

8.5.2 Inspection and Solution of Oil Leaks

When oil leak occurs in the hydraulic system, first wipe the oil stains on the surface, and start the motor to observe which part leaks oil. The judgment method is as follows:

(1) If the oil leak is caused by the untightened joint, tighten the screw.

(2) If the oil leak is caused by the missing or damaged joint seal, it is necessary to open the screw or

plug at the oil leak to replace and install the seal.

(3) If the oil leak is caused by the parts or thread damage resulting from impact and scraping, replace the corresponding parts.

8.5.3 Oil Method of Hydraulic Pump

If the hydraulic cylinder cannot rise to the top, it means that the hydraulic oil in the tank is not enough. It is necessary to fill the tank with oil first. The specific operation steps are as follows:

(1) Retract the piston rod of the hydraulic cylinder to the end.

(2) Put the hydraulic pump in the vertical position.

(3) Open the screws for the oil filler and the air vent.

(4) Add oil to the filling orifice with a syringe until there is oil overflowing, and then install the screw and tighten it.

(5) Make the piston rod of the hydraulic cylinder upward, restart the motor and extend the piston rod to make the hydraulic cylinder rise, and turn off the power supply until the piston rod is extended fully.

(6) Make the piston rod downward, start the power supply to make the piston rod retracted, and turn off the power supply until the piston rod is retracted fully.

(7) Repeat Step E/F four to five times, repeat Step A/B/C/D once to exhaust after all air in the hydraulic cylinder and oil pipe returns to the tank, and then the hydraulic system can be used normally.

If it cannot be resolved, return to the factory for solving.

8.5.4 Selection of Hydraulic Oil

Under normal circumstances, 46# anti-wear hydraulic oil is usually used in the hydraulic system. 68# anti-wear hydraulic oil should be used in high temperature areas or environments. Because of excellent flash point and pour point, it does not easily become thin in the high temperature areas. Thinning of oil will lead to insufficient pressure. 32# low condensation anti-wear hydraulic oil should be used in cold areas or environments. It does not easily bond in low temperature environments. Bonding will cause the failure of the hydraulic system and the burning of the motor. It is recommended that 15# low condensation anti-wear hydraulic oil be used in extremely cold places.

8.5.5 Replacement of Hydraulic Oil

Hydraulic oil has a certain service interval. When you buy the product from the factory and use it, we recommend that you replace the hydraulic oil every 600h.

The operation method is as follows:

(1) Retract the piston rod.

(2) Unscrew the oil filler breather.

(3) Pour out the waste oil with the oil filler downward.

(4) When replacing with new hydraulic oil, fill oil to 80% of the tank volume as the length of the tank varies.

(5) Finally install the breather.

8.5.6 Replacement of Oil Pipe

Remove the faulty oil pipe, fill the oil pipe with oil, connect the hydraulic cylinder, the oil pipe and the hydraulic pump, and then exhaust air from the hydraulic system.

8.5.7 Precautions for Use

(1) The piston rod and the whole hydraulic system cannot bear the radial force, and its structure is only suitable for vertical force; otherwise, the hydraulic system will be damaged;

(2) The service life of the brush motor has certain limitations, which will depend on the operating frequency. If the frequency is higher, the carbon brush will be worn faster.

8.5.8 Common Fault Diagnosis and Troubleshooting Methods

(1) If the piston rod automatically slides in the static state of the actuator, it indicates that the hydraulic control one-way valve is faulty. The hydraulic control one-way valve is composed of lifting pin, spring, plug screw and other parts. When the spring pressure is more than the pressure of the relief valve, the lifting pin is close to the oil hole of the valve block under the action of the spring, so that the oil hole is blocked, so as to achieve the purpose of one-way locking. If there are impurities in the hydraulic oil, the impurities may just be stuck between the lifting pin and the oil hole, so that it cannot be completely closed, resulting in hydraulic oil leakage, and the piston rod will not be locked and fall.

Solution:

a. Extend and retract the piston rod back and forth to push impurities out of the lifting pin, but the same phenomenon may occur again after a period of time;

b. Replace the hydraulic oil.

(2) Analysis and solution for piston rod’s failure to extend:

a. The motor does not work due to circuit failure. Check the circuit failure;

b. The motor is damage. Replace the motor;

c. The brushless motor driver is faulty and damaged. Replace the driver;

d. The pressure set by the pressure regulating valve is insufficient. Adjust the pressure appropriately according to the operation instructions in Item 1;

e. The hydraulic oil in the tank is insufficient. Refer to operation instructions in Item 3 to replenish the hydraulic oil;

f. There are impurities in the hydraulic oil, which may be stuck in the throttle hole, the lifting pin of the pressure regulating valve, the steel ball of the oil suction check valve, the oil pump inlet and other parts. Disassemble the control valve block assembly and clean it with gasoline, and then reassemble it (with the cooperation of the manufacturer's technical personnel);

g. The reversing piston seal is damaged. Replace the seal;

h. The gear pump is damaged to result in no thrust. Replace the gear pump;

i. The hydraulic oil is frozen or thick due to too low ambient temperature, which will seriously affect the normal use of the hydraulic system. It is recommended to replace the antifreeze hydraulic oil.

(3) Causes for failure to fall:

a. The low-pressure relief valve has impurities or is stuck. Dismantle the low-pressure relief valve to remove impurities;

b. The reversing piston seal ring is damaged. Replace the seal;

c. The quick pressure relief piston seal ring is damaged. Replace the seal;

d. The throttle valve is blocked. Dismantle the throttle valve to remove impurities;

e. The solenoid valve fails. Replace the solenoid valve;

f. Oil pump failure, etc.

(4) Causes for failure to rise:

a. The high-pressure relief valve has impurities or is stuck. Dismantle the high-pressure relief valve to remove impurities;

b. The reversing piston seal ring is damaged. Replace the seal;

c. The quick pressure relief piston seal ring is damaged. Replace the seal;

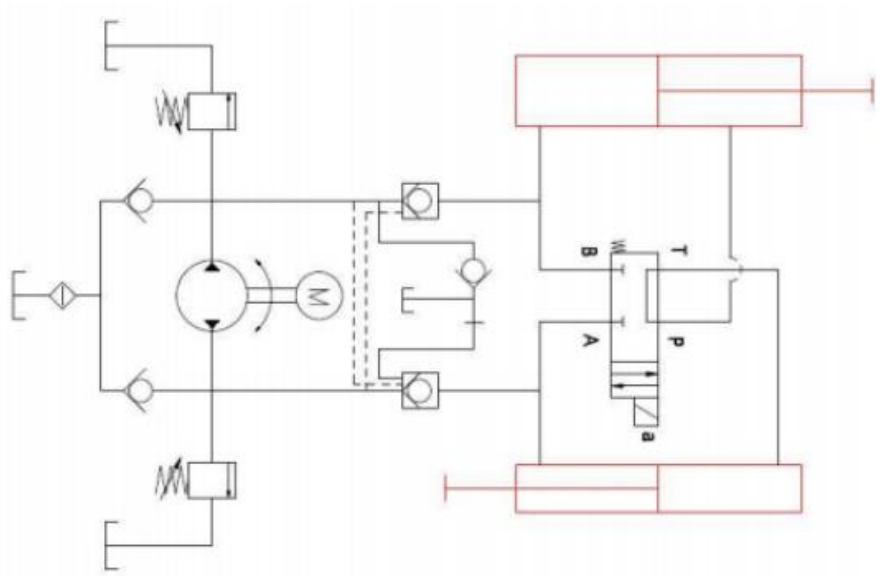
d. The throttle valve is blocked. Dismantle the throttle valve to remove impurities;

e. The solenoid valve fails. Replace the solenoid valve;

f. Oil pump failure;

g. Insufficient hydraulic oil, etc.

8.5.9 Schematic Diagram for Hydraulic System



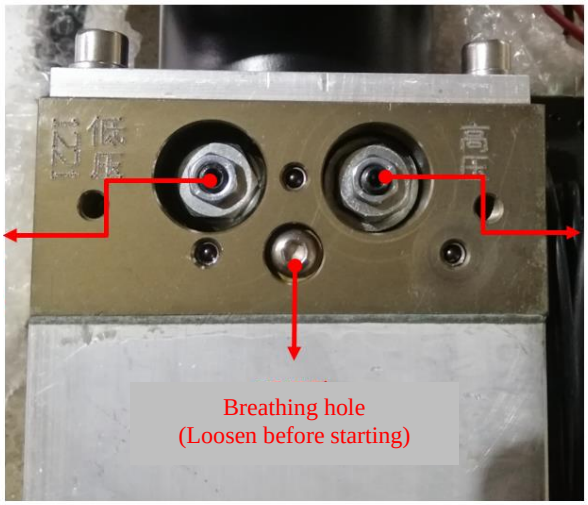
8.5.10 Illustration for Hydraulic System

Low pressure regulation:
lowering speed control

①. Loosen the nut

②. Turn the set screw clockwise to tighten

③. Turn the set screw counterclockwise to loosen



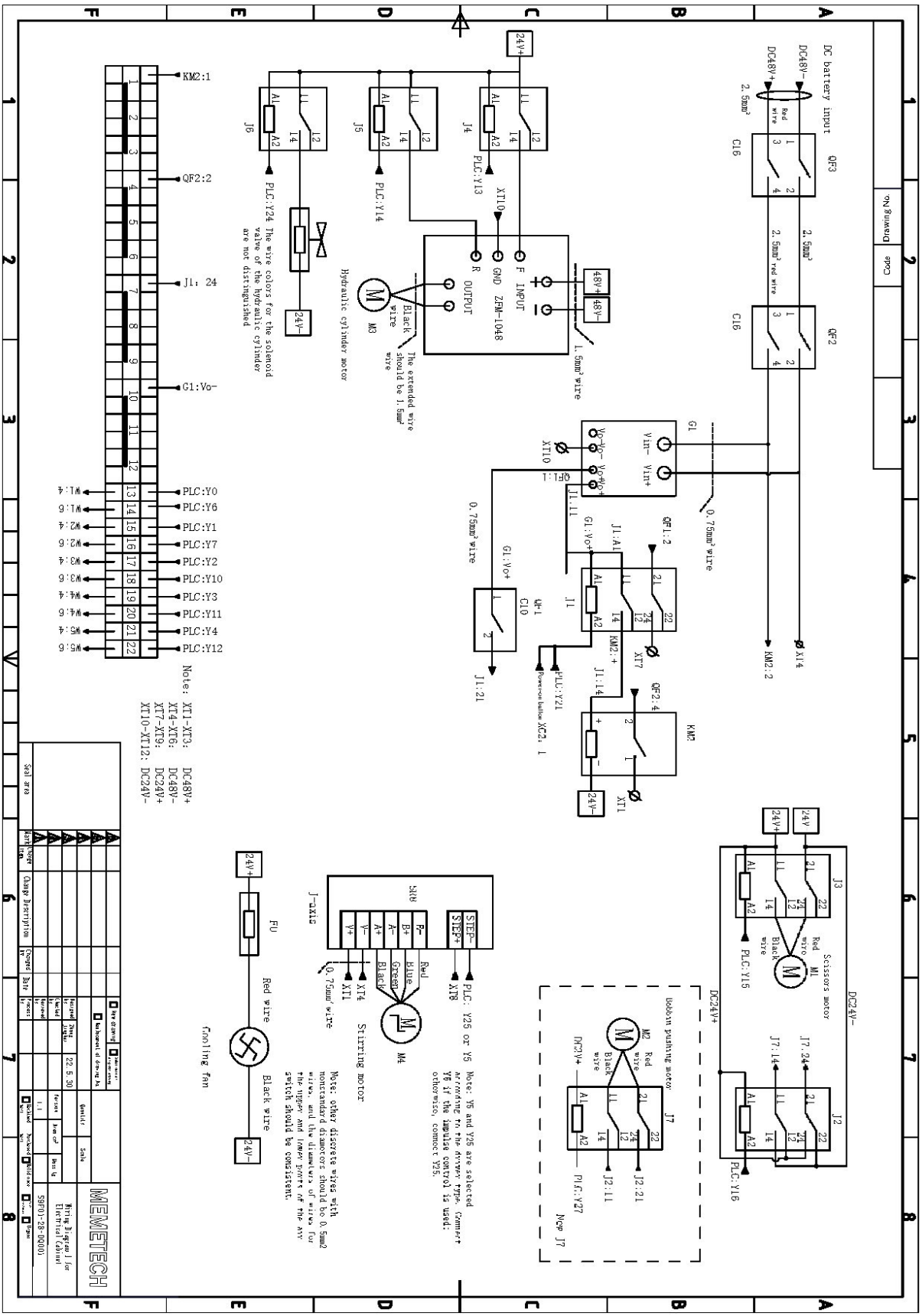
High pressure regulation:
lifting speed control

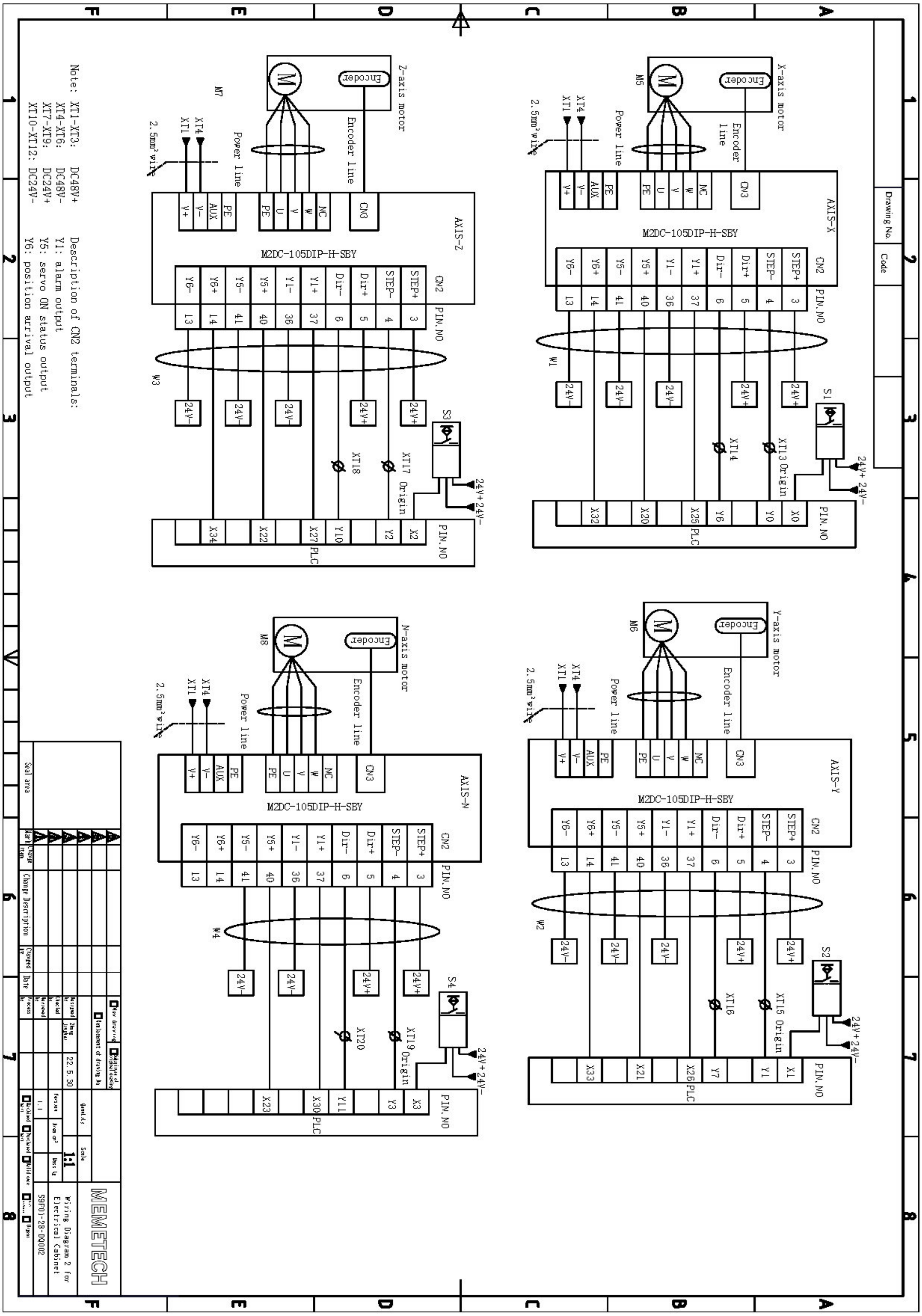
①. Loosen the nut

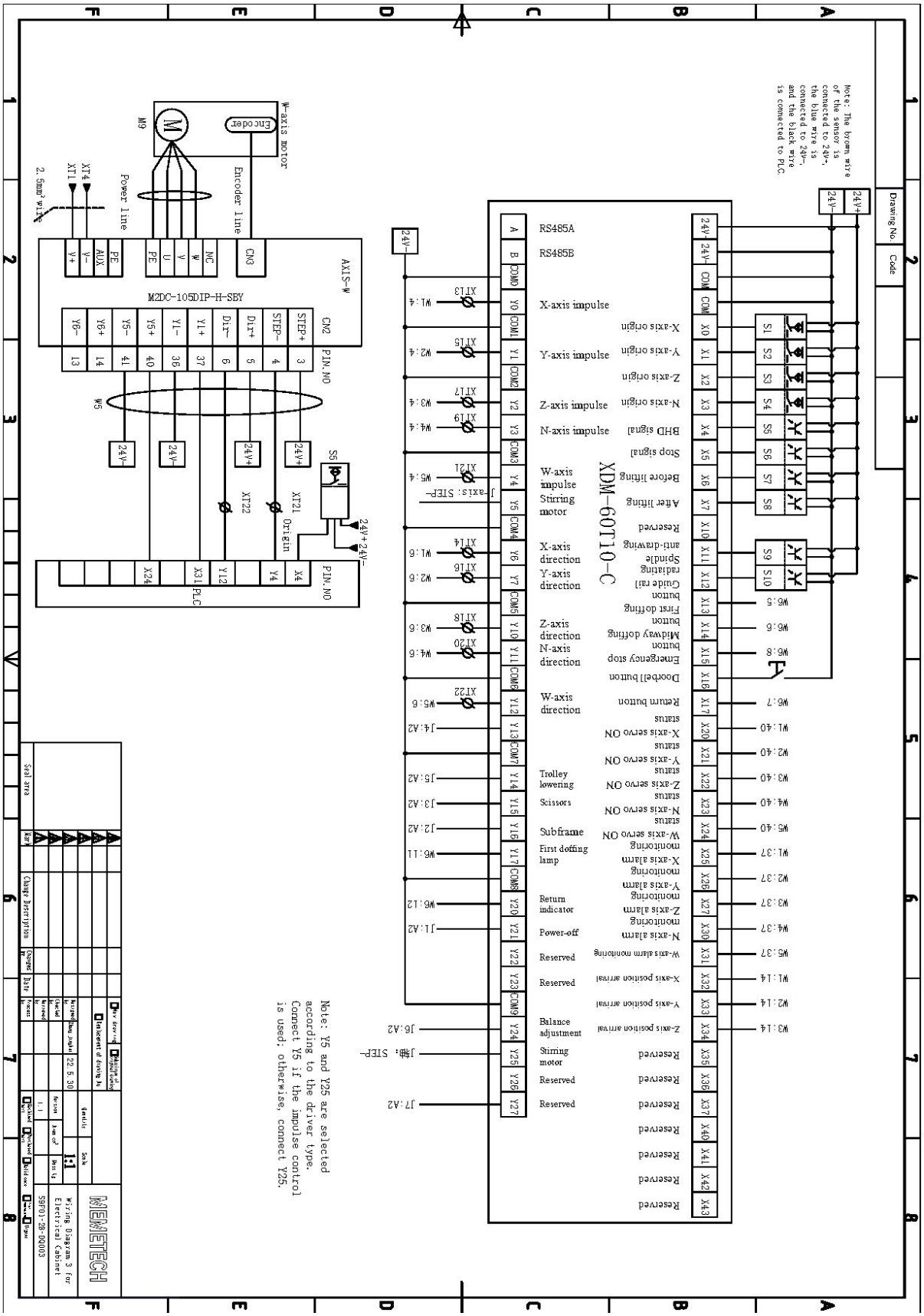
②. Turn the set screw clockwise to tighten

③. Turn the set screw counterclockwise to loosen

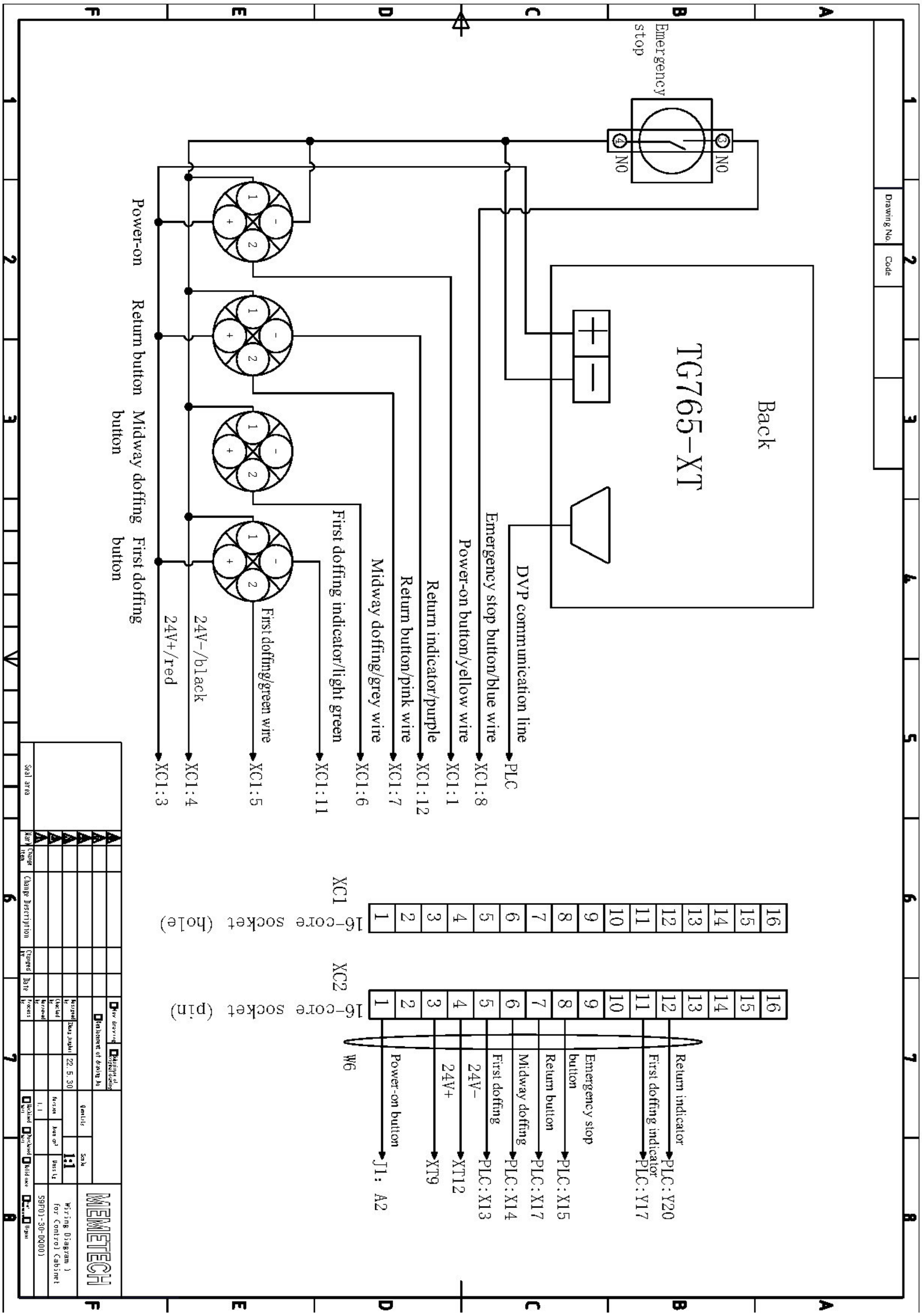
Appendix 1: Wiring Diagrams of Doffer




X-axis motor
Y-axis motor
Z-axis motor
N-axis motor
M2DC-105DIP-H-SBY
MEMETECH
Wiring Diagram 2 for Electrical Cabinet
S9F01-28-D0002

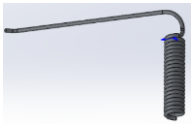
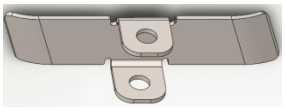
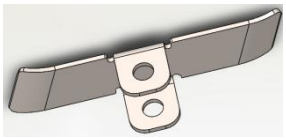
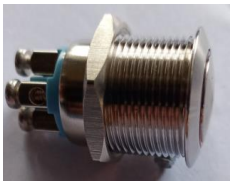

W-axis motor
Encoder
M9
Encoder line
Power line
2.5mm² wire
XT4
XT1
M2DC-105DIP-H-SBY
CN2
CN3
PIN NO
W5
XT13
XT15
XT17
XT19
XT21
XT22
XT14
XT16
XT18
XT20
XT12
S6
Origin
PLC
XDM-60T10-C
RS485A
RS485B
X-axis impulse
Y-axis impulse
Z-axis impulse
N-axis impulse
W-axis impulse
Stirring motor
X-axis direction
Y-axis direction
Z-axis direction
N-axis direction
W-axis direction
Trolley lowering
Scissors
Subframe
First doffing lamp
Return indicator
Power-off
Reserved
Balance adjustment
X-axis origin
Y-axis origin
Z-axis origin
N-axis origin
BHD signal
Stop signal
After lifting
Before lifting
Anti-drawing
Spindle radiating
Guide rail button
First doffing button
Midway doffing button
Emergency stop button
Doorbell button
Return button
X-axis servo ON status
Y-axis servo ON status
Z-axis servo ON status
N-axis servo ON status
W-axis servo ON monitoring
X-axis alarm monitoring
Y-axis alarm monitoring
Z-axis alarm monitoring
N-axis alarm monitoring
W-axis alarm monitoring
X-axis position arrival
Y-axis position arrival
Z-axis position arrival
Note: The brown wire of the sensor is connected to 24V+, the blue wire is connected to 24V-, and the black wire is connected to PLC.
Note: Y5 and Y25 are selected according to the driver type. Connect Y5 if the impulse control is used; otherwise, connect Y25.
Drawing No.
Code
Wiring Diagram 3 for Electrical Cabinet
MEMETECH

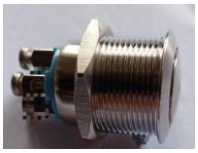
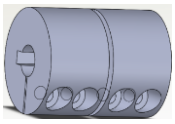
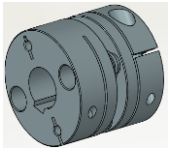
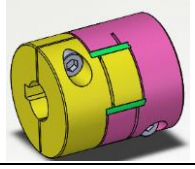
MeMeTech

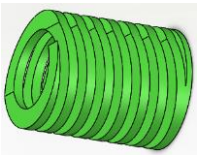
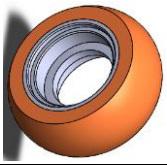
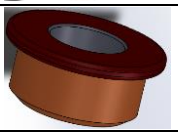


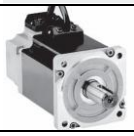
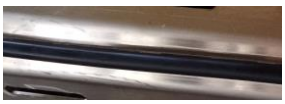
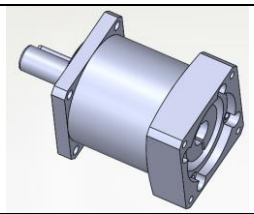
Emergency stop
NO
NO
Back
TG765-XT
DVP communication line
Emergency stop button/blue wire
Power-on button/yellow wire
Return indicator/purple
Return button/pink wire
Midway doffing/grey wire
First doffing indicator/light green
First doffing/green wire
24V-/black
24V+/red
PLC
XC1:8
XC1:1
XC1:12
XC1:7
XC1:6
XC1:11
XC1:5
XC1:4
XC1:3
Power-on
Return button
Midway doffing button
First doffing button
XC1
16-core socket (hole)
XC2
16-core socket (pin)
W6
Return indicator
First doffing indicator
Emergency stop button
Return button
Midway doffing
First doffing
24V-
24V+
Power-on button
PLC:Y20
PLC:Y17
PLC:X15
PLC:X17
PLC:X14
PLC:X13
XT12
XT9
J1: A2
MEMETECH
Wiring Diagram 1 for Control Cabinet
59F01-30-00001
1:1
22.5.30

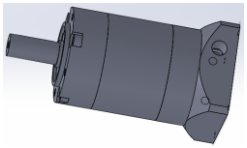
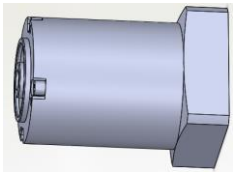
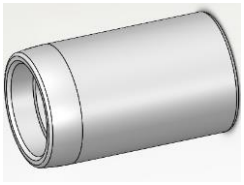
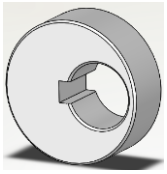
Appendix 2: Table of Material Specifications

No.	Code	Name	Specification	Legend
1	8010120123	Buffer wire	YS-S9F02-33-JG001	
2	8010120124	Buffer wire	YS-S9F01-33-JG001	
3	2010300348	Upper retaining hook A of bobbin tube, right	S9A330-15AR	
4	2010300350	Upper retaining hook A of bobbin tube, left	S9A330-15AL	
5	2010300463	Torsional spring seat of bobbin tube, right	S9E02-37-JG003-V01	
6	2010300464	Torsional spring seat of bobbin tube, left	S9E01-37-JG006-V01	
7	2010300466	Torsional spring of delivery tube	S9E01-37-JG008-V01	
8	317020003	Tension spring of bobbin tube	S9A320-01-29	
9	3010500016	Emergency stop button	YW1B-V4E10R	
10	3010500023	Metal button	19mm, reset, DC24V, red, 4-leg	

11	3010500022	Metal button	19mm, reset, DC24V, 2-leg	
12	3012000033	Normally open contact	YW-E10	
13	2010204360	Stop piece	S9320-06	
14	8010118644	Opposite flange type linear bearing	KCMH-8	
15	8010120288	Linear bearing	LMH16AUU	
16	8010125208	Two-side flange cutting type oilless bushing	MPTNZ30-40-GZ	
17	3050600007	Elastomer	GS14	
18	8010118228 （8010122880）	Scissors (High carbon steel scissors)	46*38.5 Original alloy blade （OJ-Q02 45x38）	
19	8010122978	Rigid coupling	GX4050-d12k5-d14k5	
20	8010122948	Diaphragm coupling	CS-39X34.5-12K5-14K5	
21	8010122980	Plum coupling	CFC40x45-12K5-14K5	

22	8010120505	Rectangular helical spring	TMY24.5-30	
23	8010121923	Rectangular helical spring	TF30-150	
24	2010206141	Fixed pressure spring of bumper bar	S9E01-20-JG003-V01	
25	3120100283	Upper guide rail cleaning brush	S9C605-01A	
26	2010100295	Wheel body	S9E01-18-JG016-V01	
27	2010100341	Friction guide wheel D	S9E01-11-JG001-V01	
28	2010700481	Dustproof brush for control cabinet	S9E01-35-JG008-V01	
29	8010119334	Flange bearing	F694ZZ	
30	3150700011	Tapered roller bearing	GB297-32904-20x37x12	
31	3150400086	Deep groove ball bearing	GB276-695ZZ-5x13x4	At stirring connecting rod
32	3150400003	Water-sealed bearing	S6002-2RS	Universal wheel
33	3150400057	Deep groove ball bearing	626Z-6x19x6	At gripper push rod
34	3150400115	Deep groove ball bearing	BCA-A15-D28-B7	At eccentric wheel of scissors motor
35	8010124044	Deep groove ball bearing	BCA-A12-D18-B4	Under eccentric wheel of scissors motor
36	3150400089	Deep groove ball	GB276-698ZZ-8x19x6	At stirring vibrating

		bearing		positions
37	8010122951	Synchronous belt (X-axis)	S5M-21 Width-1000MM	
38	8010122949	Synchronous belt (Z-axis)	S5M-21 Width-1100MM	
39	8010122950	Synchronous belt (Y-axis)	S5M-21 Width-2000MM	
40	8010123388	Enclosed synchronous belt	3M15 Width-306mm	At X/Z motor
41	3010600092	Scissors motor		
42	8010120688	Forward/backward motor of subframe		
43	3010600070	X/Y/Z/W/N-axis motor		
44	3010900043	X/Y/Z/W/-axis motor driver		
45	3010600069	Stirring motor		
46	8010123295	Stirring motor driver		
47	8010120281	Proximity switch		X/Y/Z/N-axis detection sensor
48	8010120403	Photoelectric sensor		Walking yarn gripping detection sensor
49	8010120670	Photoelectric sensor		Guide rail radiating detection sensor
50	3010300071	Anti-trap strip (at scissors)		
51	8010119211	Reducer (at X/Y/Z)		

52	8010121619	Reducer (at drive wheel)		
53	8010120361	Reducer (at gripper)		
54	8010126039	Side roller	YS-S9F01-08-JG006-V02	
55	8010123151	Eccentric wheel	YS-S9F01-16-JG014-V09	
56	8010124195	Rubber gasket for front gripper arm	YS-S9F01-16-JG302-V07	Rubber strip for front gripper arm
57	8010124193	Rubber gasket for rear gripper arm	YS-S9F01-16-JG303-V07	Rubber strip for rear gripper arm
58	8010120251	Moving gripper arm	YS-S9F01-16-JG002-V07	Rear gripper arm
59	8010120250	Fixed gripper arm	YS-S9F01-16-JG001-V07	Front gripper arm

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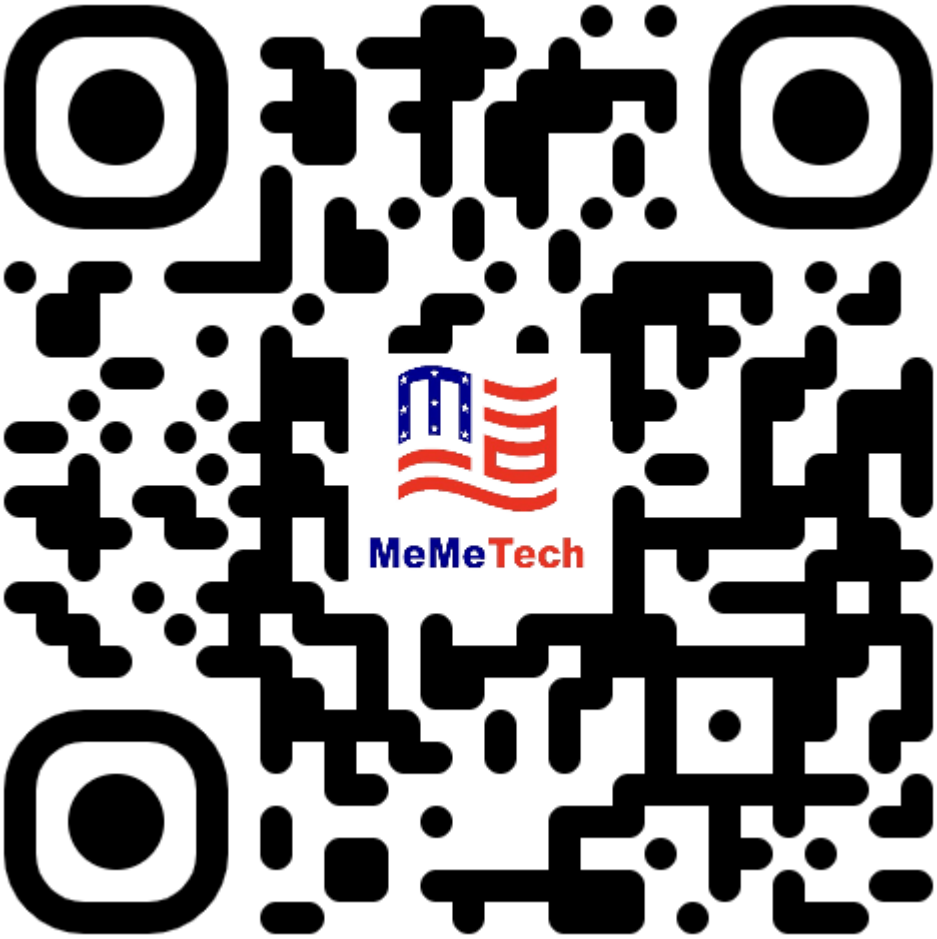

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