

Shanghai Fushan Precision Machinery Technology Co.
user's manual

Products involved: HAT-K5D [Automatic rubber band splicing machine

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Fully automatic butt rubber band machine

user's manual

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directory (on computer hard drive)

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Fully automatic butt rubber band machine

 *Please read the following carefully before using this product.*

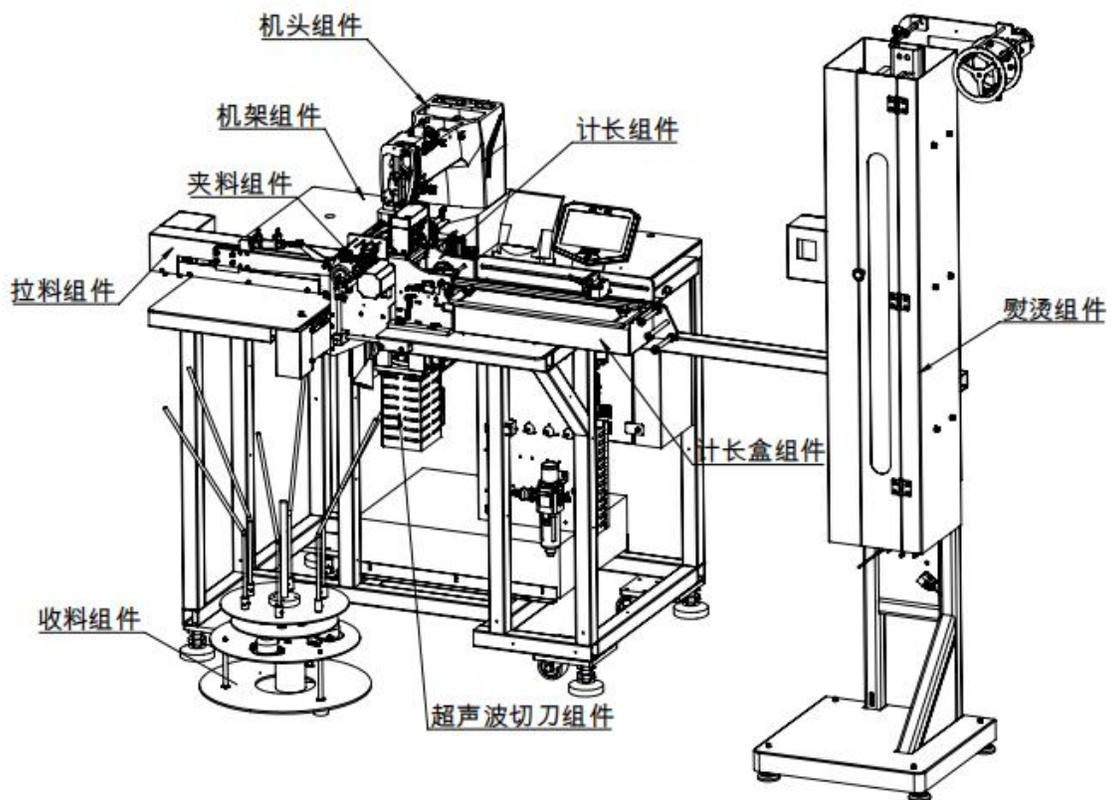
Product Performance Indicators

Fully automatic butt rubber band machine performance index			
	sports event	realm	norm
Process Indicators	Types of rubber bands	Marked, unmarked	
	stitch	Butt seams, overlapped seams	
	Stitch form	single-needle flat-seam stitch	
	Maximum rubber band width	50mm	HAT-K5D-C50YSL 8-50mm standard HAT-K5D-L50YSL 8-50mm option
	Minimum rubber band width	8mm	
	Minimum rubber band length	180mm	
	Ironing function	automatic switch	
	Take-up function	automatic switch	
	operating mode	unmarked one-part multistage multi-symbol	
	Cutting method	Ultrasonic knife, cold knife	optional
	Point Pen Function	automatic switch	optional
	Maximum sewing speed	3000r/min	
	System parameterisation	Gauge range	0.3 to 12.7 (mm)
Gauge Resolution		0.1(mm)	
Support panel programme upgrade method		USB flash drive	
touchscreens		7-inch touch colour screen	
Type of disconnection detection		digital encoder	
Power supply voltage range		220V/50HZ± 10%	
rating		0.5KW	
Working environment		0°C~45°C	

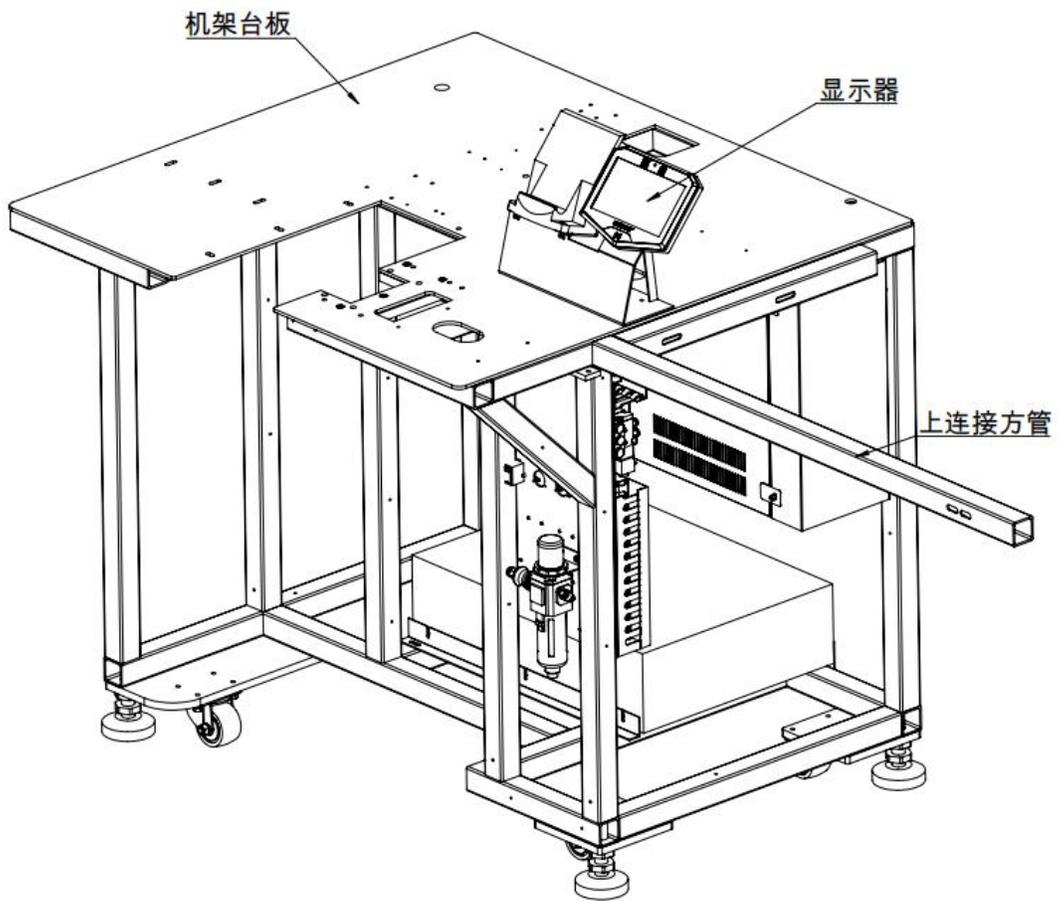
temperature		
Working environment humidity	35% to 95% (no condensation)	
Rated air pressure	Equal to or greater than 0.5MPa	
gas consumption	60 (L/MIN)	
Pneumatic components	AIRTAC	
Operating Atmospheric Pressure	86kPa~106kPa	

Component Description

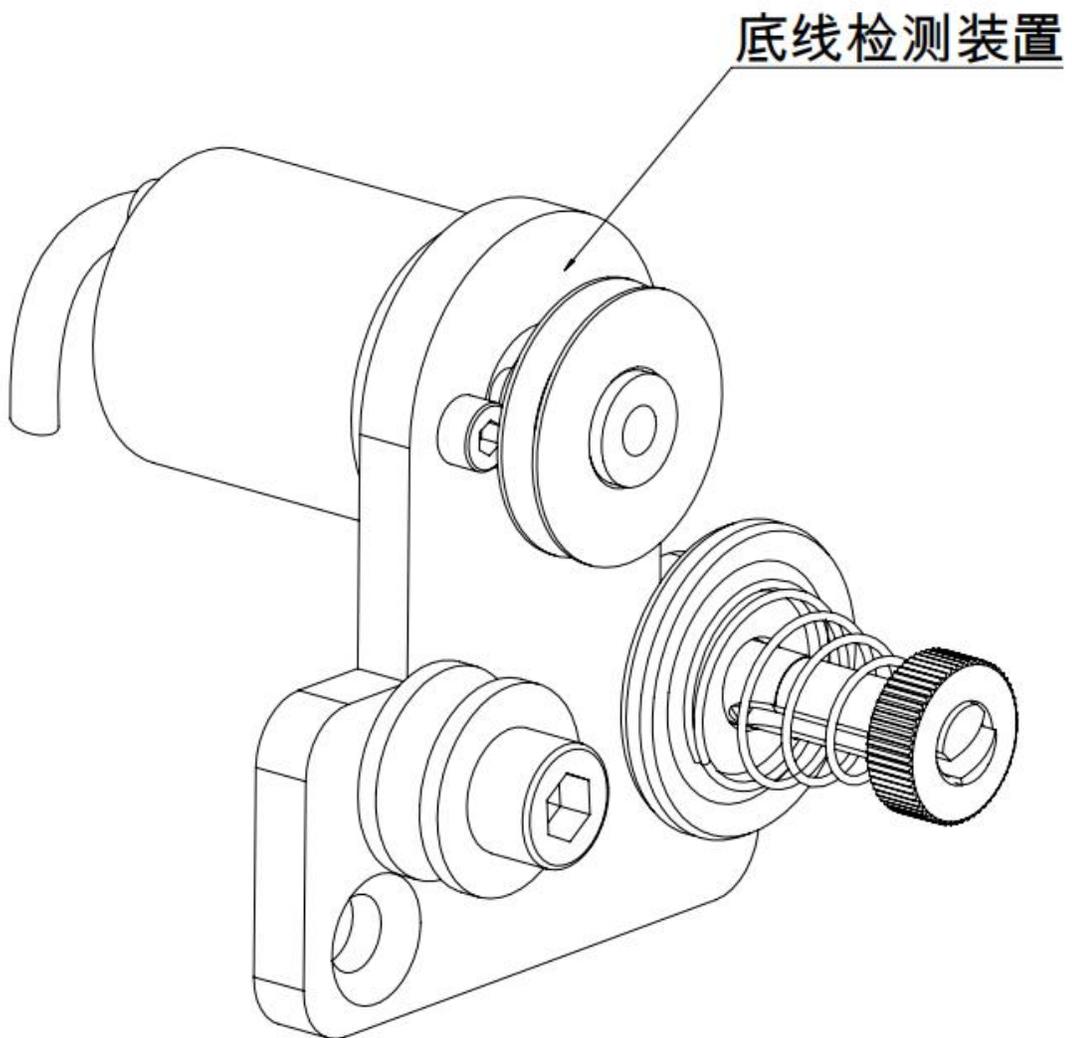
Ra Component Description



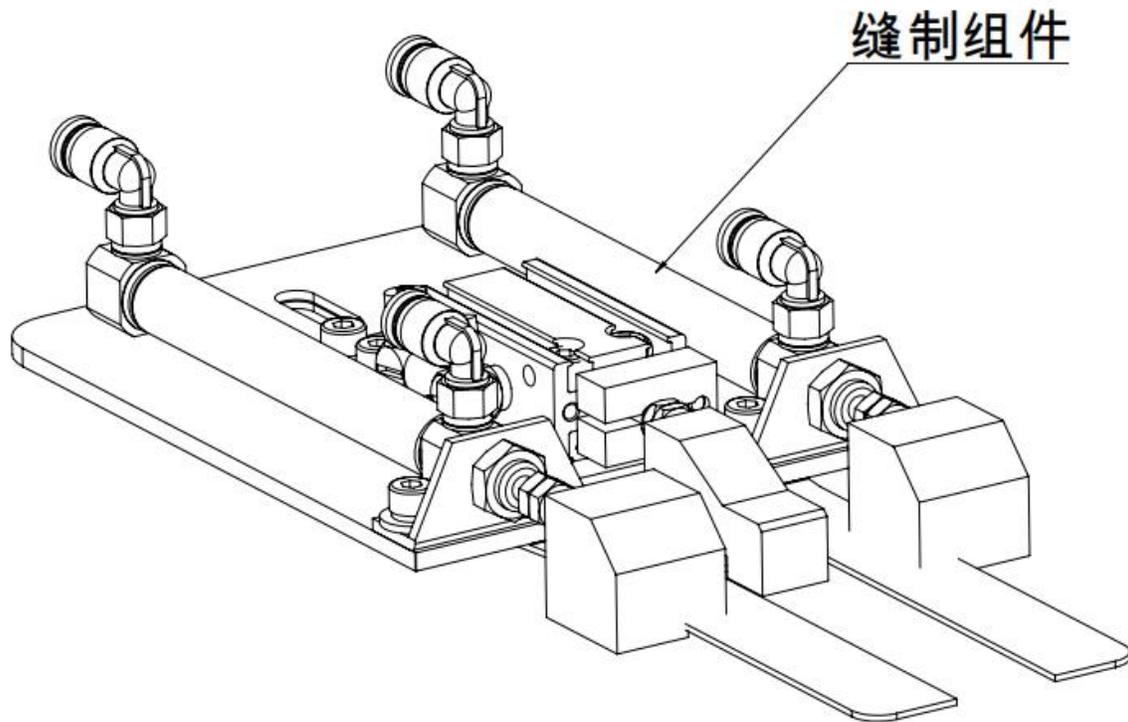
Rack components



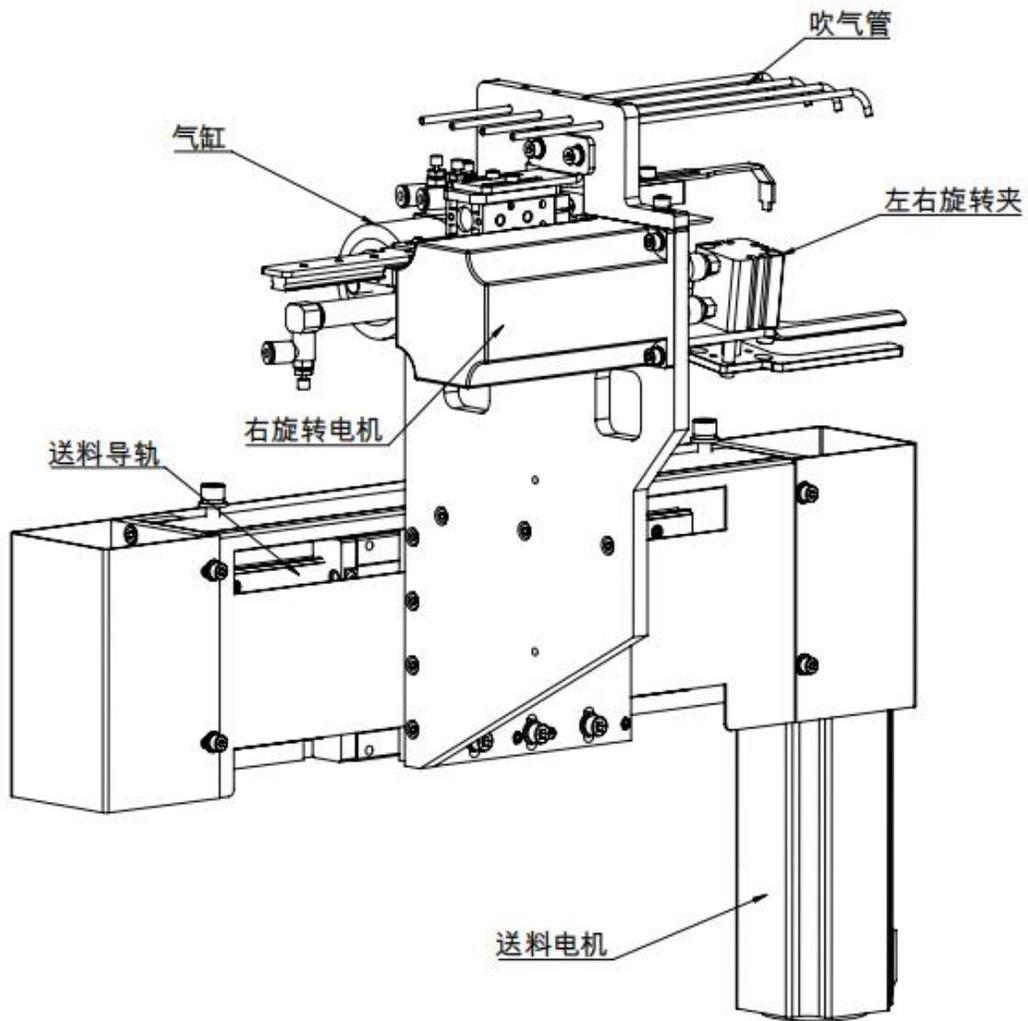
Bottom Line Detection Components



sewing group

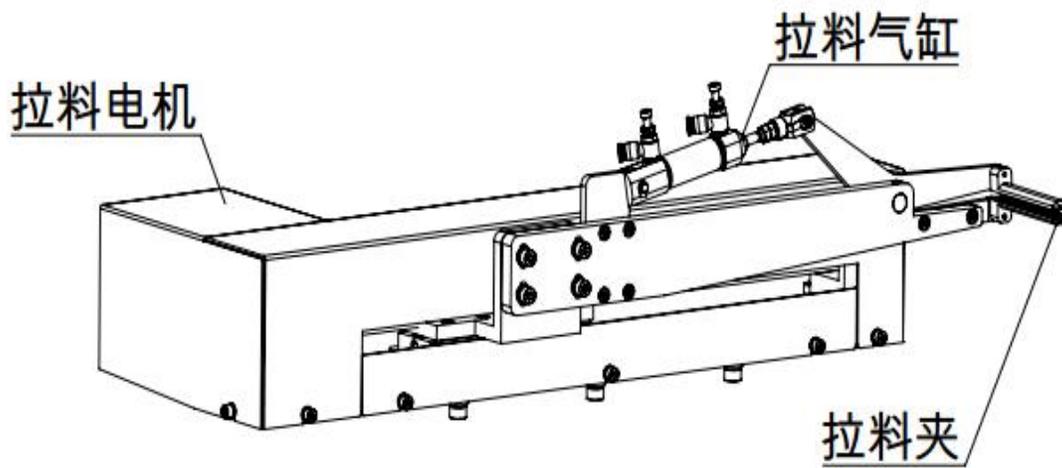


Clamping Components



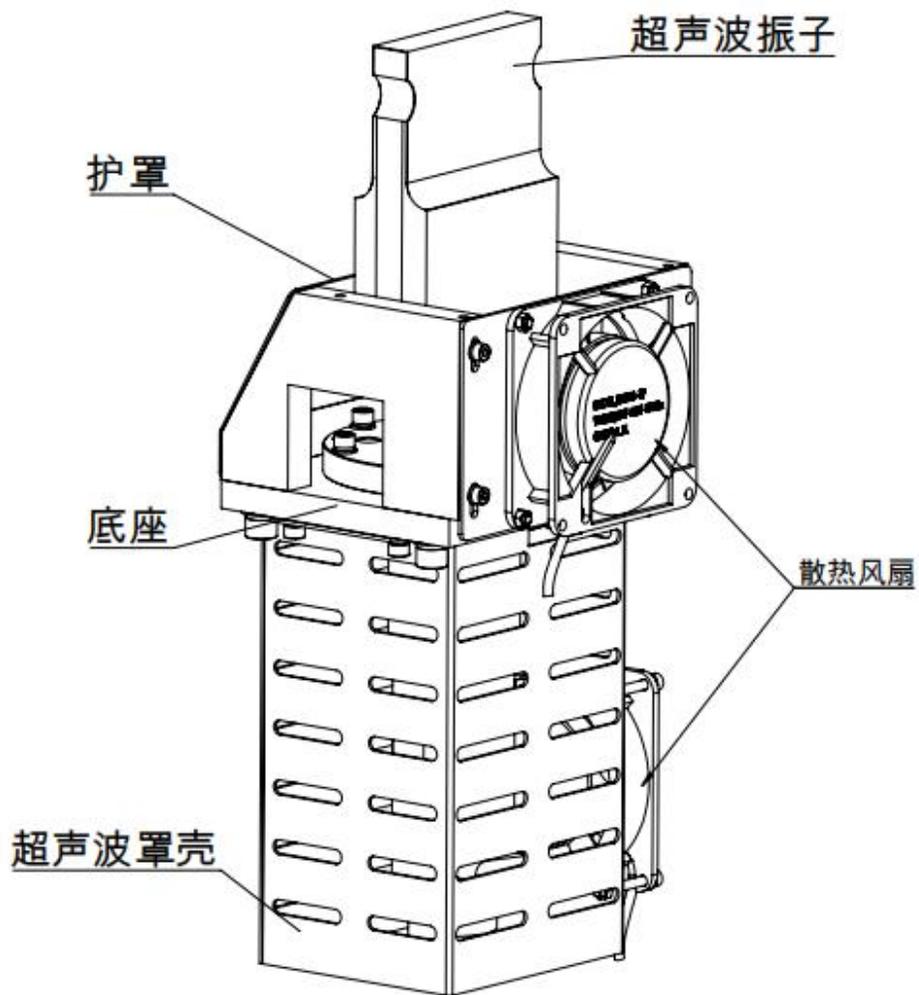
Drawing Components

拉料组件

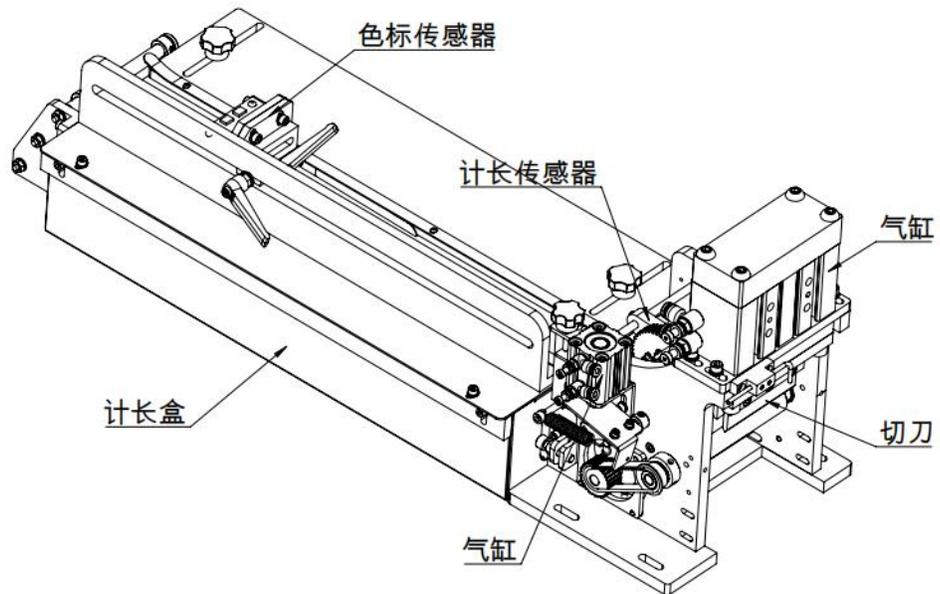


Ultrasonic fixed knife assembly

超声波组件

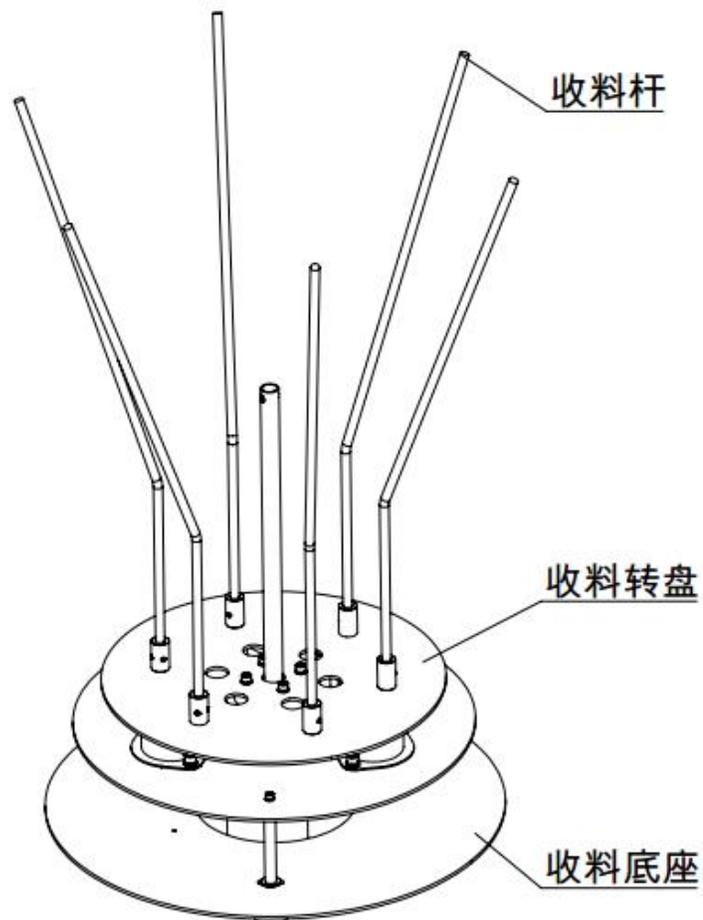


Feed gauge assembly

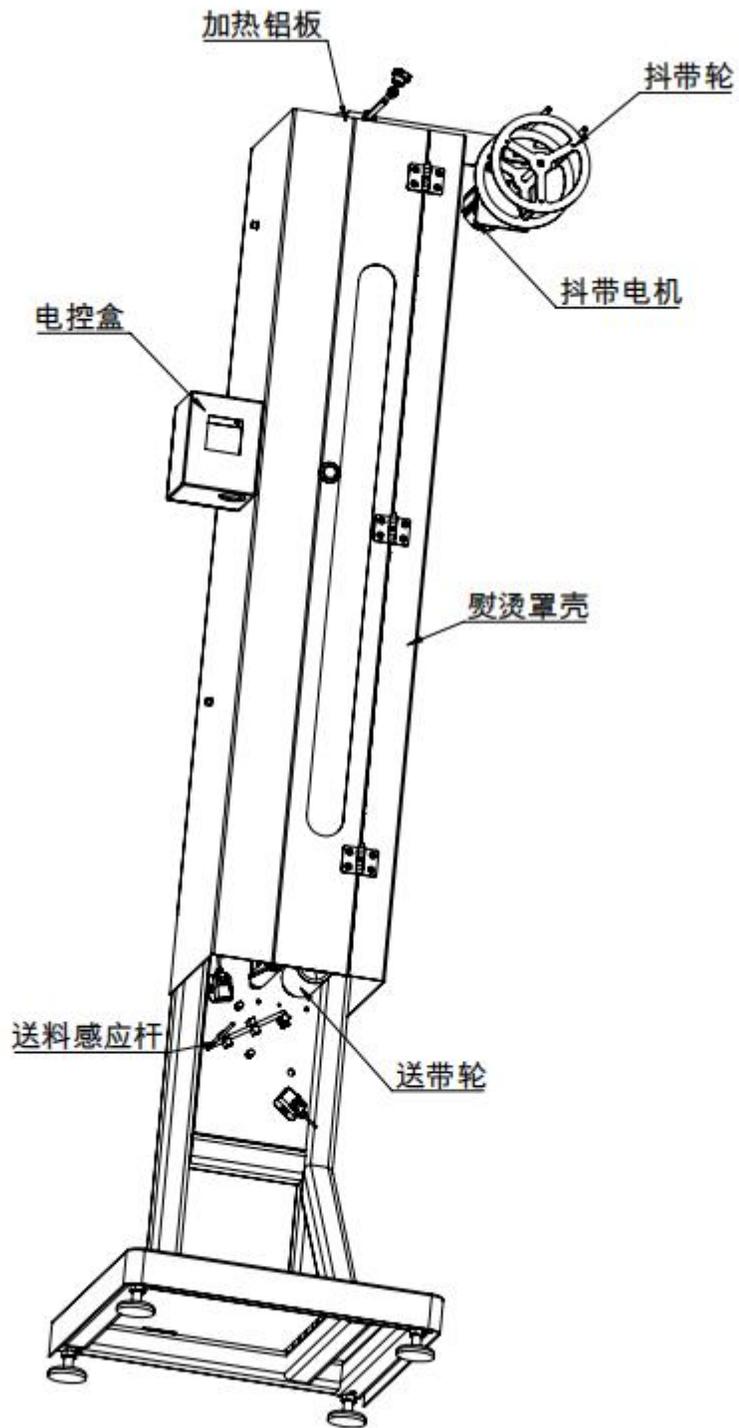


Take-up components

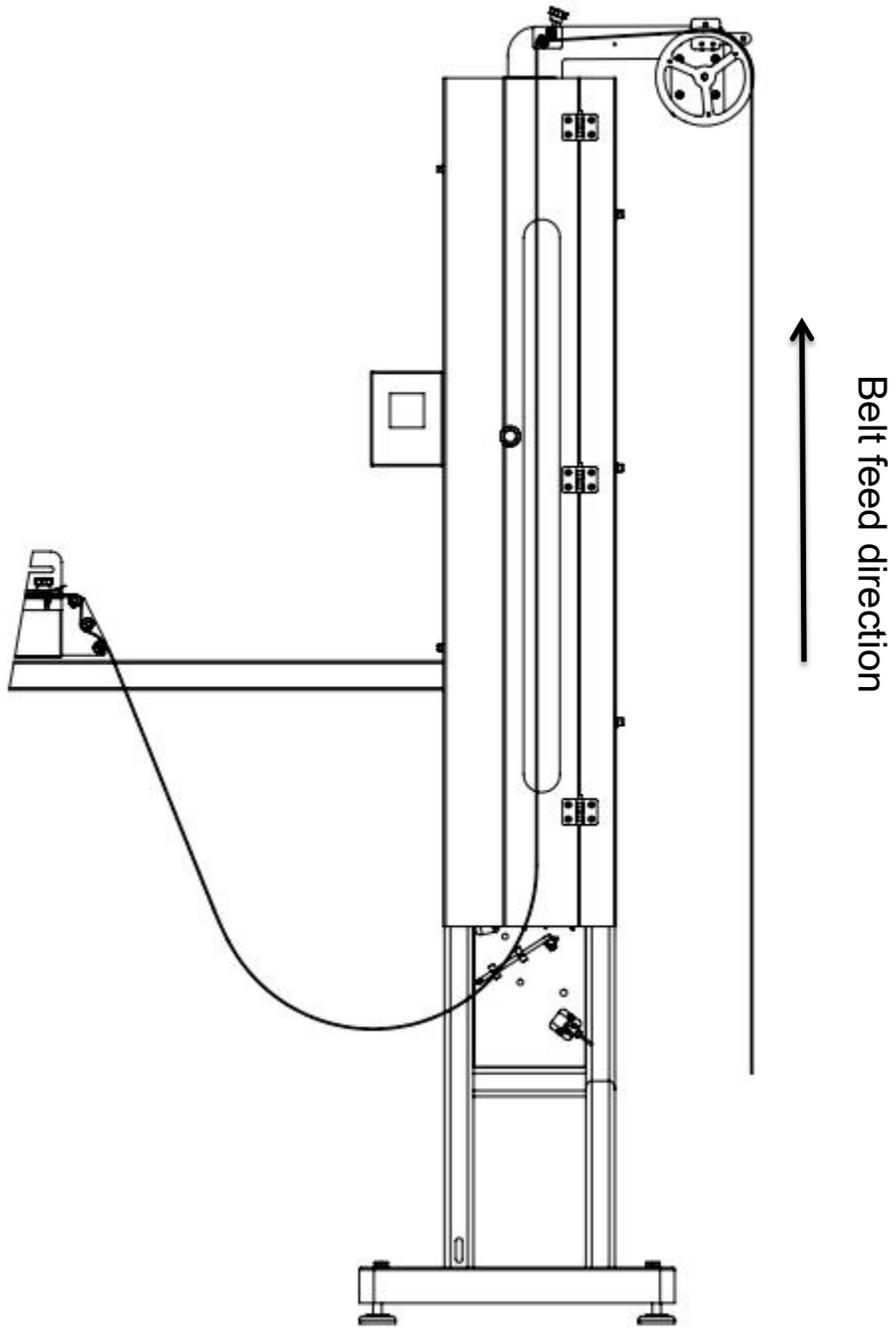
收料组件



Ironing kit



Taping Schematic



Description of the operation interface

Machine interface

1: After switching on the machine, the system enters the screen of the **main machine interface** as shown below:



2: Click the upper left corner of the main interface to display the following system language selection interface:



1: Machine operation: **start-up, mechanism reset;**

2: Sewing pattern:

① **Single Sewing**  : After the first start, the machine stops automatically until one sewing process is completed;

② **Cycle sewing**  : After starting for the first time, keep sewing until the estimated output is reached and then stop;

2: Individual movement operation:

Pressure Wheel Rise: Controls pressure wheel rise and fall

Cutter action; control cutter switch
 "Cutter on": the cutter starts working until it stops by clicking off;
 "Cutter off": the cutter stops the down-cutting action;

3: Counts are displayed in real time:

① **Processing Count:** display the number of completed processing products (click on zero to clear).

Processing Count: Display the number of products that have been processed (click zero to clear);

② **Elastic length:** display the current sewing elastic length (can be modified and set)

③ **Preset output, preset number of pieces:** the machine stops working when the preset count reaches the preset output value;

④ **Length compensation:** display the current rubber band compensation length (can be modified and set)

⑤ **Left side length, right side**

length: display the current left and right sewing rubber band length (can be modified, can be set)

4: Working mode :

① **No sign.** ② **Single-segment,** ③ **Single-sign** **Multi-segment,** ④ **Multi-sign,** ⑤ **Multi-sign Multi-segment**

5:**Carousel Setting:** Set the parameters of the carousel split bundle, and the carousel pointing operation;

6: **action debugging:** enter the **single-step debugging** interface to test the machine single-step action:

7: **Monitoring interface:** operation: **input detection, output control**

Work mode selection interface

3: **Modify the working mode:**
click **无标志** to enter the following screen



Working mode selection:

1 **No marking mode:** this mode has no special parameter setting, applicable to no marking rubber band.

2. Single paragraph - Parameter:

Style:



3. Single-sign multistage-parameters:

Style:



4. Multi-sign-parameter:

style: GO LOGO LOGO LOGO LOGO LOGO LO

无标志	1.LOGO长度设置	<input type="text" value="0"/>	(0-999) mm
单段式	2.LOGO间隔长度	<input type="text" value="0"/>	(0-9999) 1mm
单标志 多段式	3.LOGO大间隔长度	<input type="text" value="0"/>	(0-9999)1mm
多标志	4.预测LOGO数量	<input type="text" value="0"/>	(0-100)

保存 退出

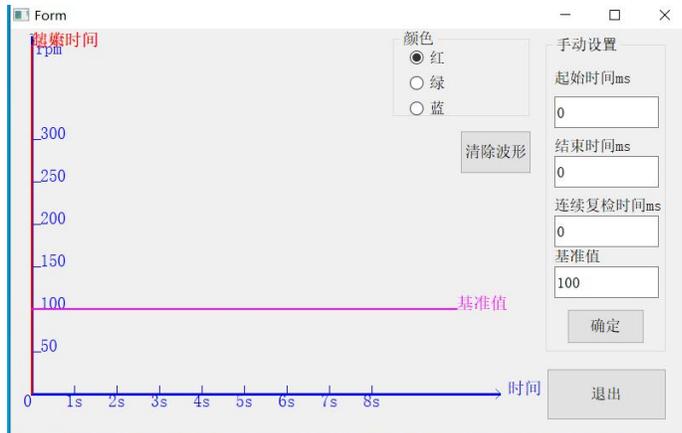
5. Multi-marked multi-segmented-parameters:

无标志	1.LOGO长度设置	<input type="text" value="0"/>	(0-999)mm
单段式	2.LOGO间隔长度	<input type="text" value="0"/>	(0-9999)mm
单标志 多段式	3.第一段长度 (短)	<input type="text" value="0"/>	(0-9999)mm
多标志	4.第二段长度 (长)	<input type="text" value="0"/>	(0-9999)mm
多标志 多段式	5.提前检测距离	<input type="text" value="0"/>	(0-9999)mm
	6.LOGO大间隔长度	<input type="text" value="0"/>	(0-9999)1mm
	7.预测LOGO数量	<input type="text" value="0"/>	(0-100)
	8.当前尺码	<input type="text" value="0"/>	0:大码 1:小码
	9.当前收料杆	<input type="text" value="0"/>	(0-255)
	10.当前方向	<input type="text" value="0"/>	(0-255)

保存 退出

See the Mode Setting Description section for specific parameter settings!

Click on the bottom right corner of the main interface drop, the system enters the following bottom line detection settings screen



Single-step debugging interface



4. Click to enter the **single-step debugging interface:**

The default action is a single combined action;

Start time: Set how long after starting sewing to start the detection of the bottom line (the default setting is 1000ms).

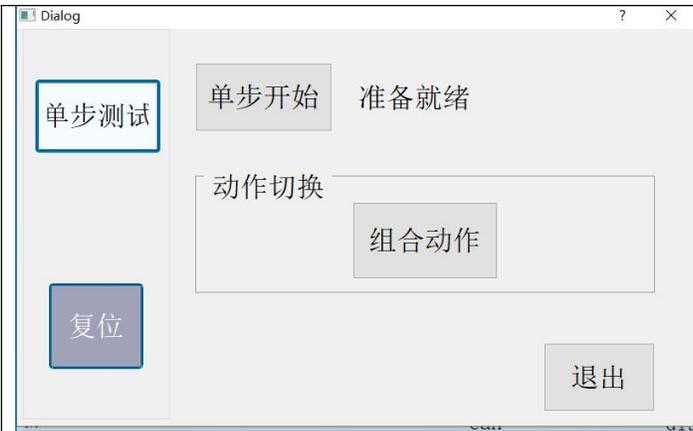
End time: set how long after the start of sewing to end the detection of the bottom line, the sewing time required for different widths of rubber bands is not the same, the wider the relative sewing time required the longer (the default setting is 1600ms).

Continuous retest time: the longer the setting time, the lower the detection sensitivity (default setting is 100)

Baseline: Used to set the bottom line detection threshold.

1: Single-step test:

It is mainly used for



Click  to switch to single-step movements, i.e. breakdowns of movements:



debugging individual movements of the mechanism; the movements in this interface can be switched between **single-step movements** and **combined movements**;

If the intermediate action is incorrect or you wish to undo it, you can reset the machine by clicking **Reset** directly; Exiting this screen automatically resets the mechanism once;

Parameter setting interface of the whole machine

5. Click  to enter the parameter setting interface.

Function	Parameter Name	Value	Range
Page 1/2	1. 切刀打开时间	0	(0~500)ms
	2. 送料速度	2800	(100~6000)
	3. 送料检测速度	300	(100~2000)
	4. 拉料杆左移百分比	50	(1~200)%
	5. 切刀吹气时间	10	(0~200)0.1s
	6. 机头延时吹气时间	0	(0~200)0.1s
Page 2/2	7. 切刀气缸延时时间	30	(0~999)ms

2: Institutional options

Parameter setting interface: according to the different functions of the machine is divided into the following names, according to the part of the machine action in the debugging or use, click on the corresponding name of the button to enter, and then adjust the specific parameter values;

1: Length counting mechanism; (as shown on the left)

- 1.1 Adjust the cutting effect, the higher the value, the longer the ultrasonic working time.
- 1.2 Counts the speed at which the long motor runs when feeding the material.
- 1.3 The speed is detected at the time of LOGO when the counting motor feeds the material.
- 1.4 Percentage of speed during synchronised operation of the pulling motor and the

计长机构	1.熨烫时间	30	(1~100)0.1s
机构选项	2.熨烫开关	开	
推料机构	3.切刀方式	超声刀	
收料机构	4.电机选型	电机B	
拉料机构	5.切带次数	50	1~9999
检测开关	6.熨烫电机选型	异步	
保存	<input type="button" value="上一页"/> 1/2 <input type="button" value="下一页"/>		
退出			

计长机构	7.简化工作模式	默认	
机构选项	8.熨烫送料系数	25	0~200
推料机构	9.送料长度检测阈值	40	(0~500 ms)
收料机构	10.报警时长	5	0~500 s
拉料机构	11.跑合检测模式	默认	
检测开关	12.大小轮模式	小轮	
保存	<input type="button" value="上一页"/> 2/2 <input type="button" value="下一页"/>		
退出			

3: Pushing mechanism

计长机构	1.右旋转电机倾斜角度	45	(0~100) 度
机构选项	2.右旋转电机速度	2000	(100~3000)
推料机构	3.推入等待距离	0	(0~1000)0.1mm
收料机构	4.推入总距离	1392	(1~3000)0.1mm
拉料机构	5.推料电机速度	3000	(100~3000)
检测开关	6.推料延时时间	0	(0~20)0.1s
保存			
退出			

counting motor.

1.5 Blow time during cutter action.

1.6 Delayed blowing time after the head presser foot is pressed down.

1.7 Delay time for cutter cylinder action.

2: Institutional options; (as shown on the left)

2.1 Adjust ironing time

2.2 Ironing function switch

2.3 Adjustment Type of cutter (ultrasonic, cold)

2.4 Motor selection. (Motor A, Motor B) (Motor A not used, default Motor B)

2.5 Number of tape cuts.

2.6 Ironing motor selection. (asynchronous, stepper) (ironing motors are stepper motors on K5 machines and asynchronous motors on models A and C)

2.7 Simplified working mode.

4: Take-up mechanism

计长机构	1.分捆数量	<input type="text" value="50"/>	(1~999)Pcs
机构选项	2.机头推料气缸时间	<input type="text" value="4"/>	(0~200)10ms
推料机构	3.机头压脚气缸时间	<input type="text" value="4"/>	(0~200)10ms
收料机构	4.分捆单杆实际数量	<input type="text" value="28"/>	(1~999)Pcs
拉料机构	5.定位笔气缸工作时间	<input type="text" value="0"/>	(0~500)10ms
检测开关			
保存			
退出			

5: Pulling mechanism

计长机构	1.拉料杆右移速度	<input type="text" value="200"/>	(100~800)
机构选项	2.拉料第一段距离	<input type="text" value="200"/>	(1~250)mm
推料机构	3.回拉距离	<input type="text" value="160"/>	(1~250)mm
收料机构	4.接头回拉距离	<input type="text" value="135"/>	(1~250)mm
拉料机构			
检测开关			
保存			
退出			

6: Detect switch:

计长机构	1.底线检测灵敏度: 0	<input type="text" value="40"/>	(1~1000)
机构选项	2.底线检测开关	<input type="button" value="开"/>	
推料机构	3.气压检测开关	<input type="button" value="开"/>	
收料机构	4.橡筋接头检测开关	<input type="button" value="开"/>	
拉料机构	5.橡筋有无检测开关	<input type="button" value="开"/>	
检测开关	6.定位开关	<input type="button" value="关"/>	
保存			
退出			

1/2

(Default, Simplified) (no sewing action in simplified mode, only tape cutting action, normal operation is in default mode)

2.8 Adjust the ironing feed length of the ratio coefficient, the larger the number of the longer the feed

2.9 Feed length detection threshold: the smaller the value, the higher the detection sensitivity.

2.10 Adjustment of alarm time

2.11 Run-in detection mode. (default, run-in)

Default mode: the machine works normally;

Running-in mode: running-in test mode before the machine is shipped from the factory

3: Pushing mechanism

3.1 Adjust the tilt angle of the right rotating motor for smoother passage of the rubber band.

3.2 Right rotating motor operating speed.

3.3 The pushing mechanism



picks up the rubber band and pushes it forward a distance in advance to wait for the last stitch to be completed.

3.4 Adjust the push-in position to find the best position for the suture.

3.5 Running speed of the pusher motor when pushing in.

3.6 After the machine head is sewn, the pushing mechanism delays the push-in time.

4: Take-up mechanism

4.1 Quantity of material to be received in a single pass for each receiving bar

4.2 Adjusting the head pusher cylinder time

4.3 Adjusting the head presser foot cylinder time

4.4 Positioning pen cylinder operating time

4.5 Delay time for closure of the splice plate

5: Pulling mechanism

- 5.1 Pulling motor right shift running speed.
- 5.2 The pulling mechanism moves the first distance to the right to find the best position for pulling the material
- 5.3 Pull back distance setting for pull back motor.
- 5.4 Joint pullback distance setting.

6: Detect switch:

Bottom line detection sensitivity adjustment, the lower the value, the more sensitive the

Low. (Settings are adjusted according to feedback values)

- 1. Bottom line detection sensitivity: bottom line detection sensitivity adjustment, the larger the value, the higher sensitivity
- 2. Bottom line detection switch: detect whether the alarm is

triggered when the bottom line reaches the target value.

3. Air pressure detection switch: detects if the air pressure is lower than the set value to alarm or not

4. Rubber band joint detection switch: whether to alarm when detecting the rubber band joints

5. Rubber band detection switch: detect whether the alarm is alarmed when there is no rubber band.

6. Positioning switch: with or without positioning pen

7. Metal detection switch: detecting the presence of metal in the rubber band to alarm or not.

8. Take-up detection switch: detecting whether the alarm is raised when the rubber band is not kicked out after the sewing is completed in the machine head.

Note: When the function switch is on, if the above problem occurs, the machine alarms and stops working. When the function switch is off, if the above problem occurs, the machine will not alarm and the machine will still work.

Machine Alarm and Resolution Interface

3. Machine alarms:



When an abnormality occurs, the machine will stop working and prompt an alarm screen: (click the **OK** button to release the alarm)

K5A alarm content and solution:

Alarm serial number	Alarm name	cure
1	No rubber band alarm	Please check the rubber bands and place the rubber bands
2	Connector Alarm	Please check the rubber band and remove the joints
3	Jamming Alarm	Please check the rubber bands and place the rubber bands
5	air pressure alarm	Air pressure is below the set value, please check the ventilation device
6	Alarm for insufficient length between signs	Please check the actual length of the labelled rubber band
7	Undetected flag alarm	Please check the operation mode and rubber band
8	disconnection alarm	Please check whether the surface thread and bottom thread are broken or off.
9	Bottom Line Insufficient Alarm	Please replace the bottom line and

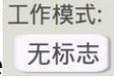
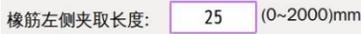
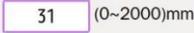
		release the alarm when the replacement is completed.
10	Abnormal head reset	Please check whether the head reset device is abnormal
11	emergency stop	Please check that the devices are working properly
12	The head is not reset.	Please reset the head.
13	Number of sewn pieces reached	The number of sewn pieces reaches the preset value
14	Abnormal pulling mechanism home position detection	Please check whether the home sensor of the pulling mechanism is abnormal or not.
15	Abnormal home detection of pushing mechanism	Please check whether the home sensor of the pushing mechanism is abnormal or not.
16	Alarms on counting drives	Please check the gauge driver.
17	Push drive alarm	Please check the pusher drive
18	Pull drive alarm	Please check the puller drive
19	Right rotary drive alarm	Please check the right rotary drive
20	Ironing Feed Alarm	Please check the ironing feeder and return the rubber band to its normal position.
21	Receiving Detection Alarm	Check and manually clean the material trapped in the machine head.
22	Feed length deviation alarm	Please check the size length for deviation. If yes: 1. Please check the feeding device 2. Feeding device no problem, please length compensation setting If no: Please adjust the feed length detection threshold in the parameters.
23	Cylinder sensor alarm not detected	Please check that the cylinder sensor is not mounted in place If yes: please adjust the sensor position If not: please test whether the sensor is

		damaged and whether the wiring connection is reliable.
24	Pusher motor reference position offset alarm	Please reset the mechanism
25	Alarm for pulling motor reference position deviation	Please reset the mechanism
26	Right rotary motor reference position offset alarm	Please reset the mechanism
27	Abnormal right rotary motor home detection	Check whether the right rotary motor reset action, 1, no action, then check the drive, motor and the corresponding connecting wires; 2, action, then power off to remove the right rotary motor phase line, and then power into the input detection interface, rotate the right rotary motor shaft, observe the X25 right rotary home signal changes, no change, then check whether the X25 connecting wire is connected reliably and correctly and the motor code disc may be damaged. No change and then check whether the X25 connection line is connected reliably and correctly and the motor code disc may be damaged.
73	X1 axis driver communication abnormality alarm	Please contact the manufacturer
74	X2 axis driver communication abnormality alarm	Please contact the manufacturer
75	X3 axis driver communication abnormality alarm	Please contact the manufacturer
76	X4 axis driver communication abnormality alarm	Please contact the manufacturer

Mode Settings and Operating Instructions

1. Unmarked mode

Basic Operations:

1. Select the **no-flag** mode  .
- 2, set the **length of the rubber band**  300 mm , such as: length 300mm, directly enter 300.
3. Set the **left and right clamping length**   and select the effect that suits the demanded suture opening.
- 4 、 Set the **preset output** value  OFF 58 and **bottom line count**  76 .
- 5、 Load the rubber band to the length counting mechanism according to the threading schematic, point the **cutter action** button  to remove the excess part.
6. Confirm that the agencies are ready to go.
- 7、 Select sewing mode: **single sewing**  .
- 8、 Tap the **start** button, the machine enters the automatic running state.
- 9, wait for the head to finish sewing, after the machine stops, test whether the actual length of the rubber band is the same as the set length.
- 10、 If the actual length is not the same as the set length, please **compensate the length**.
- 11 、 After the setting is completed, select the sewing mode: **cycle sewing**  .
- 12, point **start** button, the machine automatically cycle work to complete the preset output.

2. Marked mode

2.1. Colour-coded sensor teaching methods:

2.1.1. Adjust the distance of the light point of the colour-coded sensor from the detecting object to 10 ± 1 mm.

2.1.2 Firstly, put the light point of the colour-coded sensor against the LOGO logo, press ON, wait for the indicator to flash slowly, then move the light point of the colour-coded sensor against the non-LOGO rubber band, then press OFF, wait for the indicator to light up for about 2 seconds, then the calibration will be completed, please refer to the following figure 1 for details.

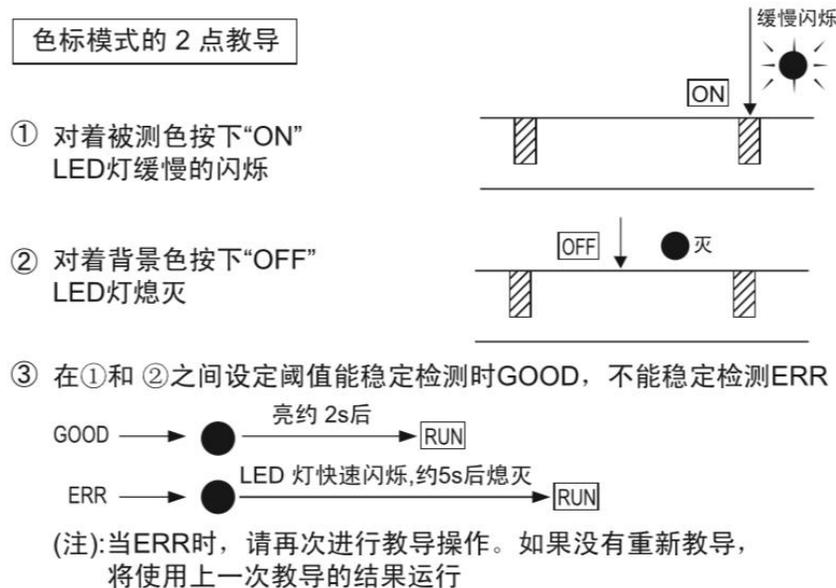


Fig. 1 Method of teaching colour-coded sensors

2.2. single paragraph:

Take the sample, measure the total length of the sample rubber band, the length of the colour scale position, the length of the logo, the length of the logo interval (see Figure 2 below), place the colour scale sensor in the colour scale position, and enter the parameters into the operation interface to save them for use. When the length of the colour code position is too small to place the colour code sensor, you can input the appropriate advance detection distance. The error-proof detection distance is used to detect the presence of LOGO before the end of sample feeding, if LOGO appears, it will report error and stop working.

Note: This mode is suitable for rubber band with sparse logos and logos spaced far apart.

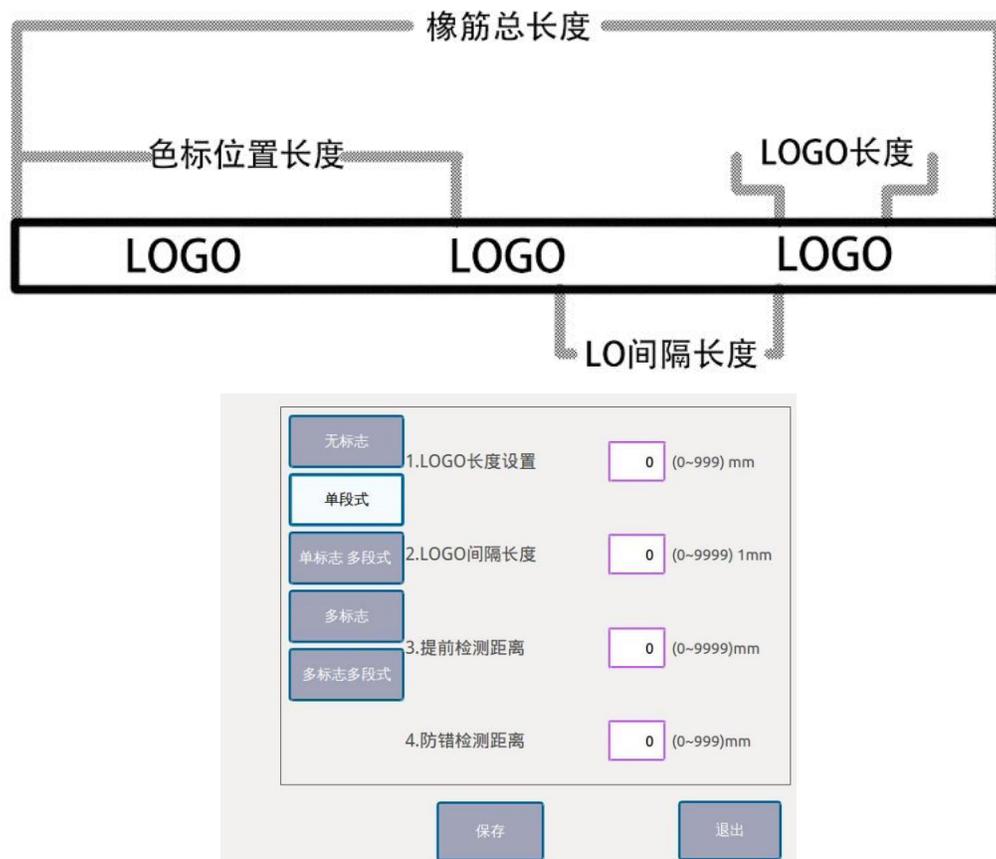


Figure 2

2.3. single sign multi-paragraph:

Take two samples of different lengths, measure the total length of the two samples of rubber bands, LOGO length, LOGO interval length (see Figure 3 below), take the longer samples, measure the length of the colour coded position, place the colour coded sensor in the colour coded position, measure the length of the finished rubber band and enter the parameters into the operating interface to save the use of the interface (no need to set the other). Error-proof detection distance is used to detect whether LOGO appears before the end of sample feeding, if LOGO appears, it will report error and stop working.

Note: This mode is suitable for rubber band with sparse logos and logos spaced far apart.

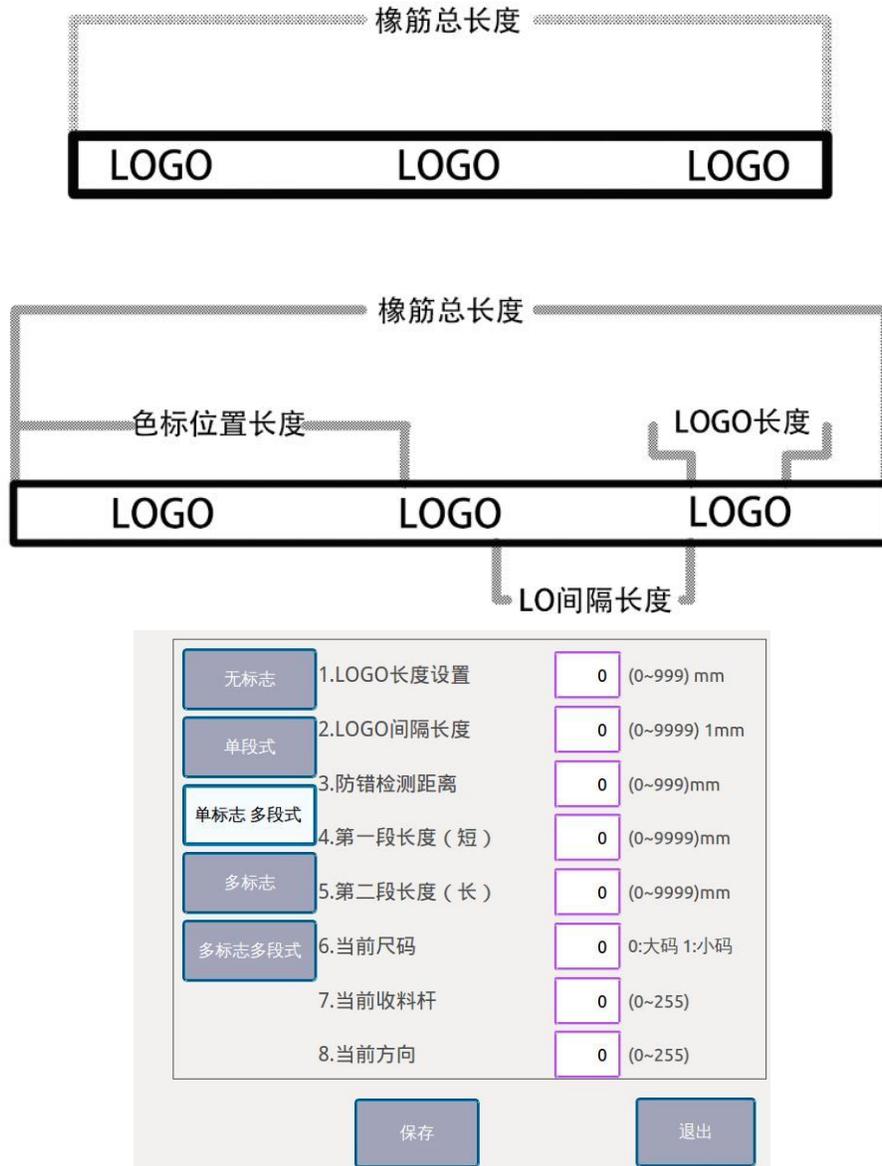


Figure 3

2.4. multiple signs:

Take the sample, measure the total length of the sample rubber band, the length of the colour code position, the length of the logo, the length of the small logo interval, the length of the large logo interval (see Figure 4 below), place the colour code sensor in the colour code position, calculate the number of logos in front of the logo position where the colour code sensor is located and input the parameters to the operation interface to save the number of predicted logos, and then you can use it.

Note: This mode is suitable for rubber band LOGO dense gathering, LOGO spacing is close.

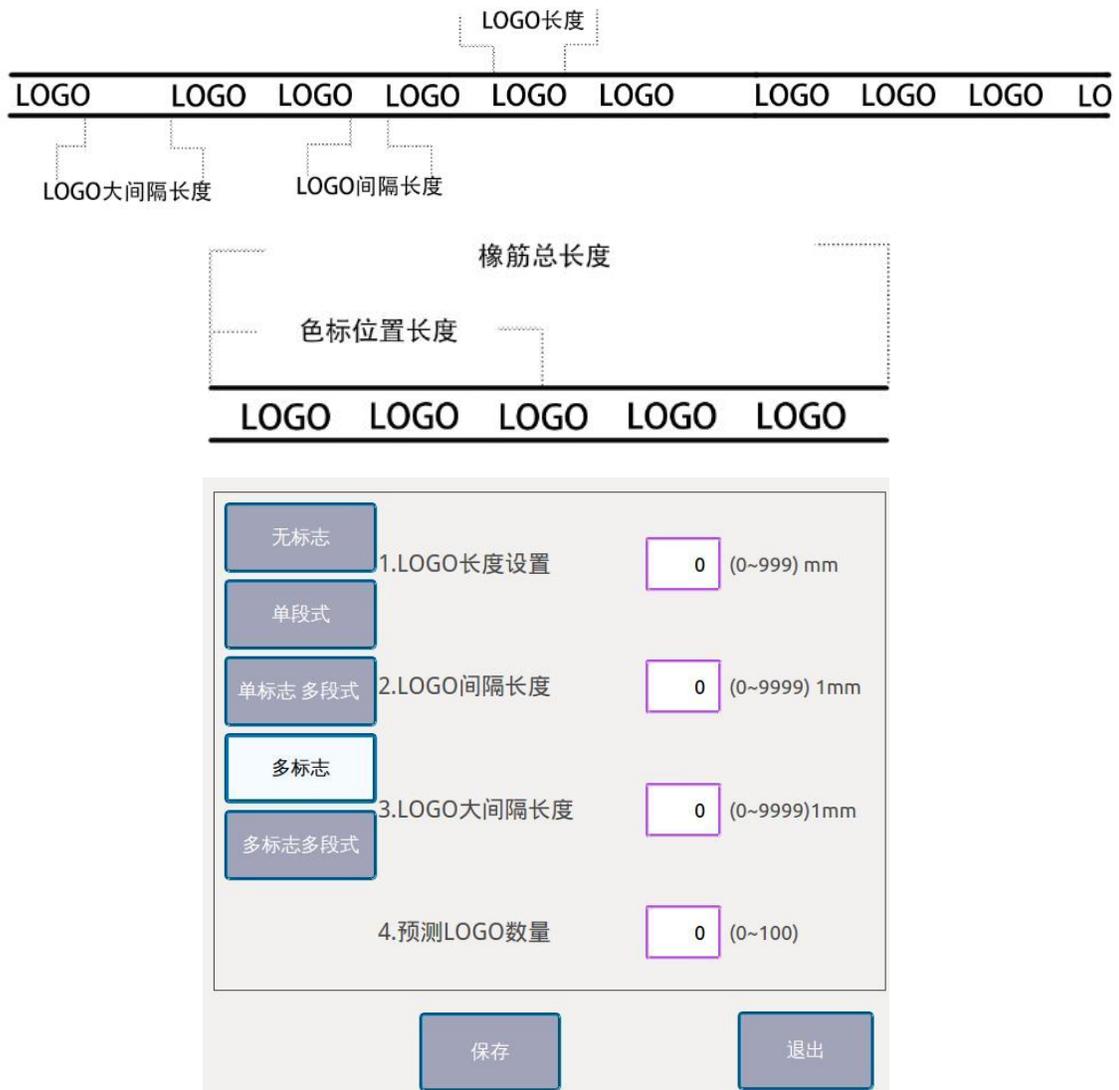


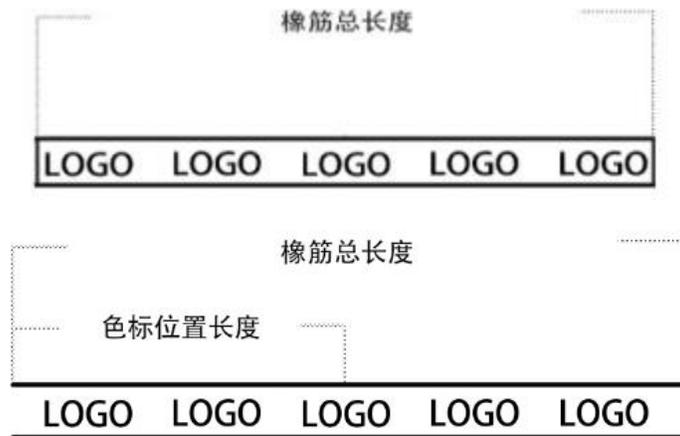
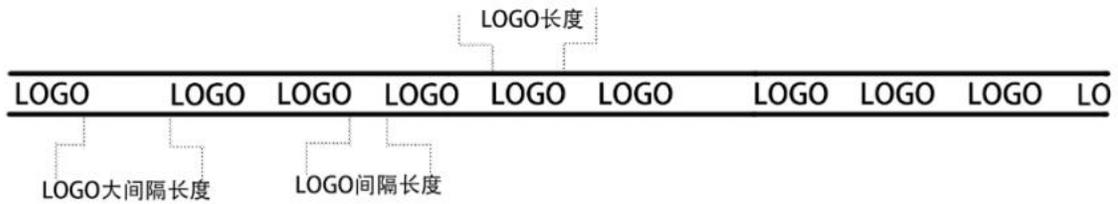
Figure 4

2.5. Multi-sign and multi-paragraph

Take two samples of different lengths, measure the total length of the rubber band, LOGO length, LOGO interval length, LOGO interval length (see Figure 5 below), take the longer samples, measure the length of the colour coded position, place the colour coded sensor in the colour coded position, calculate the number of LOGOs in front of the colour coded sensor's position and input them into the predicted number of LOGOs, measure the length of the finished rubber band and save the parameters to the operation panel. Measure the length of the finished rubber band and input the parameters into the operation panel to save them for use. When the length of the

colour marker position is too small to place the colour marker sensor, you can input the appropriate detection distance in advance. The error-proof detection distance is used to detect the appearance of LOGO before the end of sample feeding, if LOGO appears, it will report error and stop working.

Note: This mode is suitable for rubber band LOGO dense gathering, LOGO spacing is close.



<div style="text-align: center; margin-bottom: 5px;">无标志</div> <div style="text-align: center; margin-bottom: 5px;">单段式</div> <div style="text-align: center; margin-bottom: 5px;">单标志 多段式</div> <div style="text-align: center; margin-bottom: 5px;">多标志</div> <div style="text-align: center; margin-bottom: 5px;">多标志多段式</div> <div style="text-align: center; margin-bottom: 5px;">保存</div> <div style="text-align: center;">退出</div>	1.LOGO长度设置	<input type="text" value="0"/> (0~999)mm
	2.LOGO间隔长度	<input type="text" value="0"/> (0~9999)mm
	3.第一段长度(短)	<input type="text" value="0"/> (0~9999)mm
	4.第二段长度(长)	<input type="text" value="0"/> (0~9999)mm
	5.提前检测距离	<input type="text" value="0"/> (0~9999)mm
	6.LOGO大间隔长度	<input type="text" value="0"/> (0~9999)1mm
	7.预测LOGO数量	<input type="text" value="0"/> (0~100)
	8.当前尺码	<input type="text" value="0"/> 0:大码 1:小码
	9.当前收料杆	<input type="text" value="0"/> (0~255)
	10.当前方向	<input type="text" value="0"/> (0~255)

Requirements related to electric control and precautions for operation and use

0. Main technical data

Power supply voltage range: AC220V \pm 10%

Power supply frequency: 50Hz/60Hz

1. Safety precautions

1.1 Scope of use

This servo controller is developed and designed for industrial sewing machines. If it is used in other ways, please pay attention to the safety of the user.

1.2 Working environment

1.2.1 The power supply voltage should be within \pm 10% of the electrical voltage.

1.2.2 Keep away from high-frequency electromagnetic wave transmitters, etc., so that the electromagnetic waves generated do not interfere with the controller and cause incorrect operation.

1.2.3 Temperature and humidity.

a. Operate in a place where the room temperature is above 0°C and below 45°C.

b. Prohibit operation in places exposed to direct sunlight or outdoors.

c. Do not operate the unit too close to the heater.

d. Please maintain 30 % ~ 95 % relative humidity (no condensation).

1.2.4 Do not operate near flammable gases or explosives.

1.3 Installation

1.3.1 The controller should be installed correctly in accordance with the instructions.

1.3.2 Switch off and unplug the power cord before installation.

1.3.3 When attaching power cords, avoid proximity to rotating parts, and leave at least 3cm of clearance. 

1.3.4 To prevent noise interference or electric shock, ground the sewing machine and control box.

1.3.5 Before switching on the power supply, make sure that this supply voltage must be within $\pm 15\%$ of the voltage specified for the electronic control.

1.4 Provisions for maintenance and repair

1.4.1 Switch off the power before operating maintenance or repair actions.

1.4.2 Make sure the power is off when turning over the machine head, changing needles or threading.

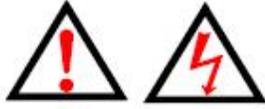
1.4.3 The control box contains dangerous high-voltage electricity and should not be opened until more than 5 minutes after the power is switched off.

1.4.4 Repairs and maintenance are carried out by trained technicians.

1.4.5 Maintenance or repair must not be carried out with the motor and control box running.

1.4.6 All parts for maintenance shall be supplied or approved by the Company before use.

1.5 Hazard alerts



This symbol indicates that special attention should be paid to the safety of the machine when it is being installed, and that incorrect operation of the machine in spite of this symbol may result in injury to persons or to the machine.

1.6 Other safety provisions

1.6.1 After switching on the power for the first time, operate the sewing machine at a low speed and check that the direction of rotation is correct.

1.6.2 When the sewing machine is running, do not touch the handwheel, needle or other parts of the machine that will move.

1.6.3 All movable parts must be isolated from physical contact by means of protective devices provided, and no other objects should be inserted into the device.

1.6.4 Do not operate with the motor guard or other safety devices removed.

1.6.5. Do not allow the motor or control box to fall to the ground.

1.6.6 Do not allow liquid objects such as tea to flow into the control box or inside the motor.