

Full-automatic pallet stretch wrapping machine User manual

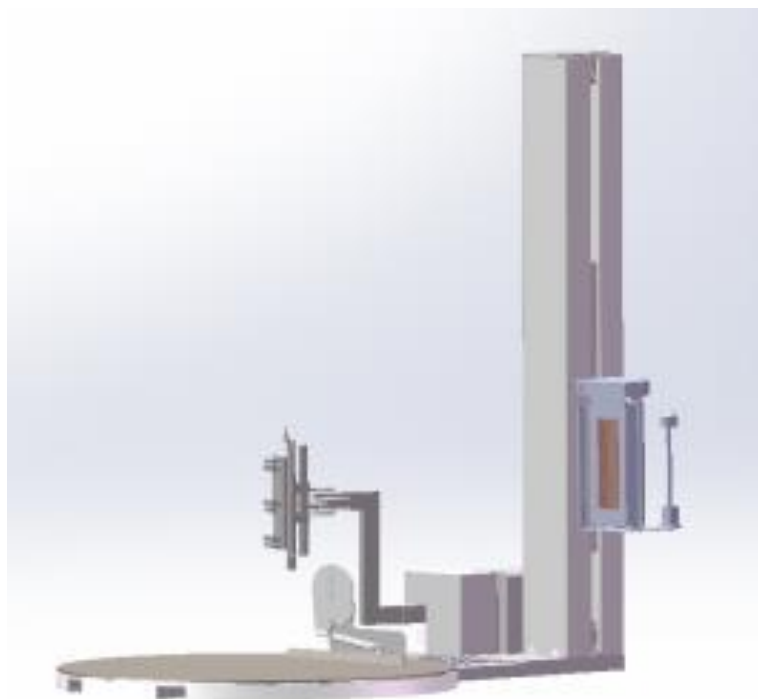


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§1 Introduction

1. How to refer to and use this manual

- 1) Please read this manual carefully before using the machine
- 2) The manual is the full description of the product. Please keep it with the machine.
- 3) If the machine is resold or lent to others, this manual shall go with it
- 4) Do not damage this manual
- 5) Do not delete or modify this manual without permission
- 6) If you adjust the technical parameters of the machine, please modify according to the relevant instructions in this manual
- 7) Due to continuous improvement and improvement of machine performance, the company reserves the right to modify the machine and manual
- 8) If you have any good Suggestions on this manual or machine, please contact us

2. Safety precautions:

- 1) The circuit breaker and power cord with the same capacity of the machine must be used. A circuit breaker with a smaller capacity or a power cord with a smaller wire diameter will cause damage to the circuit or devices.
- 2) Do not use the machine in a humid environment and do not expose the machine to large amounts of water vapor.
- 3) Do not use or place the machine on dusty occasions.
- 4) Please turn the machine in the direction of the arrow on the

turntable.

5) When replacing parts, the power should be cut off and replaced according to the correct steps.

6) During normal packaging, please do not touch the part where the membrane is formed.

7) Do not pack the goods beyond the scope of the package to avoid damage to the film frame.

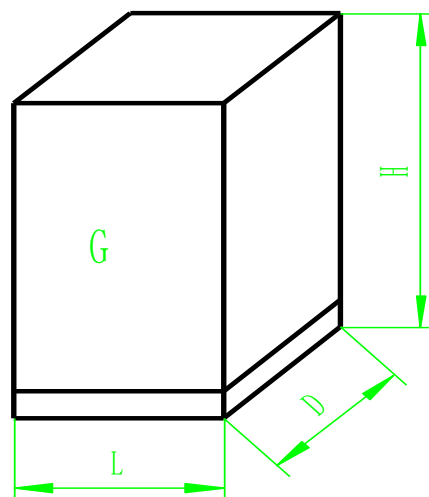
8) Do not pack any goods greater than the rated packing weight.

§2 About

1. The stretch film wrapping packaging machine is a professional packaging machine with LLDPE stretch film as the packaging material to wrap a variety of goods.2. T100 series film wrapping and stretching packaging machines can reduce the packaging cost, facilitate storage and transportation, and facilitate the recovery of packaging materials (films) to reduce environmental pollution. This is one of the more popular green transport packaging methods.3. This packaging method has been widely used in glass manufacturing, paper industry, chemical industry, machinery manufacturing, food industry and other different industries, especially in the export trade in the transport of goods in the container category has been widely used.4. The company produces a comprehensive stretch film wrapping machine, in addition to the pallet basic type, also produces cylinder paper/curtain type, cable type, horizontal type, cylinder radial packaging and other types. In addition, we also produce Kraft paper, pearl cotton, ordinary PE film packaging machine, if necessary, please ask our sales department for more detailed instructions and information.

§3 Main parameter

1. Size of packing:



Model	L(mm)	D (mm)	H (mm)	G(Max kg)
T103FZ	800~1200	800~1200	max:2400mm	2000kg

Note: the diagonal length of the goods shall not be greater than 1650mm. The technical agreement shall prevail for other unmarked equipment ;

2. Materials:

Material	W	T	I.D	O.D
LLDPE stretch film	500 mm	14-35μm	76.2mm(Three inches)	≤240 mm

LLDPE Stretch film performance feature: (Mechanical drawing equipment without tensile ratio)

During the wrapping packaging process, the film is stretched in a certain proportion, and the stretched film exerts back pressure on the package to protect the package. Meanwhile, the adhesive force generated by the stretching reduces the skidding and provides a superposition effect to form a dynamic skin on the outside of the cargo.

0-40% Minimum memory

40-75% Memory response

75-100% Moderate returns pressure

100-200% It is extremely easy to obtain the maximum ratio of return

pressure

200-300% it is recommended to choose suitable film and drawing equipment to achieve the maximum amount of drawing

Ordinary stretch film up to 250% will cause damage to the membrane tissue; our company stretch film can be increased to more than 300%, for you to save packaging costs.

According to the properties of stretch film, the best state of use of stretch film can only be achieved by setting the pre-draw ratio between 1:2.5 and 3.0 in the pre-draw machine. Therefore, the pre-draw ratio designed by this machine is 1:3.0. The film width shrinkage is about 10%.

3. Equipment parameter

Unit type	Power (KW)	Efficiency(max)	Speed
T103FZ	1.7 KW	30Pallet/Hour	0-12Rpm

Note: the technical agreement shall prevail for other unnoted series equipment ;

Working power supply: AC220V/50HZ 20A -1p。

Be sure to use a separate fixed power supply, do not use temporary wire or power supply with other equipment, the voltage shall not be lower than 210V, or higher than 230V, please check the fire wire zero line and ground line when wiring (electrical damage and other damage caused by incorrect power supply is not included in the warranty).功率: 1.7KW

4. Diameter: 1500mm~1800 mm

6. Machine weight: 800Kg

7. Working speed: 2~4mim

8. Turntable speed: 6~12rpm

9. Gas consumption: 1000ml/min

10. Pneumatic working pressure: 0.5~0.6MPa

§4 Unpacking, installation and debugging

1. After the machine arrives at the site, check whether the machine, parts and accessories listed in the packing list are complete and whether the machine is damaged during transportation.
2. Check the certificates to confirm that the machines you will use are qualified products and meet the requirements of your order.
3. Open the container at the designated position (be careful not to damage the machine) and check the equipment and accessories according to the random packing list.
4. Read this manual carefully for installation, debugging and use.
5. The equipment should be installed in a relatively dry indoor environment, and there is no dust, no inflammable and explosive chemical preparations and other corrosive substances on the machine, the temperature range of -10 -- 40 C, no condensation.
6. Place the turntable on the flat ground and connect the guide column of the film system with the turntable.

Install the ramp (accessory, optional) in the working position where the goods can be placed or unloaded, and at the same level with the turntable. Pay attention to the position and the gap between the turntable. After the installation, you can fix it with expansion screw (self-provided).
7. Check other connected parts, whether the electrical wiring is loose or falling off, and fix all loose or falling parts and wires in time.
8. Be sure to provide correct, stable and reliable fixed power supply (temporary

cable is strictly prohibited).

9. Connect the motor connection and the sensor lead according to the corresponding line number, connect the power supply to the machine power outlet line, confirm the accuracy and conduct ground detection before the test; When connecting, pay attention to the positive and negative direction of the motor. When confirming the running direction, it should be in manual state.
10. Check whether all limit switches, limit switch arms and limit blocks are damaged, are in the correct position and can be used normally (under manual condition).
11. The chain and reducer of the equipment have been lubricated or oiled before delivery, please confirm before operation.
12. Switch on the power, turn on the air switch in the electrical cabinet, and the machine will be in standby state for debugging after self-check.

§5 Facilities maintenance

1. Keep the lubrication between the inner and outer chains of the chain. Add hj20-hj40 mechanical oil.
2. When the turntable slows down or skids, open the motor housing of the turntable, loosen the four connecting bolts on the deceleration mounting plate, and then adjust the two tensioning bolts clockwise and evenly to reach the required tensioning force, and tighten the four connecting bolts.

The tensioning of the chain should be adjusted after continuous use of the machine for 10-15 days.

3. The lifting, chassis and membrane frame are driven by the worm gear and

worm speed governor to complete the speed change. During the use process, please use according to the following requirements:

A) The reducer is lubricated with oil, and the immersion depth is the full tooth height of the worm if the worm is under or on the side of the worm wheel;

The oil immersion depth is $\frac{1}{3}$ of the outer diameter of the worm on the worm wheel.

B) Synthetic worm oil 200# (kinematic viscosity is 320 at 40 C) is recommended;

C) Those with oil mirrors are $\frac{1}{2}$ of the oil mirrors, and the center distance from $a=63\text{mm}$ suggests 400ml;

D) New oil must be replaced after 7-14 days of operation, and it should be replaced every year thereafter;

E) The ambient temperature should be $-40 \sim +40 \text{ C}$ below 0 C with low freezing point lubricating oil.

F) The gear reducer is lubricated with grease, so there is no need to replace grease during use, or to replace it according to the actual situation.

4. When placing the goods in the package, the goods should be moved and put gently as far as possible to avoid deformation of the chassis or shorten the service life of the parts.

5. The goods should not exceed the designed packing height; otherwise, the packing effect will be affected.

6. The goods should be placed within the range of the turntable. If the goods are too large, they should be operated within the range of 100mm or according to the actual space of the machine.

7. The electric cabinet should be closed, and the electrical parts and electrical connections should be cleaned and checked regularly to ensure the normal use

of the equipment.

§6 Use of safe

1. Read the manual of inverter carefully before operating the converter.
2. When the machine is in normal use, check every connection part of the machine regularly whether it is loose or falling off. If so, be sure to tighten it.
3. It is strictly prohibited to move or remove the upper and lower fixed limit block!

The rotary table of the machine should run clockwise.

5. People are not allowed to stand under the film system or pile up any objects!
6. When the film system roller is rotating, it is forbidden to extend your hand or reach into other objects to prevent damage to the cots or fingers!
7. It is strictly prohibited to extend the hand into the chain for maintenance or inspection or other operations during operation to prevent hand injury.
8. When the machine is running, the operator should stand in a safe place at a certain distance from the turntable. When a working process of the machine is completed and stops, the operator should be close to the machine to prevent the spread of cargo and injury.
9. Should be firmly grounded or ground zero (ground zero shall not be mixed) to prevent electrical leakage damage to the machine or personnel.
10. When the machine is moved from its original position, the machine shall be reinstalled and tested by professionals, and its safety shall be confirmed before use.

Regularly check the electrical and electrical connections and clean the electrical

cabinets.

12. Due to the characteristics of frequency converter, the leakage protector cannot be used in the power supply of this equipment, or the leakage protector specially used for frequency converter can be used.

§7 Product warranty

1. Under the premise of installation, maintenance and use in accordance with the requirements of the machine manufacturer, the product shall be guaranteed for one year from the date of delivery, all expenses shall be borne by the manufacturer, and all expenses beyond the warranty shall be borne by the user.

The manufacturer has the right to repair or replace the defective parts.

The manufacturer has the right to inspect the cause of the fault.

4. Any loss caused by incorrect use, including incorrect power supply, improper operation or damage caused by human factors shall not be included in the warranty.

The machine manufacturer is not responsible for any loss except the machine itself.

6. The machine manufacturer is not responsible for damage caused by maintenance by unqualified professionals.

7. The machine manufacturer shall not be responsible for any equipment damage and related losses caused by natural disasters such as earthquake, as well as force majeure such as war and riot.

8. The machine manufacturer shall not assume, free of charge, other requirements and improvements not included in this specification or in the purchase contract, unless the manufacturer undertakes voluntarily due to product upgrades.

§8 Instructions for mechanical parts

一、 Film carriage:

1. Economical pre-stretch film carriage

1) Film operation diagram: please penetrate the film as follows

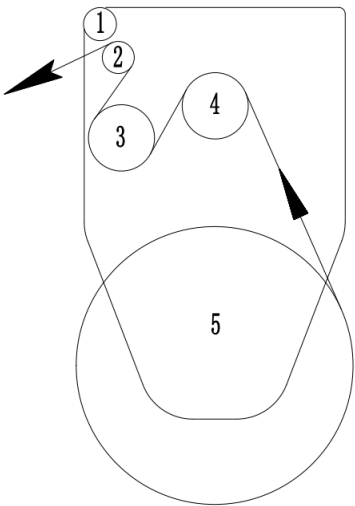


Chart1 Side 1 Guide roll 2 Floating roll 3 Rubber covered roller 4 Rubber covered roller
5Film roll

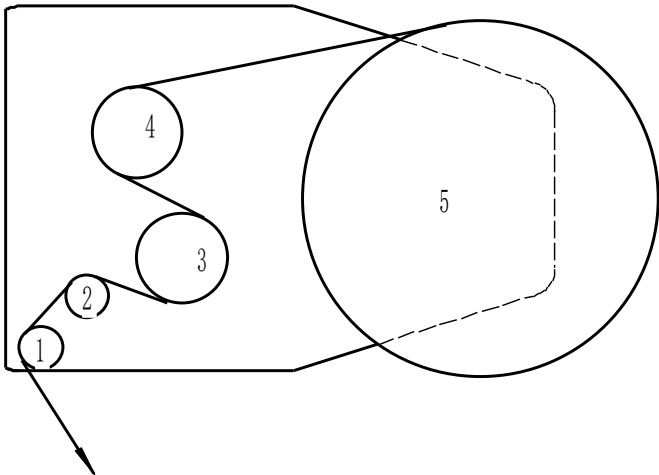


Chart 2 Front 1 Guide roll 2 Floating roll 3 Rubber covered roller 4 Rubber covered
roller 5Film roll

2) Pre-drawn film output

Pre-stretching: such as chart 2 shows in the direction of the thin film export is a floating roller guide roller on the swing arm, when the film is pulling the guide roll inward, sensors, sensor less than when the swing arm startup pre-stretching motor, film is output, when traction reduce or relax, swing arm back, sensors, sensor to stop when the swing arm pre-stretching motor output.

In use or manual traction should be appropriately adjusted film tension, to avoid the film is rolled back to the cots, affecting the work efficiency.

2. Open-door film carriage

1) Film operation diagram: please penetrate the film as follows

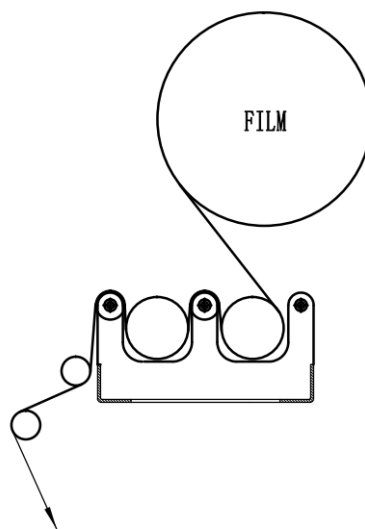


Chart 3 (Pre-stretch)

2) Pre-drawn film output

Pre-stretching: such as chart 3 second from bottom in the thin film export direction of root guide roller is a guide roller on the swing arm, when the film is pulling the guide roller, move outward sensors, sensor to swing arm start

pre-stretching motor, the film is output, when traction reduce or relax, swing arm back, sensors, sensor less than stop when the swing arm pre-stretching motor output.

In use or manual traction should be appropriately adjusted film tension, to avoid the film is rolled back to the cots, affecting the work efficiency.

3. Mechanical stretch film carriage

1) Film operation diagram: please penetrate the film as follows

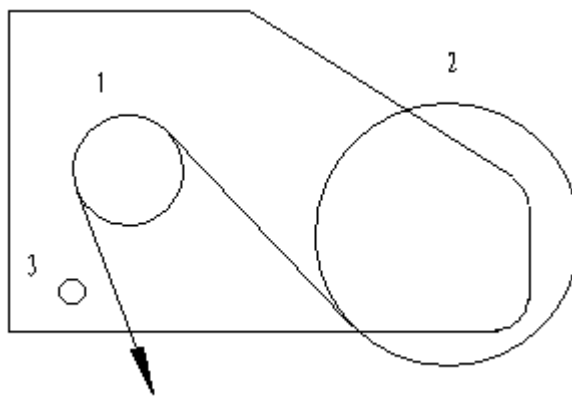


Chart 4 1 Rubber covered roller 2 Film roll 3 Guide roll

2) **Mechanical**-drawn film output

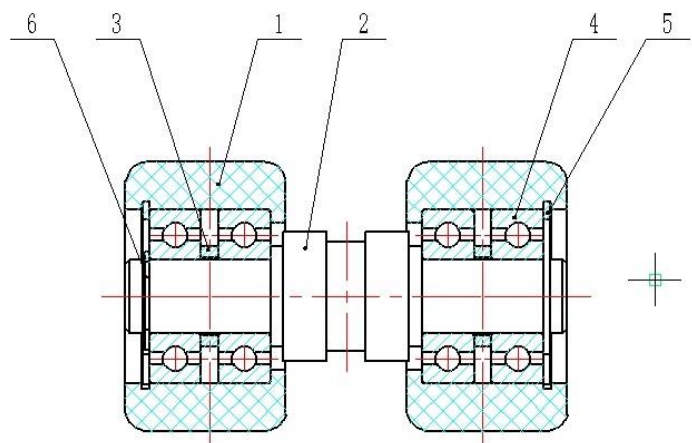
Mechanical drawing: when mechanical drawing, because the film elongation is compensated by the width and thickness, generally cannot reach the same effect as the pre-drawing, but in different requirements of the packaging of goods is also different, mechanical drawing can enhance the local binding force, single layer of strong binding force, weak adhesion.

二、 Turntable

1. The turntable part can realize the load of two tons of goods. It is firmly designed and equipped with forklift holes2. The turntable tug is a wearing part, which should be replaced regularly (it is recommended to replace it once a

year);As shown in the figure, if replacement is needed, please provide the parts number as shown in the figure.

Chart 5



No.	Name of part
1	Roller
2	Supporting shaft
3	Baffle
4	Deep groove ball bearing
5	Type A hole with retaining ring
6	Type A shaft with retaining ring

三、 Optional part

- 1. Top pressure palet
- 2. Ramp

§9 Instructions for electrical operation

一、 Power supply

The working power supply used by this device is

Voltage: single-phase AC220V $\pm 10\%$

Frequency: 50Hz $\pm 2\%$

Electrical damage or other damage caused by incorrect external power supply is not included in the warranty.

二、 Operation panel

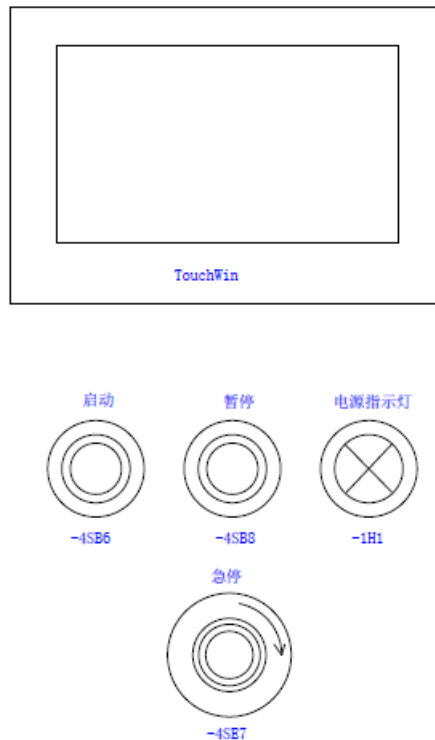


Chart 1 Operation panel diagram

See Chart 1: the operations panel is shown above

三、 Instructions for

1. Power indicator: indicator light for the power supply of the equipment.

This green indicator light is always on when the power switch is on.

2. Pause: yellow instantaneous button, one of the automatic operation buttons, located at the bottom of the man-machine interface.

Press this button during the automatic operation of the device to make the device temporarily stop (the device's turntable stops, the motion of the film frame stops, but the device is still in the automatic state).

After the device is suspended, press the auto run button again, and the device will continue to run automatically, completing the automatic winding process of the device.

This button is not valid while the device is in standby mode.

Note: pneumatic top pressing device, here is the top pressing button, used to control the rise and fall of the top.

3. Start: green instantaneous button, located at the bottom of the man-machine interface.

This switch has two functions:

1) in standby mode, when the membrane frame is not at the highest or lowest level, press the switch to lower the membrane frame to the lowest level, so that the machine is in the packaging preparation state.

2) in standby mode, when the membrane frame is at the upper or lower limit, press the switch and the machine will run automatically according to the set parameters and procedures;

4. Emergency stop: red push-pull mushroom head self-locking button.

The position is below the man-machine interface.

Press down when all actions and PLC internal parameters stop and reset, the machine will not remember all previous actions.

However, all Settings of the device will keep the user's Settings.

四、 Directions for use

1. Manual operation:

Under manual operation mode, press the buttons of turning inventory, membrane frame rising and membrane frame falling respectively to complete manual operation of the equipment.

In this mode, the above three keys are all operated by holding down the corresponding part of the key, and stop after releasing the key.

Under manual operation mode, press the orange button at the bottom left of the man-machine interface to enter the semi-automatic operation mode.

2. Semi-automatic operation:

In semi-automatic operation mode, put the goods on the chassis, put the film coil on the roll holder, press the film penetration mode to wear the film, and then press down the rotation button to rotate the rotary table.

When the film frame rises to the required position, press the film frame rise button again to make the film frame stop rising;

When the winding number of the top layer reaches the number of winding you need, press the down button of the film frame to make the film frame fall to the bottom or press the down button of the film frame again to make the film frame stop rising.

Press the turn inventory button to stop the rotation of the turntable and remove the goods.

Repeat the above process to complete the packaging.

In this mode, the above three keys are pressed to release the corresponding parts of the operation, and the operation stops after pressing again.

In semi-automatic operation mode, press the orange button at the bottom left

of the man-machine interface again to enter the manual operation mode.

3. Automatic operation:

Make the machine in the initial state, put the goods, wear the film, set up the number of up and down turns, up and down times, over the top time and the number of strengthening turns, press the automatic start button, the whole process is completed automatically (photoelectric height measurement is effective), manually raise the press top and remove the goods.

In the automatic operation, press "strengthen" to realize the function of strengthening winding in the process of membrane frame rising or falling.

4. Brief description of automatic process:

The machine is in the initial position, place the goods, fix the film on the turntable or the goods, press the automatic operation button, the turntable starts to accelerate to the set speed, the film automatically output with the turntable operation, at the same time the turntable count, when the bottom set value is reached, the film frame starts to rise.

If press "strengthen" during the rising process, the membrane frame will stop rising to perform the function of strengthening winding. The rotary plate will continue to operate and count. When the set number of strengthening turns is reached, the membrane frame will continue to rise.

Film frame, the goods have to illuminate photoelectric switch to perform set delay time after time (the roof) membrane stopped rising, up and down time counter, turntable carries on, rotary counting, when arrived at the top of the circle can be set up, the film carriage down, dropped to the bottom of the film carriage stop, up and down the frequency meter once again, and began to plan the underlying laps.

And so on until the up and down times reach the set value of the packaging process is completed.

Notes:

1. When the goods are lower than the height of the film frame, the film frame does not rise or fall when the film frame is wound automatically. When the rotary table counts the number of the bottom turns, it slows down and stops, and the packaging process is completed.
2. Pneumatic top pressing equipment, manual start of the top pressing is required before automatic winding, and the top pressing is automatically reset after winding.

五、 Parameter setting and man-machine interface function description

1. Operating instructions for man-machine interface

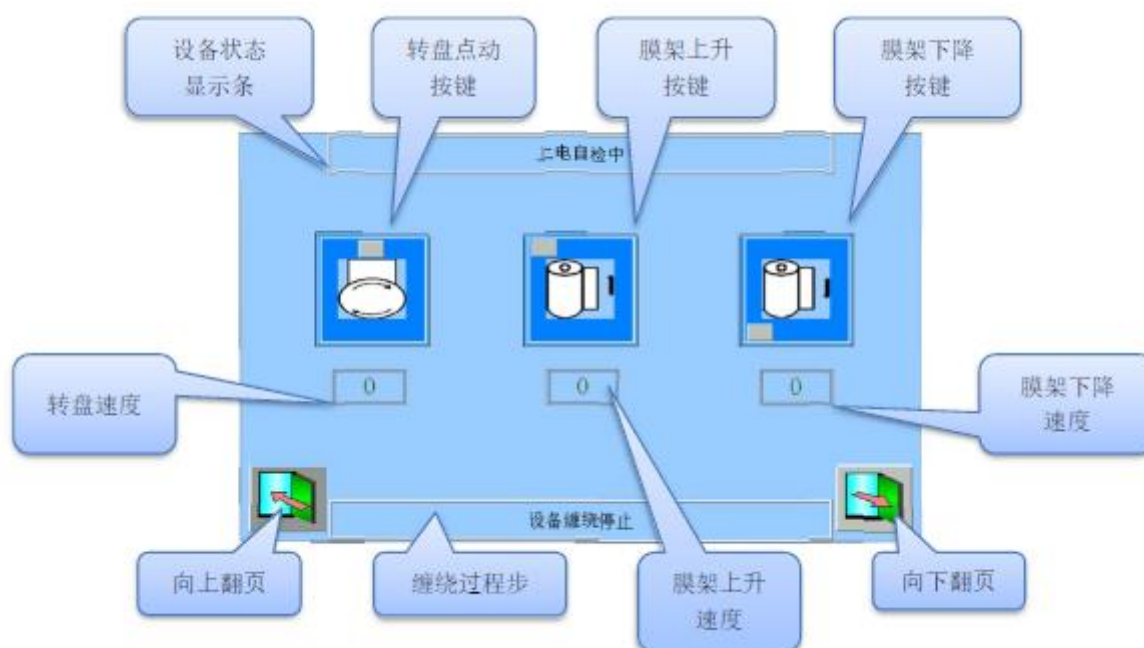
1、开机界面



The following four buttons can switch different interfaces, among which the advanced parameter setting interface requires password entry.

Upper right corner packaging volume statistics can monitor the packaging volume of the device.

1. Manual operation interface of man-machine interface



Device status display bar: displays the running status of the device

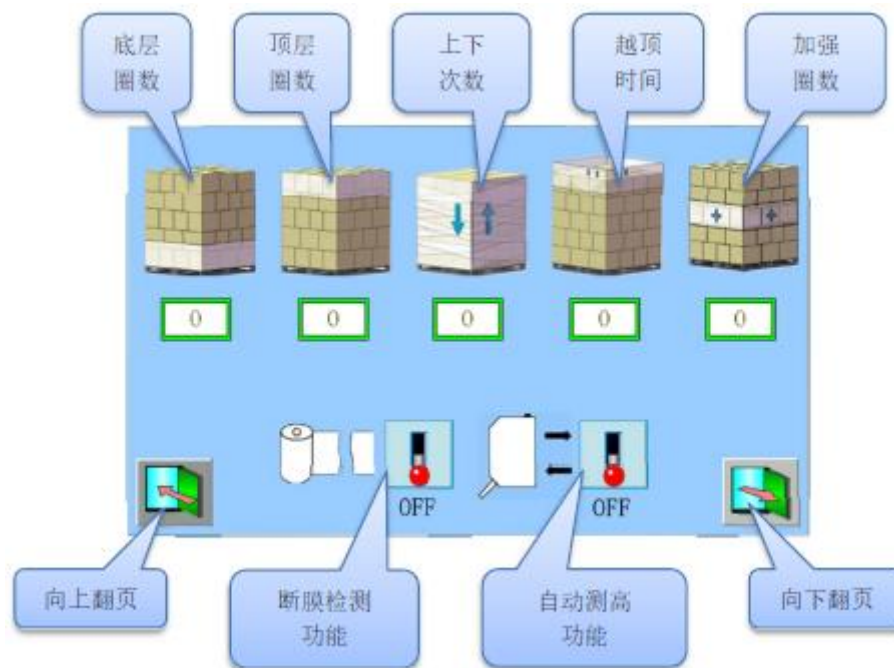
Winding process step: winding process description

Turn inventory, film frame rise, film frame fall: three manual keys, press and hold the corresponding motor to start, release and stop;

When the motor starts, the corresponding red frame flashes.

Speed of turntable, rising speed of film frame, falling speed of film frame: setting of lifting speed of turntable and film frame, unit Hz, range 10-50.

2. Equipment parameter setting - basic parameters for HMI instruction



Equipment parameter setting:

Bottom winding number: this parameter is set to a range of 1-20 in circles

Bottom winding number refers to the winding number of the bottom of the cargo when the membrane frame is in the bottom limit.

Top level winding number: this parameter is set to a range of 1-20 winding units

Top winding number refers to the winding number of the cargo top layer when the membrane frame is on the upper part (overtop or upper limit switch).

Number of reinforcing cycles: this parameter is set to a range of 1-20 cycles

The number of reinforcing turns refers to the number of winding turns in the middle of the cargo after the "reinforcing" button is pressed during the automatic operation of the equipment.

Overhead time: this parameter is set to a range of 1-20 seconds

Top crossing time refers to the time delay when the height measurement is effective (i.e. the photoelectric switch is used to sense the height of the cargo), when the photoelectric light leaves the top of the cargo during the rise of the cargo automatic packaging film frame. When the delay time arrives, the film frame immediately stops rising.

Carry out winding of the top of the cargo or enter the parking process.

Up and down times: this parameter is set to the range of 0-20, the unit is times

The up and down times refer to the up and down times of the membrane frame when the equipment is running automatically.

Film breaking detection function: the range of the parameter setting value is 0 -- 1;

"0" : the film breaking detection function is not used, which means that the device will not detect the case of film breaking or use up in automatic operation. In other words, if the film breaking occurs in the process of automatic packaging, the device will continue to run and will not stop.

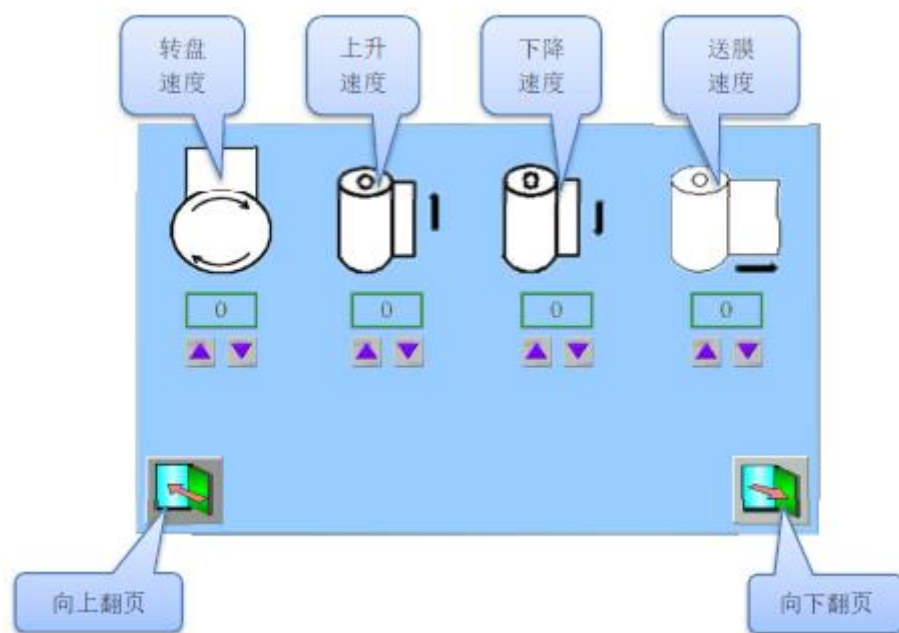
"1" : the film breaking detection function is used to indicate that the device will detect the broken or used up wound film during the automatic operation, that is, if the device has broken or missing film in the process of automatic packaging, the device will enter the suspended state. After manual processing, press the "start" button, the device will continue to run until the packaging is completed.

Automatic altimeter: the range of this parameter setting value is 0 -- 1;

"0" : the photoelectric height measurement function is not used, which means that the equipment will not detect the height of the cargo when the membrane frame rises in the automatic operation, and the membrane frame will not stop until it reaches the upper limit of rising or reaches the parameters set by the equipment.

"1" : the photoelectric altimeter function is used to indicate that during the automatic operation of the equipment, the height of the cargo will be detected when the membrane frame rises, and then the membrane frame will stop rising after reaching the top according to the set overhead time, and the top layer will be wound.

3. Equipment parameter setting - motor speed



Equipment parameter setting:

Rising speed: this parameter is set to a range of 10-50, the unit is the frequency Hz

The rising speed refers to the rising speed of the membrane frame;

Increasing this value can accelerate the rising speed of the membrane frame, and decreasing this value can reduce the rising speed of the membrane frame.

Descending speed: this parameter is set to a range of 10-50, the unit is the frequency Hz

The falling speed refers to the falling speed of the membrane frame.

Increasing this value can accelerate the falling speed of the membrane frame, and decreasing this value can reduce the falling speed of the membrane frame.

Turntable speed: this parameter is set to the range of 10-50, the unit is the frequency Hz

Turntable speed refers to the turntable's automatic operating speed and point operating speed;

Increasing this value increases the speed of the turntable. Decreasing this value decreases the speed of the turntable.

Film exit velocity: the set value of this parameter ranges from 0 to 50, and the unit is frequency Hz

Film speed refers to the automatic operation speed of film feeding motor.

Increasing this value can speed up the speed of the film feeding motor and reduce the film feeding tension. Reducing this value can reduce the film feeding speed and increase the film feeding tension

4. Manual operation interface - section of broken film

5、手动操作界面-断膜部分



操作说明：

摆臂伸出：按一下，摆臂运动到断膜位置；运动过程中，再按一下，摆臂停止

摆臂返回：按一下，摆臂运动到起始位置；运动过程中，再按一下，摆臂停止

焊膜伸出/返回：按一下，焊膜伸出；再按一下，焊膜返回

夹板夹紧/打开：按一下，夹板夹紧；再按一下，夹板打开

断膜加热：按住此按钮，断膜加热丝加热；松开此按钮，加热停止

焊膜加热：按一下按钮，焊膜加热板加热；再按一下，加热停止

注意事项：

- 1、 **摆臂伸出与摆臂返回**按键，操作时会有 1 秒钟的延时，属正常现象
- 2、 **由于焊膜加热需要预热大约 5 分钟，每次开机建议先打开焊膜加热；**另外，缠绕启动时也会自动启动焊膜加热。

Operation instruction:

Swing arm extension: press once, swing movement to the position of the broken membrane, during the movement, press again, stop the movement

Swing arm return: press once to move the swing arm to the starting position.

During the process, press again to stop the movement

Film extension - return: press once, extend, press again, return

Splint open/tighten: press the splint to tighten and press again to loosen

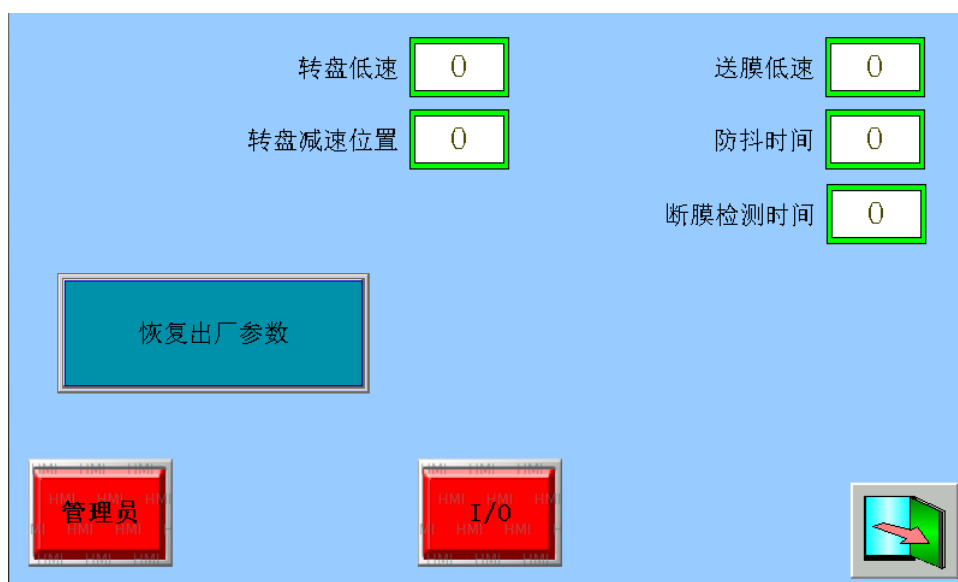
Break film heating: press and hold this button, break film heating wire heating, release and stop

Welding film heating: press once, welding film heating plate heating, press again, stop heating

Note:

1. Reach out of the swing arm and return button, the operation will have a delay of 1 second
2. The mass heating should be preheated for about 5 minutes. It is recommended to preheat each time the machine is started
3. Automatic pneumatic welding film heating when winding starts

5. Advanced parameter setting for user interface instruction



Description of advanced equipment parameter setting:

Low speed of turntable: the speed of the device when it returns to the origin and the device is slowed down and stopped

Low speed of film feeding: the film discharging speed corresponding to the low speed of the rotary disk.

Deceleration position of turntable: the position time (5 ~ 50) when the turntable runs at high speed and passes through the origin of the turntable to run at low

speed.

Anti-vibration time: to prevent the jitter of the film feeding motor due to the back pressure of the film after the packaging.

If this happens, you can increase the anti - shake time appropriately.

Restore factory parameters: this button can restore the default parameters of the factory equipment, and it will take effect after holding down for more than 2 seconds

6. User interface instructions for I/O monitoring



Device input monitoring function description:

Through the device input monitoring interface, we can judge the peripheral sensors and switches

Whether the signal is normal, help us to carry out equipment maintenance and fault judgment.

Note: the input points shown in this interface are not used on all models

§10 Safe

1. Read the manual of inverter carefully before operating the converter.
2. When the machine is in normal use, check every connection part of the machine regularly whether it is loose or falling off. If so, be sure to tighten it.
3. It is strictly prohibited to move or remove the upper and lower fixed limit block!

The rotary table of the machine should run clockwise.

5. People are not allowed to stand under the film system or pile up any objects!
6. When the film system roller is rotating, it is forbidden to extend your hand or reach into other objects to prevent damage to the cots or fingers!
7. It is strictly prohibited to extend the hand into the chain for maintenance or inspection or other operations during operation to prevent hand injury.
8. When the machine is running, the operator should stand in a safe place at a certain distance from the turntable. When a working process of the machine is completed and stops, the operator should be close to the machine to prevent the spread of cargo and injury.
9. Should be firmly grounded or ground zero (ground zero shall not be mixed) to prevent electrical leakage damage to the machine or personnel.
10. When the machine is moved from its original position, the machine shall be reinstalled and tested by professionals, and its safety performance shall be re-used.

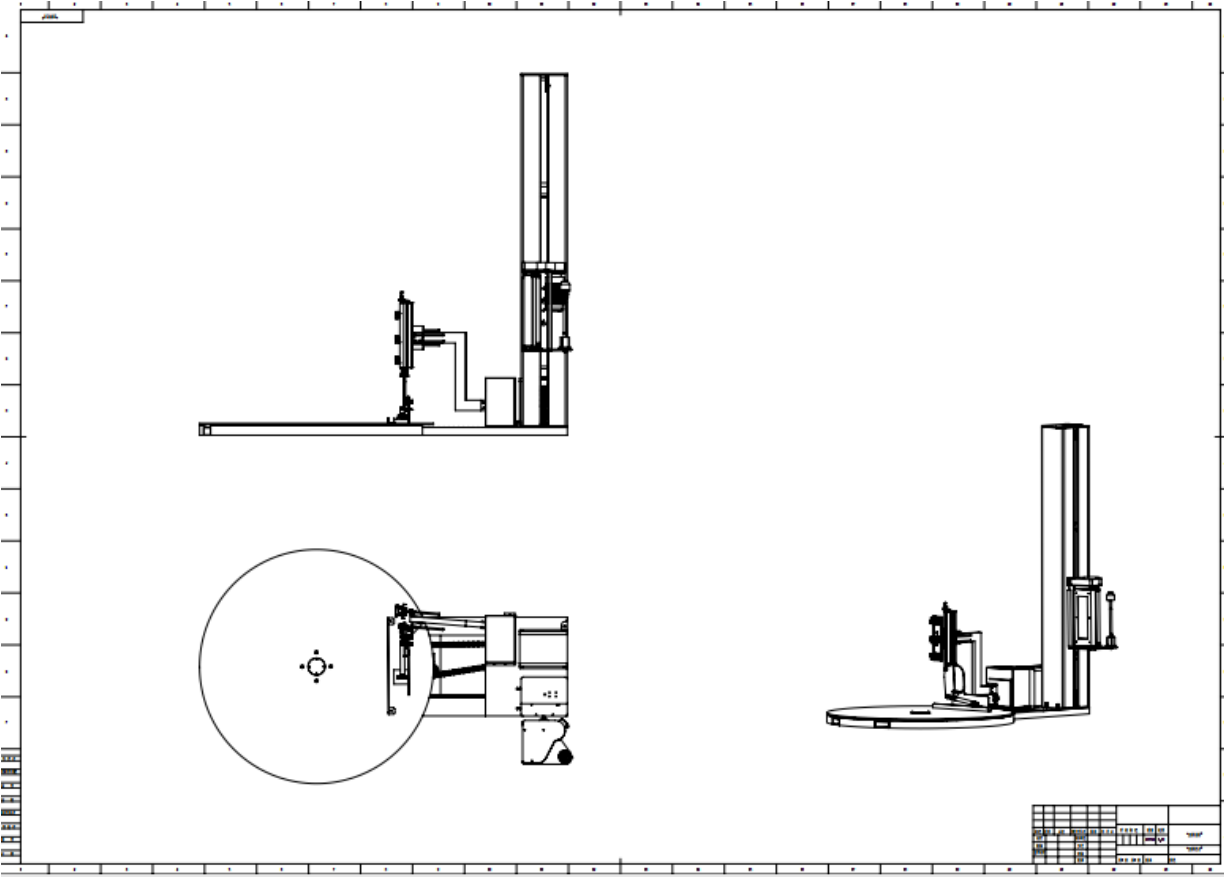
Regularly check the electrical and electrical connections and clean the electrical cabinets

§11 Maintenance record

Date	Project	User	Remark

§12 Appendix

1、Schematic diagram



2、Pneumatic schematic

