Fixed Length Control System

Uni-path & Bi-path

Operating Instructions

Wenzhou Lianjie Electrical Technology Co., Ltd.

I. Working Conditions

Voltage: DC12-30V, switch power supply Imp<3A

Power: <3.5W

Input: valid signal on low level, drive current ＞5mA, external function buttons connected with related input port and ground, or with 24V sensor.

Output: valid signal on low level, external relay connected with +24V and signal port, 3A output current

II. Start-up Screen

Before power on, make sure voltage is within rated range, check power polarity and ports. The start-up screen (Fig.1) shows at power on. Touch screen switches to standby page (Fig.1) if no action happens in some time or clicking any position.

Start-up/welcome screen

Fig. 1

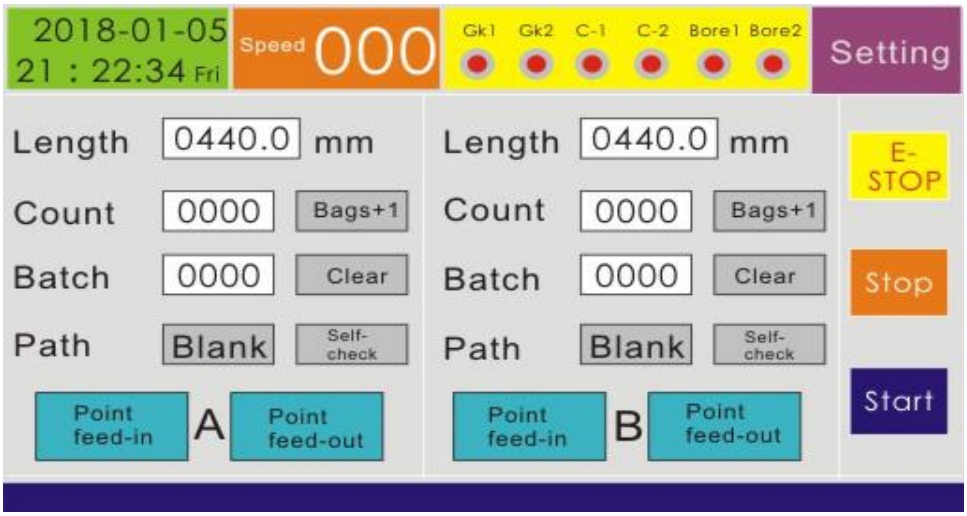


Fig. 2

1. Introduction to Pages

Current time and date is showed in the green zone at the top left of the page. The orange zone shows working speed on start-up and speed setting when analog controls machine. The top yellow zone shows key signal indicator of machine. Parameter setting button is at the top right, click setting to enter controller parameter. Data of path A and path B are shown in bottom left and middle zone, where parameters like bag length and color are set and actions like point moving and self-check are set. Buttons like Start, Stop, and Emergency Stop are on the right zone, button functions are same as the one of external buttons.

2. Main Motor Speed Setting

There are two modes for speed setting, potentiometer setting and touchscreen button setting. Method of button setting is, click speed zone in fig.2, digit keyboard pops out like fig.3, enter speed and click OK to set, if CANCEL is clicked, the digit keyboard is closed and speed is not changed. If there is typo, click DELETE to erase wrong number and re-enter correct one. The input data is shown above the digit keyboard for checking. The following parameter setting method is similar to this one.

3. Length Setting

The path bag length is shown after Length A, Length B with unit as millimeter and accuracy as 0.1MM. Click data area to input length and set it.

4. Count, Complement, Batch & Clear

All the data in the screen are real-time working data, the number increases by one automatically if feeding-in happens under normal working. If one unqualified product is found and removed manually, press “complement” the number decreases by one automatically. In this way, quantity of each patch equals with setting value. Value after batch shows batch number produced by current path. Click CLEAR button and table like fig. 4 pops

out to clear COUNT or BATCH, click Red Cross at the top right corner to close clearing page.

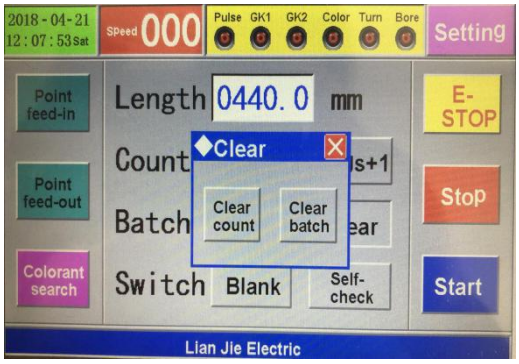


Fig. 3

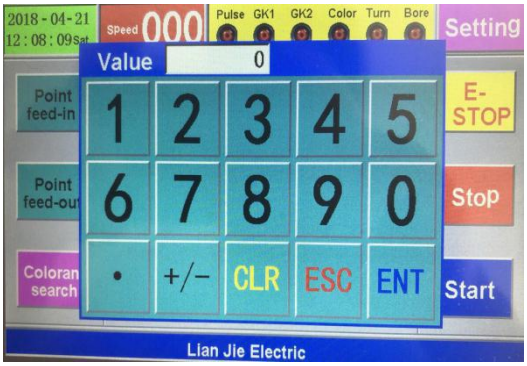


Fig. 4

5. Multicolor Bag, Single Color Bag, Self-check, Point Feeding

There are Multicolor bag and single color bag switch buttons for Path A and Path B. Click Blank button to switch modes of Blank(single color), Light Color Track and Dark Color Track. Blank (single color) means current bag is of one color and no color track, light color track and dark color track means current bag is of multi-color. Click L-color track or D-color track to switch colorant track signal, with the same function of photo-electricity sensor.

Under multi-color modes, click Self-check and servo stops automatically at colorant, if keep pressing Self-check, servo do not stop till the next colorant after loosing Self-check. The servo working length is calculated, which is also the length between two adjacent colorants, machine can be started directly and work with self-check length if the self-check length is correct and auto saved. If the self-check length is not correct, click Stop or Emergency Stop before machine starts, the length returns to previous one. Under Blank (Single color) mode, function of Self-check button is same as function of Point Feeding.

Under Blank (Single color) mode, Point Feeding-in and Point Feeding-out button is only for point feed, servo runs in relevant direction after clicking point feeding buttons, servo runs at low setting speed if keep pressing Point Feeding-in or Point Feeding-out, when the pressing time exceeds low speed point-feeding time, servo accelerates to high setting speed, servo stops after loosing buttons. Under multi-color modes, Point Feeding-in can search for colorant automatically. Click Point Feeding-in button and servo stops at colorant or one more clicking even not at colorant. Point Feeding-out function under multi-color modes is the same as the one under Blank (Single color) mode.

6. Start, Stop, Emergency Stop

Machine can be started or stopped from touch screen or external buttons. Click Start and the starting confirmation page pops like Fig.5 pops out, the confirmation page shows " are u sure to start machine?", click "Yes", startup delay begins, beeper alarms and starting confirmation page closes. Machine starts working when delay period reaches startup setting time. If machine is started by external Start button, there will be no starting confirmation page, keep pressing Start button for startup delay period, beeper alarms at the same time, and then machine starts.

If click Stop button in touch screen or press external Stop button when machine is working,

machine stops with cutter at high position. If click Emergency Stop button in touch screen or press external Emergency Stop button, main motor and servo motor stop immediately whatever status machine is in.

7. Setting

Click the pink Setting button at the top right corner to the parameter setting page like Fig. 6. Parameter setting with different authorities can be done in Fig. 6.

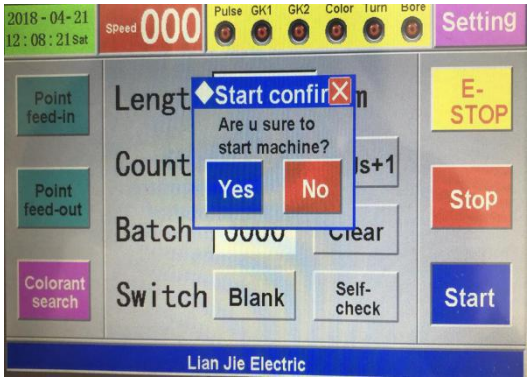


Fig. 5

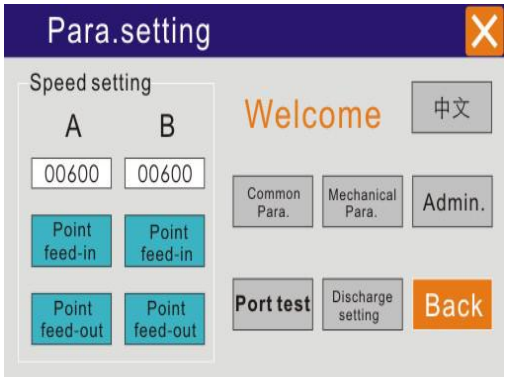


Fig. 6

III. Parameter Setting Screen

The left part of parameter setting screen are point feeding speed setting and point feeding buttons, click input box, the digit keyboard pops out, and then input point feeding frequency. The point feeding buttons are same as point feeding buttons in standby page.

There are Common Parameter Setting, Mechanical Parameter Setting, Administrator, Port Test and Feeding Setting buttons in parameter setting screen, relevant parameters can be set in the screen. Common Parameter Setting and Port Test page can be entered without password, Mechanical Parameter Setting and Feeding Setting page can only be entered with password, and parameter in Administrator Page can only be revised under machine supplier's instruction, otherwise it will cause machine abnormal.

1. Common Parameter Setting (entered with no password)

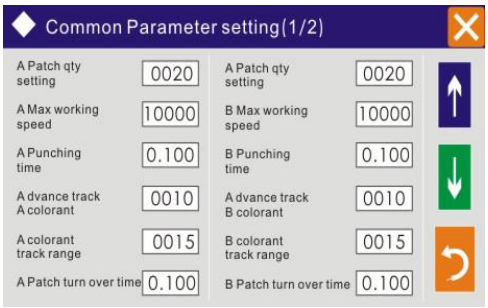


Fig. 7

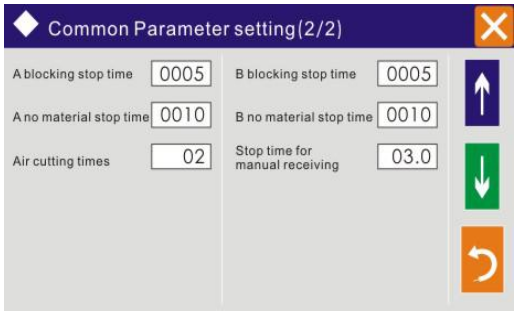


Fig. 8

Patch Qty Setting: qty setting of one patch bag

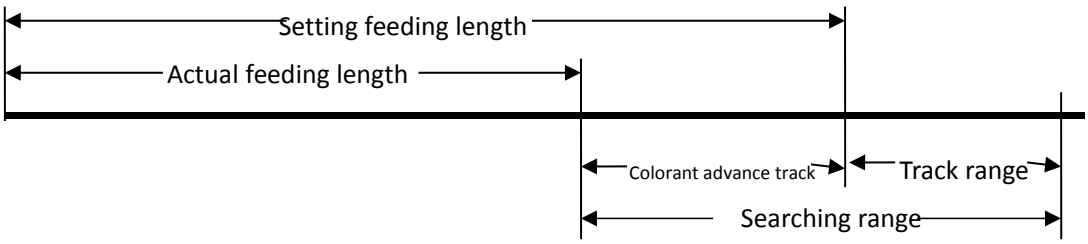
Max Working Frequency: max working frequency of servo at starting, too high frequency may cause stepping motor lose step and too low frequency effects working efficiency, so appropriate frequency can be set according to actual load. (Unit: Hz)

Punching time: punching time setting, this parameter can be neglected if machine does not have this function. (Unit: second, accuracy: 0.001 second)

Colorant advance track: length before colorant track signal is on under multi-color modes. (Unit: millimeter)

Colorant track range: tracking length setting, if colorant is tracked within this length, then the colorant is valid, otherwise machine will alarm, after qty of bags with no colorant reaches setting number, machine stops and alarm indicates in touch screen. (Unit: millimeter)

Colorant searching range



Turn over time: turning-over signal time at full patch (Unit: second, accuracy: 0.001 second)

Blocking stop time: if machine is with blocking detection sensor and it has no signal at working, machine stops and alarms automatically, alarm indicates in touch screen, when blocking sustains for setting time, when blocking sustains for setting time. (Unit: second)

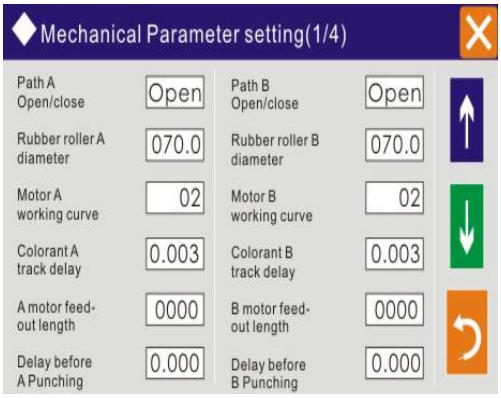
No material stop time: if machine is with material checking sensor and there is no signal at working for setting time, machine stops and alarms automatically, alarm indicates in touch screen.

Air cutting times: it is valid when machine working mode is “0”, i.e. machine do no stop at full patch, air cutting starts and feeding-in stops, turning-over starts. If the air cutting setting times is zero, then there is no air cutting. Machine alarms ahead of full patch and continue next patch after full patch.

Stop time for manual receiving: it is valid when machine working mode

is “1”, i.e. machine stops with cutter at high position when the last bag of the patch is cut. When the stopping time reaches the setting time (>0), machine re-started. If setting time is 0, machine only re-starts working after pressing “Start”. (Unit: second, accuracy: 0.1s)

Mechanical Parameter (Fig. 9 to Fig 12, enter with password, initial password is 1)



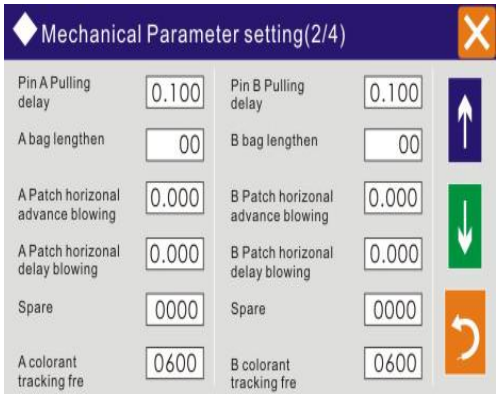


Fig. 9 **Fig. 10**

Path A (B) open/close: click the switch button to open or close path, if this switch button is not in the screen, then it is fixed that path A is open with path B closed.

Rubber roller diameter: input the feeding-in roller diameter to controller, controller calculates perimeter and working rounds of the roller. Input roller diameter= actual roller diameter*motor wheel gear number/ roller gear number (Unit: millimeter, accuracy: 0.1MM)

Motor running curve: starting pulse setting, the bigger the value, the smoother the starting, the slower the starting, vice visa.

Colorant track delay: if servo is feeding-in, machine runs fast before colorant track. Tracking pulse is sent out after controller pulse finishes sending, but servo motor is still running fast since it is not stopped, so tracking sensor can only be open after some time to make sure the colorant is tracking by sensor with tracking speed.

Motor feed-out length: it is valid when machine working mode is “0”, machine feeds-out the setting length at full patch and air cutting. The length is made up to the first bag after air cutting. (Unit: millimeter)

Delay before punching: due to inertia, servo does not stop completely after feeding-in, if punching signal is open directly, the punching hole will be

stretched since bag is shaking. To avoid the stretching, there shall be a punching delay setting after feeding-in. (Unit: second, accuracy: 0.001s)

Pin pulling delay: pin is pulled before patch is turned over, to avoid the last bag is not fully cut at pin pulling, there is a delay setting before pin pulling. (Unit: second, accuracy: 0.001s)

Bag lengthen: under Blank (Single color) mode, the last bag is lengthened for a setting length to reduce the manual separation time. If the setting is zero, there is no lengthening for the last bag. (Unit: millimeter)

Patch horizontal advance blowing: if there is horizontal blowing signal, it is opened a setting time before feeding-in to avoid difficult feeding-in. (Unit: second, accuracy: 0.001s)

Patch horizontal delay blowing: not valid

Colorant tracking frequency: pulse sending frequency setting at colorant tracking. The bigger the setting is, the faster the tracking is and the more over-tracking is, vice visa. (Unit: Hz)

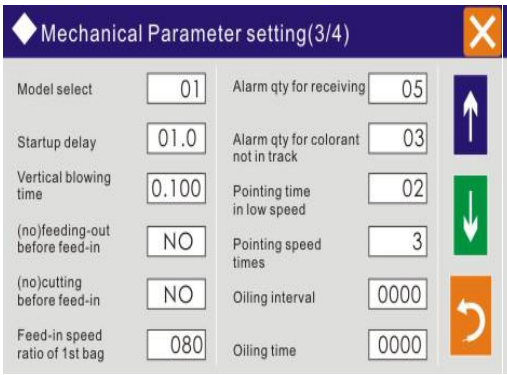


Fig.11

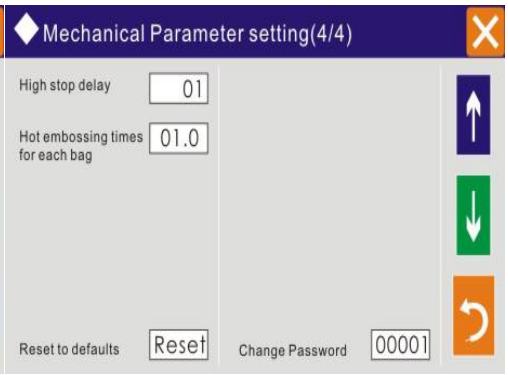


Fig. 12

Working modes: 0 is machine do no stop at full patch, 1 is machine stops with cutter at high position when the last bag of the patch is cut. There is mode “2” under Uni-path screen, i.e. machine starts feeding-in immediately once the sensor GK1 signal is cut off, and the main motor starts running after feeding-in finished. The stopping time at full patch is the same as that of mode 1. There is no mode “2” under Bi-path screen.

Startup delay: to avoid personnel damage due to sudden startup, there is a delay for startup and beeper alarm to remind safety. (Unit: seconds, accuracy 0.1s)

Vertical blowing time: the vertical blowing time at hot cutting under working mode 0. (Unit: seconds, accuracy 0.1s)

(no) feeding-out before feeding-in: not valid

(no) cutting before feeding-in: if the setting is NO, machine starts feeding-in and then main motor starts. If the setting is Yes, main motor starts before feeding-in.

feeding-in speed ratio of 1st bag: it is only valid under the condition that feeding-in happens before startup. If the servo working setting speed is 10000 Hz and this ratio is 80%, then the feeding-in speed of the first bag before startup is 80% of the setting working speed, i.e. 8000Hz, then the feeding-in speed of the second back is normal.

Alarm qty for receiving: quantity for receiving alarm before full patch. If the setting value is 5, machine starts alarming 5 bags before full patch.

Alarm qty for colorant not in track: quantity for alarm and machine stopping when colorant is not in track. If the setting is 3, beeper alarms when there is one abnormal colorant tracking. And continuous 3 abnormal colorants tracking, machine stops and alarm shows in touch screen.

Pointing time in low speed: if click pointing buttons when machine stops, machine starts pointing at the setting frequency. If the pressing time exceeds the setting time, machine switches to high speed pointing automatically. Loose the button and click it once more, machine returns to low speed. (Unit: seconds, accuracy 0.1s)

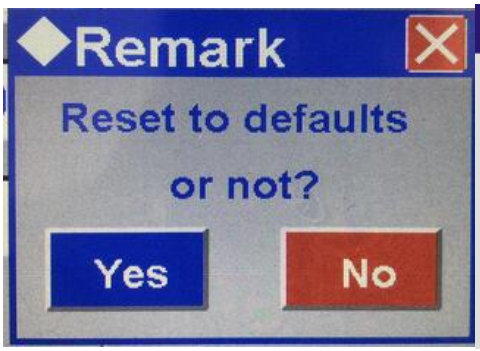
Pointing speed times: when the pressing time exceeds the setting time, machine runs at a high speed, this setting is the high speed times to low speed.

Oiling interval: not valid

Oiling time: not valid

Reset to default: factory default can be restored after the parameters are at a mess, click this button and page (Fig 13) pops out, click Yes to restore factory default, click NO or the red cross at the top right corner to close resetting page.

Password revision: revise password entering mechanical parameter page, please remember the revised password.



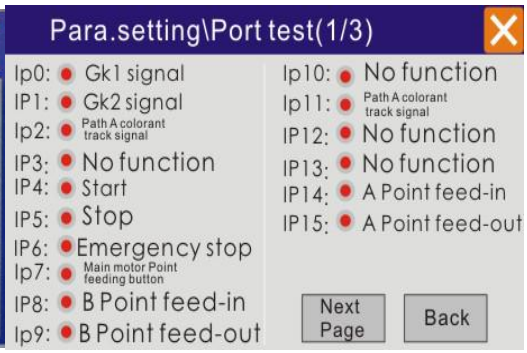


Fig. 13 **Fig. 14**

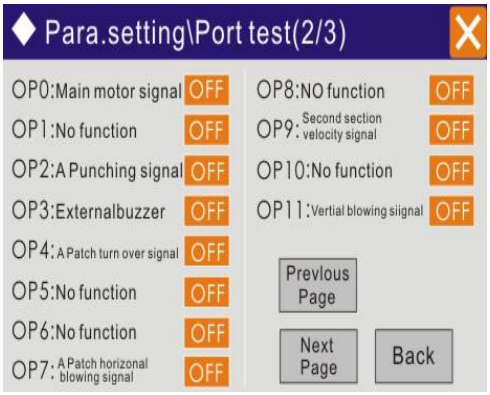
2. Administrator

Parameters within administrator's authority shall only be revised under supplier's instruction, otherwise it may cause abnormal working.

3. Port test (Fig. 13, Fig. 14, Fig. 15)

The port test page can only be entered when machine is stopped. After the port test page is entered, all the input & output are not in the control of program. Input signal program is not in control, output signal is closed and manual controlled. Analog ready and writing is cut off and the analog test is manual controlled.

The first page of port test is input port test (Fig. 14), all the ports and its relevant setting function is showed in the touch screen, and there is an indicator for each port to show signal input. If there is input signal, indicator is green, otherwise it is red. Take Start signal for example, when the external Start button is pressed, the starting port indicator turns green, but controller does not conduct Start action. This page is only for checking the input port manually.



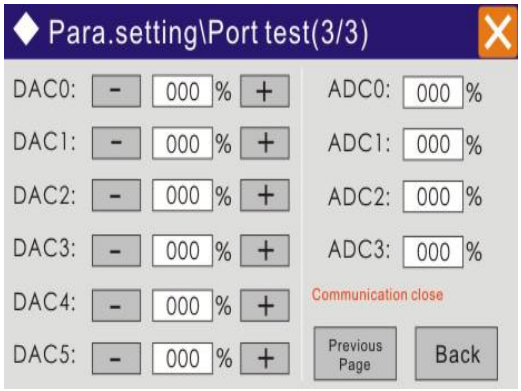
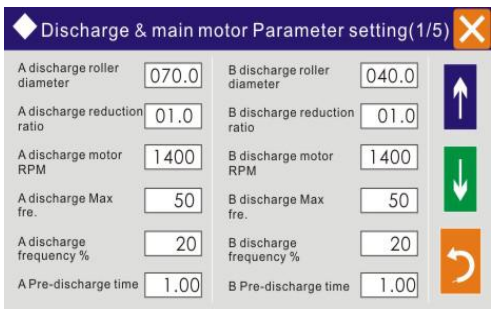


Fig. 15 **Fig. 16**

The second page of port test is output port test (Fig. 15), all the ports and its relevant setting function is showed in the touch screen. The ON/OFF button after port name is to open/close output port manually. No matter how many ports are open or closed in manual page, all the opening ports are closed automatically after exiting the manual page.

The third page of port test is analog module test page, left is DAC output controlling, right is ADC analog collection. Analog output can be a ratio, for example, if DAC0 is 0-10V, and the ratio is 20%, then the actual analog output voltage is 10*20%=2V. The ratio can be set by clicking the "+" or "-", it increase or decrease by one for one clicking, increase or decrease continuously by keeping pressing. The actual analog output voltage changes accordingly after the ratio is changed. The ratio can also be set by clicking it and entering the ratio directly. The actual potentiometer voltage (display 0-100%) can be seen in the right analog input port page and the communication status is showed under analog input part. If the communication is abnormal, then the reason is showed there. The communication can be closed in administrator parameter setting page. If machine is without analog control unit, then the analog communication is closed in factory default and the manual analog function is invalid.

4. Discharge setting (Fig. 17 to Fig. 20)



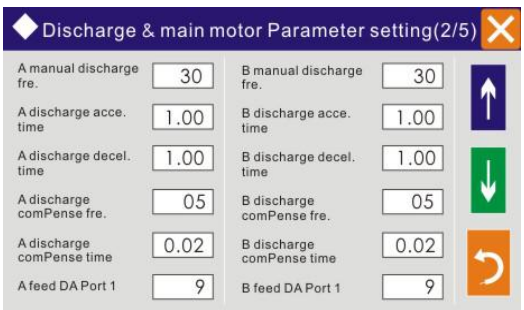


Fig. 17 **Fig. 18**

Discharging roller diameter: setting method same as the one of servo roller

diameter setting. (Unit: millimeter, accuracy, 0.1mm)

Discharging reduction ratio: discharging reduction gearbox ratio setting

Discharging motor RPM: discharging motor rated RPM setting. The setting is under rated frequency, if the max frequency is changed, the max RPM shall be re-calculated.

Discharging Max frequency: max output frequency inverter set (unit: Hz)

Discharging frequency%: if the discharging signal is blocked at machine startup, discharging motor runs in low speed, which is the normal speed timing this percent.
Pre-discharging time: discharging motor can work with manual discharging frequency during startup delay, and stops working after the pre-discharging time, then restarts working with speed calculated by production.

Manual discharging frequency: discharging speed at manual guiding when machine stops.

Discharging acceleration time: time it taking for discharging frequency accelerated from 0 to max frequency. (Unit: second, accuracy: 0.01s)

Discharging deceleration time: time it taking for discharging frequency decelerated from 0 to max frequency. (Unit: second, accuracy: 0.01s)

Discharging compensation frequency: due to acceleration time in working, slow discharging resulted and compensation to discharging needed. If the needed discharging frequency is 20Hz, and the compensation setting is 3Hz, then the actual frequency during acceleration is 23Hz, after working with 23Hz for some time, the frequency will decrease to 20Hz. (Unit: Hz)

Discharging compensation time: time working with compensation frequency, when the discharging frequency works with 23Hz for this setting time, it starts decreasing to 20Hz. (Unit: second, accuracy: 0.01s)

Discharging DAC port: actual analog output port for discharging

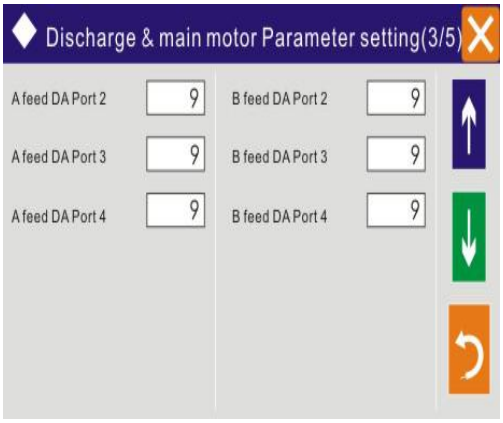


Fig. 19

Main motor speed adjusting mode: potentiometer adjusting mode and touch screen setting mode, the first mode shall have adjusting potentiometer connected to the relevant input port, the second mode is to enter the required speed to standby page.

Main motor RPM: main motor rated working speed, setting method same as discharging motor speed setting.

Motor potentiometer port: when the main motor speed is adjusted by potentiometer, connect potentiometer to this port to adjust main motor speed.

Main motor DA output port: main motor analog actual input port setting.

Main motor max frequency: max rated output frequency setting of main motor inverter, setting method same as discharging motor. (Unit: Hz)

Signal abnormal stop: machine alarming and stopping if discharging motor has not signal for a long time, touch screen showing abnormal reason.

Discharging adjusting frequency: this parameter working with the following one, if the signal does not change after several continuous bags at startup, the output frequency of discharging motor starts adjusting automatically. If there is no signal for several continuous bags, the frequency increases, otherwise, it decreases. Each increasing or decreasing equals this adjusting frequency.

Discharging adjusting qty: working with above parameter

Main motor adjusting interval: only valid when main motor speed is adjusted by touch screen setting, not valid under potentiometer adjusting mode. Since there is possibility that analog input voltage of inverter does not match with the actual output frequency, the actual measured speed is compared with setting speed, if the actual speed is slower, the main motor speed will accelerate automatically, vice

visa.

Main motor adjusting starting %: only valid when main motor speed is adjusted by touch screen setting, not valid under potentiometer adjusting mode. If the main motor analog output frequency is 10Hz and this percentage is 80%, then machine starts and keeps working with 10*80%=8Hz till the actual working speed is measured to be bigger than 0. After that, machine starts adjusting to setting speed, the adjusting interval refers to above parameter.

Hall sensor installation

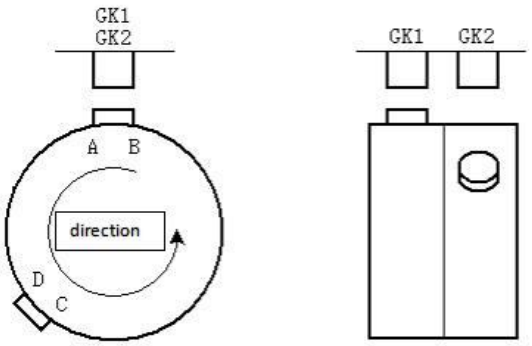
Hall sensor is the key element to coordinate main motor and shaft motor, reflect information like cycle time, phase etc. Hall sensor is actually a time distributor. If there is deviation of these information, machine coordination is effected, which leads bad performance and low efficiency. Installation reference is as below.

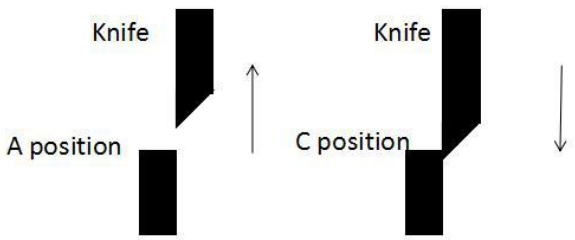
Position A: cutter opening, initial position of feeding-in, feeding in shall finish before position C, otherwise machine stops for over-speed.

Position B: cutter position at all kinds of stopping action. Cutter will stop at position B due to inertia with highest point.

Position C: cutter descend position, feeding in limit position, position for punching sensor about to touching cutter, position where turning-over signal is over. If mechanically approved, make C as near to A as possible to improve efficiency.

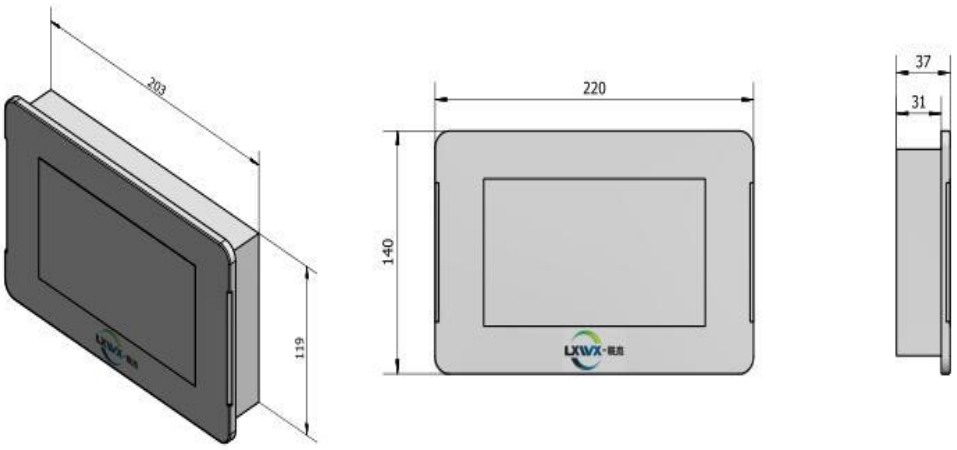
Position D: for special model





Installation

1 Dimension (unit: mm)



2 Installation Hole (unit: mm)

User can adjust hole per final machine, the following draft is for reference.