



EXT202-K

Small Package Controller Instruction Manual

EXT202-K-92001



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Company web site: <http://www.szamp.com.cn/>

This product carries out the standard:

GB/T 7724-2008 National standard of <electronic weighing instrument>

JJF1624-2017 Type evaluation outline of <digital weighing indicator (weighing indicator) >

JJG649-2016 Verification regulation of digital weighing indicator (weighing indicator)



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1. Basic Information

1.1. Features and Specifications

EXT202-K is a small package controller designed for industrial weighing. The controller has the characteristics of small size, stable performance and rich interfaces. It can be widely used in industrial field small package linear scales and other equipment.

EXT202-K has the following basic characteristics:

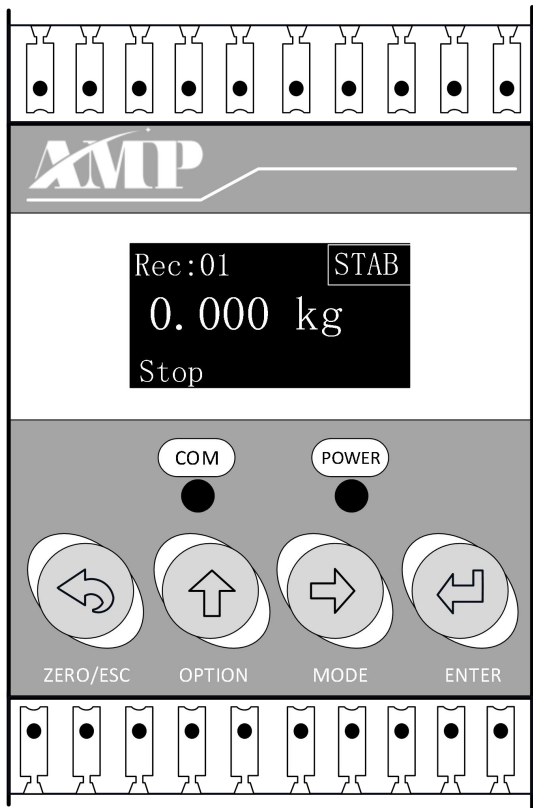
- Working voltage: DC24V
- Weighing channel: single channel
- Sensor: DC5V/4-wire resistance strain bridge weighing sensor
- Switch quantity: 3 inputs/5 outputs
- Standard communication interface: standard serial port RS485.
- Optional, you can choose one of the following two forms:
 1. Optional analog output: two analog output interfaces (optional voltage or current) to control the vibration feeder.
 2. Optional serial port: You can choose to add one more serial port (RS485 or RS232).
- Installation method: DIN35 snap-on installation

The detailed technical specifications are as follows:

Transducer Excitation	DC5V $\pm$ 10%/120mA Drive current/can receive eight Ω 350 specifications of the sensor
Adaptive Sensor Sensitivity	2mV/V or 3mV/V
Input Signal Range	0~15mV

Minimum Input Sensitivity	0.5uV/d
Nonlinearity	0.02%FS (3mV/V hour)
Zero Drift	<0.5μV/°C
Gain Drifting	<10PPM/°C
AD Rate	960Times/Seconds
Maximum Accuracy of Display	1/100000
Product Accuracy Grade	Ⅲ
Working Voltage	DC24V (18V~30V compatibility)
Product Power Consumption	<5W
Operating Temperature Range	-10°C~45°C
Storage Temperature	-20°C~60°C
Humidity	Within 90%RH (No Condensation)

1.2. Front panel



The front panel of the instrument consists of an LCD display, 2 indicator lights and 4 buttons. The following are the instructions:

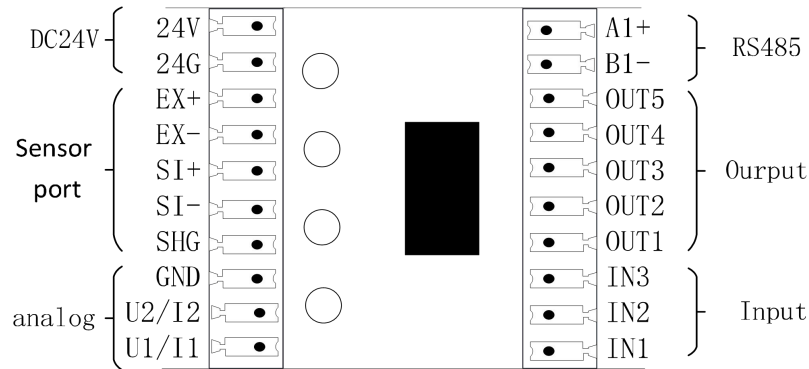
Indicator lights	
Comm	The indicator lights up once when the serial port receives a command and responds
Power	Long on when powered on
Buttons	
	1. Press the button once in the menu interface

Clear/Exit	to exit to the previous menu. - Press the button once in the standby state to perform the zero operation. - Press and hold in the standby state to perform the zero calibration operation. - In the numerical input interface, press and hold to clear the input data. - When there is an alarm message, the alarm can be cleared.
 Select/Up	- In the menu and selection interface, move the cursor up. - In the numerical input interface, add 1 to the flashing number.
 Mode/Down	- In the menu and selection interface, move the cursor down. - In the numerical input interface, move the flashing cursor to the right.
 Confirm	- Menu and selection interface, confirm to enter the current option. - Numerical input and option interface, confirm to save the current data.

1.3. Wiring port

The controller has two expansion boards for selection: "analog" and "serial communication".

1. When analog is selected, the wiring port is as shown in the figure below:

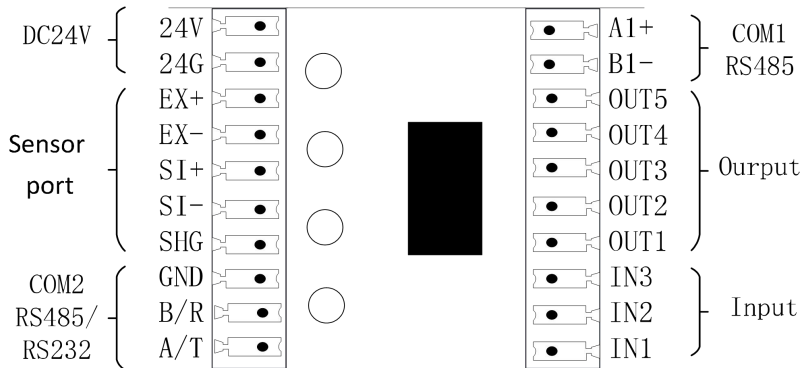


The wiring port description is as follows:

Category	interface	instructions
DC24V	24V	DC24V+
	24G	DC24V-
Sensor port	EX+	Load Cell Excitation+
	EX-	Load Cell Excitation-
	SI+	Load Cell Signal+
	SI-	Load Cell Signal-
	SHG	Load Cell Shielded Wire
Analog (Optional voltage or current)	GND	A0 GND
	U2/I2	The positive terminal of analog output 2 Configured as voltage: U2 Configured as current: I2
	U1/I1	The positive terminal of analog output 1: Configured as voltage: U1 Configured as current: I1
	Note: In the following sections, the description and explanation of parameters will be illustrated using the optional	

	voltage as an example.		
COM(RS485)	A+	RS485 A+	
	B-	RS485 B-	
Output port	OUT1	Output 1	Q4. med
	OUT2	Output 2	Q5. fine
	OUT3	Output 3	Q14. feed end
	OUT4	Output 4	Q10. Disc Open
	OUT5	Output 5	Q9. Disc (Lock)
Input port	IN1	Input 1	I15. Run/SlowStop
	IN2	Input 2	I7. Disc enable
	IN3	Input3	I8. Disc close OK

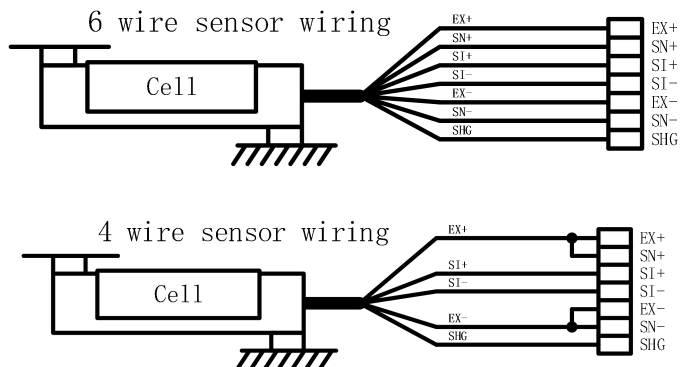
2. When serial communication is selected, the wiring port is as shown in the figure below:



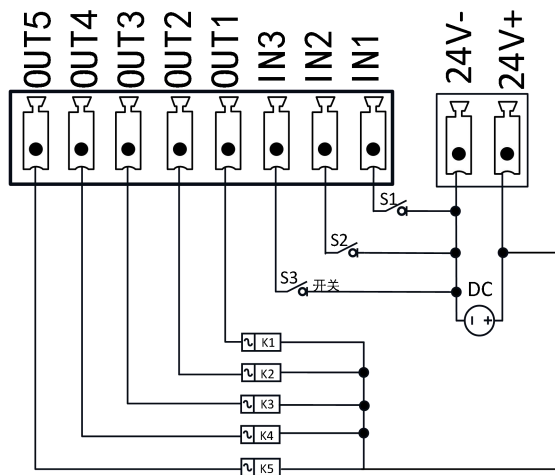
Category	interface	instructions
COM2 (Optional RS485 or RS232)	GND	RS232 GND
	B/R	Optional RS485 is B- Optional RS232 is RXD
	A/T	Optional RS485 is A+ Optional RS232 is TXD
	Note: When optional serial COM is selected, there will be no analog output-related parameter	

settings. No further special explanation will be provided in the following text.

1.3.1.Sensor wiring method



1.3.2.IO wiring and definition



The external circuit drive input switching quantity should meet two points, as follows:

1. The external circuit must be co-located with the controller;
2. When the input power of the external circuit is low, the input is valid; otherwise, the input is invalid.

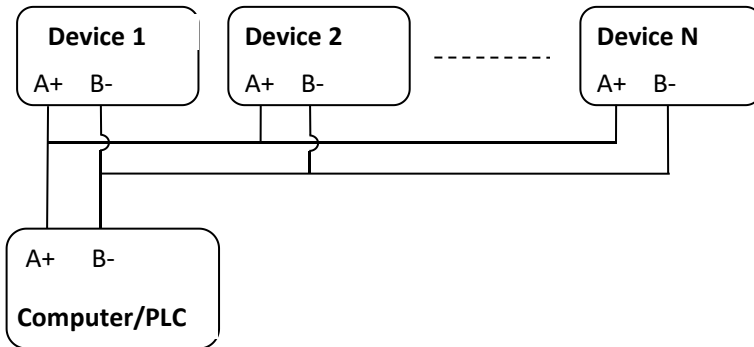
The external circuit driven by output switching quantity should meet two main points:

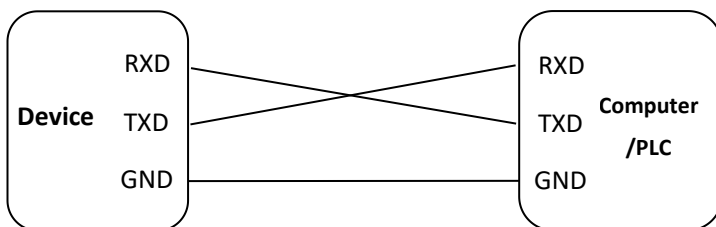
1. The external circuit should be co-located with the controller;
2. Low level when switching quantity output is active.

Note: the maximum driving capacity of each switch output is 500mA. Please pay attention to the power of the load when connecting the load. If the power exceeds the driving capacity of the output, the switch output may be damaged.

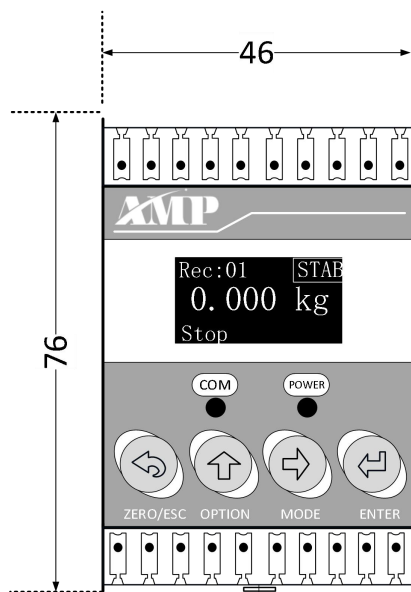
1.3.3. Serial Port Wiring Method

RS485 Wiring Diagram:



RS232 Wiring Diagram:

1.4. Installation Dimensions



High: 105

Unit: mm

2. Function menu

Press the  key in the standby interface to enter the function menu selection interface, where you can set and view the various function configurations of the controller. The main menu is shown in the table below:

No.	Item	Description
1	Basic Wt	Basic parameters for weight collection and processing.
2	Calib	Weight calibration related operations.
3	Ctrl para	Function process control related parameters.
4	Recipe	20 groups of product formula parameters.
5	AI pack	AI machine learning smart packaging function settings.
6	IO	Switch quantity function definition and port test.
7	Analog	Analog quantity output range and calibration.
8	Comm Port	Communication serial port related parameter settings.
9	Acc & Bat	Cumulative data and preset batch viewing and setting.
10	Reset& password	Reset controller parameters and parameter page password settings.
11	System	System language selection and version view.
12	Step motor	Stepper motor control parameter settings

In [10 Reset& password], each project has a password function, and you can choose whether to open the entry password for the project.

All passwords are factory defaulted to "000000".

2.1. Basic weighing parameters

Parameters for weight signal acquisition and processing related functions are set in this project.

1.1	Zero range	0~9d;Only in the stop state, the weight value is stable in the set value × D (minimum indexing value) within the positive and negative range of automatic zeroing.	
1.2	Zeroing Range	0~99%;The weight must be less than or equal to Maximum measuring range x Clearing range.	
1.3	Stable Range	1~9d	These two parameters work together to determine whether the weight is stable. Take all the weight values within the "stable time", and the difference between the maximum value and the minimum value is ≤"Stable range", the weight value is considered stable at this time.
1.4	Stable Time	0.1~9.9s	
1.5	Filter stop	0~9; Software digital filter intensity level in Disc state. Set the appropriate filtering level parameter value based on the actual debugging performance of the equipment. 0: Weakest filtering, fast weight response, poor vibration resistance; 9: Strongest filtering, slow weight response, effective vibration resistance.	
1.6	Filter Run		
1.7	Power zero	After it is turned on, the controller will automatically perform a zeroing operation every time it is powered on and powered on.	

2.2. Weight calibration

In this project, weight calibration related operations are performed. When this product is installed and used for the first time or there are any changes in the scale structure, such as replacing the sensor or weighing platform, a weight calibration operation should be performed to ensure accurate weight display.

No.	Parameter	Description	Initial
1.1	point	①0/②0.0/③0.00/④0.000/⑤0.0000 Select the decimal number for the system weight.	③0.00
2.2	unit	①g/②kg/③t/④lb; Select the unit for the system weight display.	②kg
2.3	Min-Div	①1d = 1/②1d = 2/③1d = 5/④1d = 10/⑤1d = 20/⑥1d = 50 Select the minimum separation value displayed by the system weight.	①1d = 1
2.4	Max range	Set the maximum weighing range. If the weight exceeds the set maximum range, the weight overflows "OFL"	100.000
2.5	Loadcell Vol	Displays the voltage signal size of the current sensor input. ADOFL Or ADOFL means that the current sensor signal is abnormal.	
2.6	Zero clb	 Empty the scale table zero according to confirmation.	
2.7	Gain clb	Place objects with known weight on the weighing platform for gain calibration.	

		 Enter the exact weight of the put object after confirmation.	
2.8	Comm.clb	① OFF : Calibration operations via serial communication are not allowed. ② On : Calibration operations via serial communication are allowed.。	

2.2.1.Weight calibration process

1. Set the weight decimal point, unit, minimum division, maximum range and other parameters used by the system.
2. Calibrate the empty scale.

Enter the [2.6 Zero Cal] interface, as shown below:

```

2.6 Zero Clb
Abs:  0.120 mV
Wt:   0.121 kg
 
  
```

The main display shows the absolute voltage of the current sensor .

At this time, clear the scale and keep the sensor voltage stable.

Press the  key and the controller starts collecting signals for empty scale calibration. Complete the zero calibration and displayed below: “Zero Clb OK”.

Weight calibration.

Enter the [2.7 Gain Cal] interface, as shown below:

2.7 Gain Cal	
Gain:	0.359 mV
Wt:	0.340 kg
 input	 Clb

The main display shows the current sensor voltage relative to the empty scale.

At this time, put the weight on the scale, the relative voltage value of the sensor increases, wait for the displayed voltage

value to stabilize, press the , and input weight :

2.7 Gain Cal	
Gain:	0.359 mV
Wt:	0.340 kg
	000.000kg

After entering the weight, press the  to complete the weight calibration, and automatically calibrate the voltage relative to the zero point and the input weight.

2.2.2. Quick calibration of empty scale

In the stop state, press the  key to switch to the single-channel display interface that needs to be calibrated for the empty scale, press and hold the controller  key for about 2s, and release it after hearing a long buzzer sound, and the current state can be quickly calibrated to zero.

Note: The weight needs to be stable when quickly calibrating the empty scale.

2.2.3. Calibration Notes

1. When calibrating an empty scale or a weight, the normal sensor voltage range is greater than 0mV and less than 10mV (15mV for a sensor with a sensitivity of 3). If the sensor voltage displays 0mV or exceeds 10mV, it means that the current sensor signal is abnormal. You should check whether the sensor line connection and installation are normal and whether the sensor is damaged.
2. During the calibration of empty scale and weight, the displayed sensor voltage must be stable and not fluctuate before the calibration operation can be performed. If the sensor voltage is abnormal and keeps fluctuating, check whether the sensor line connection and installation are normal and whether the sensor is damaged.
3. Empty scale calibration and weight calibration support manual input of sensor voltage value for calibration. Just press  keys according to the prompts on the calibration interface.

2.3. Control parameters

This project sets all parameters related to the equipment process control function.

2.3.1. Feeding start

Related function settings before feeding starts.

No.	Parameter	Description	Initial
3.1	Feeding start		
3.1.1	Start Dly	0~9999ms After starting the operation, the delay time before feeding starts.	500

3.1.2	Zeroing intvl	0~999 After each several packaging processes, perform a zeroing before feeding starts. Note: The first scale after startup is not zeroed.	0
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2.3.2. Feeding process

Set the output mode of the relevant feeding signal.

number	Parameter	Description	Initial value
3.2	Feeding process		
3.2.1	Signal SW	① IO & Analog ② only IO	② only IO
3.2.2	Feed mode	① Combination: Fast: fast, med and fine feeding are effective Med: med and fine feeding are effective Fine: fine feeding is effective ② Independent Fast: fast feeding is effective Med: med feeding is effective Fine: fine feeding is effective	① Combination
3.2.3	Feed speed(analog)	By REC ☒ SP1 ☐ ☐ SP2 ☒ ☒ SP3 ☐ ☒ Press  and  to switch lines, and  to check or uncheck.	

3.2.4	Feed speed(IO)	By REC ☒ SP1 ☒ ☒ ☒ SP2 ☐ ☒ ☒ SP3 ☐ ☐ ☒ Press  and  to switch lines, and  to check or uncheck.	
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2.3.3.Setting process

Set the relevant functions in the setting process after the feeding is completed.

No.	Parameter	Description	Initial
3.3	Setting process		
3.3.1	Need stab	①Off ②On: The weight needs to be stable to end the setting process. If the weight is unstable, wait.	① Off
3.3.2	Fix stop	①Off ②On: Return to stop state after setting value.	① Off
3.3.3	O/U check	① Off: Do not perform over-under detection. ② On: Perform over/under detection on the feeding result after each feeding. Over/under is a combination of over and under. During the packaging process, when the packaging result is higher than the target value within a certain range, it is considered over, and when it is	① Off

		lower than a certain range, it is considered under. This range is set according to production requirements.	
3.3.4	Alarm time	0~9999ms; Alarm time when over-tolerance occurs.	1000
3.3.5	O/U pause	① Off ② On When both the over-tolerance alarm switch and the over-tolerance pause switch are turned on, if over-tolerance occurs, the controller will alarm and wait for the user to handle it. At this time, "I5 clear alarm" is input and continue to run, or "I2 stop" signal can be given to return to the stop state for processing.	① Off
3.3.6	Refeed	① Off ② On: When over/under occurs, the refill process will be started.	① Off
3.3.7	Min time	0~9999ms Minimum time of fine output during refilling.	500
3.3.8	Max time	0~9999ms Maximum time of fine output during refilling. If refilling is not completed after this time, the refilling process will be forced to stop.	5000
3.3.9	Pass time	0~9999ms The alarm time for qualified O/U check.	0
3.3.10	ALM DscEn	When the d O/U check alarm occurs, the unloading operation is allowed to be executed	0
3.11	Fast Res	0~9999ms	0

		The alarm time for qualified over-difference detection.	
3.12	Res hold	① Off ② On: During unloading, the display maintains the current loading result and returns to real-time weight display after unloading is completed.	① Off
3.13	Hold filter	0~9 The intensity level of the software digital filter during the fixed value. Set the appropriate filter level parameter value according to the actual debugging effect of the equipment. 0: The weakest filter, fast weight response, and poor anti-vibration effect; 9: The strongest filter, slow weight response, and good anti-vibration effect.	5

2.3.4.Disc process

Related function settings such as Disc control method.

No.	Parameter	Description	Initial
3.4	Disc process		
3.4.1	Disc mode	① Air ② Motor one Dir ③ Motor two Dir For detailed description of each Disc mode function, please refer to the 2.3.4.1 section.	② air
3.4.2	Mtr Ontime	0~9999ms Motor Disc door opening time.	300
3.4.3	Disc Timeout	0~9999ms	5000

		When the motor unloads and Off the door after this time, if the "I8Disc close OK" signal input is still not detected to be valid, it is considered that the Disc door has timed out and an alarm is issued.	
3.4.4	Rerun Dly	0~9999ms The delay time from the completion of Disc to the start of the next feeding process.	500
3.4.5	Rerun mode	① None: [3.4.4 Rerun Dly] Directly start the next feeding process after the time is up. ② zero value: [3.4.4 Rerun Dly] After the time is up, you need to wait for the weight to meet the range of "0±[3.4.6 Zero range]" before starting the next feeding process.	② zero value
3.4.6	Zero range	When the current weight is within the range of "0±[3.4.6 Zero range]", it is considered to be in the zero zone. [3.4.5 Rerun mode] takes effect when it is set to "②zero value".	50
3.4.7	DscEndMode	① Time: After Disc starts, Disc is considered to be completed after the [4.5.5 Disc time] time has expired, and Disc is closed. ② Zero Rng: After Disc starts, when the weight is lower than [3.4.6 Zero range], Disc is considered to be completed after the [4.5.5 Disc time] time has expired, and Disc is closed.	①Zero Rng
3.4.8	DscOn mode	①Disc Enable, wait for the external input "I7. disc enable" signal to start Disc.	①Disc Enable

		②NONE: After the feeding is completed, directly starts Disc.	
3.4.9	Filtering Disc	0~9 The intensity level of the software digital filter during Disc. Set the appropriate filter level parameter value according to the actual debugging effect of the equipment. 0: The weakest filter, fast weight response, and poor anti-vibration effect; 9: The strongest filter, fine weight response, and good anti-vibration effect.	0
3.4.10	Dosc filter	0~9 The intensity level of the software digital filter during unloading. Set the appropriate filter level parameter value according to the actual debugging effect of the equipment. 0: The weakest filter, fast weight response, and poor anti-vibration effect; 9: The strongest filter, slow weight response, and good anti-vibration effect.	3

2.3.4.1. Detailed description of Disc mode

1. Air : The air device controls the action of the Disc mechanism.

Related IO: "Q10 Disc open".

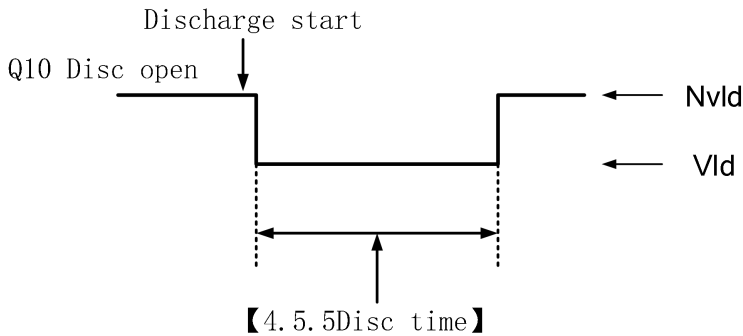
Related parameters: [3.4.6 Zero range], [3.4.7 DscEndMode], [4.5.5 Disc time].

When [3.4.7 DscEndMode] is set to "① Time", the discharge process is as follows:

When the discharge starts, the "Q10 disc open" signal is output to control the discharge door to open. After [4.5.5 Disc time] time, the discharge is considered complete, and the

"Q10 Disc open " signal is turned off to close the discharge door.

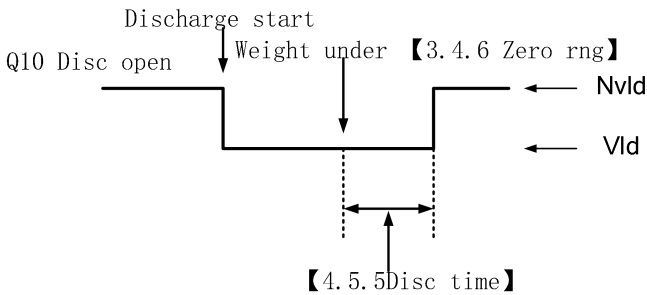
The signal timing diagram is as follows:



When [3.4.7 DscEndMode] is set to "② Zero zone value judgment", the discharging process is as follows:

When discharging starts, the "Q10 Disc open " signal is output to control the opening of the discharging door. When the weight value is lower than [3.4.6 Zero range], and after the [4.5.5 Disc time] time, the discharging is considered completed, and the "Q10 Disc open " signal is turned off to close the discharging door.

The signal timing diagram is as follows:



2. One rotation of the motor: One rotation of the motor controls the

discharge mechanism to open and close the discharge door.

RelatedIO: "Q10 Disc open ", "I8 Disc close OK ".

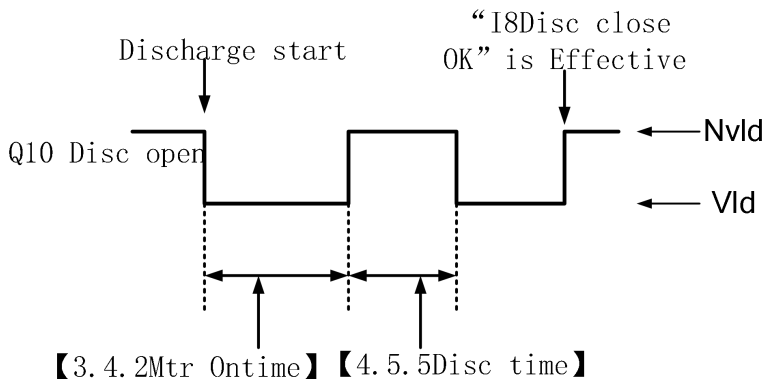
Relevant parameters: [3.4.2 Mtr Ontime], [3.4.3 Disc Timeout],[3.4.6 Zero range], [3.4.7 DscEndMode], [4.5.5 Disc time].

When [3.4.7 DscEndMode] is set to "① Time ", the discharge process is as follows:

When the discharge starts ,the "Q10 Disc open " signal output is valid, and it is considered that the discharge door has been opened after[3.4.2 Mtr Ontime], at this time, the"Q10 Disc open " signal output is invalid, and the discharge is considered to be completed after the[4.5.5 Disc time] time is up, and the"Q10 Disc open " signal output is valid to control the discharge door to close, until the input signal "I8 Disc close OK "is detected to be valid, and the discharge door is considered to be closed in place, the "Q10 Disc open " signal output is invalid, and the discharge process ends.

If the [3.4.3 Disc Timeout] time is exceeded during the closing process of the discharge door, and the "I8 Disc close OK " signal input is still not detected to be valid, it is considered that the discharge door closing timeout has occurred and an alarm will be issued.

The signal timing diagram is as follows:

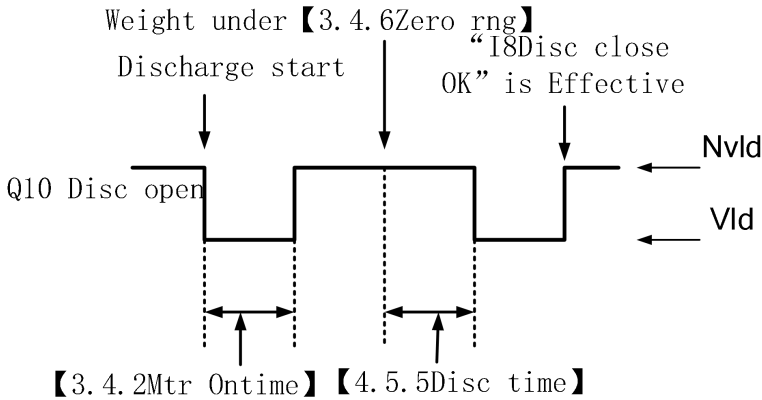


When [3.4.7 DscEndMode] is set to "②Zero Rng", the discharge process is as follows:

When the discharge starts the "Q10 Disc open " signal output is valid, and after [3.4.2 Mtr Ontime], it is considered that the discharge door has been opened. At this time, the "Q10 Disc open " signal output is invalid. When the weight value is lower than [3.4.6 Zero range], and after [4.5.5 Disc time] time, it is considered that the discharge is completed. The "Q10 disc open" signal output is valid to control the discharge door to close. After the input signal "I8 Disc close OK " is detected to be valid, it is considered that the discharge door has been closed in place. The "Q10 Disc open " signal output is invalid, and the Disc process ends.

During the closing process of the discharge door, if the[3.4.3 Disc Timeout]is exceeded and the"I8 Dis Close OK" signal input is still not detected to be valid, it will be considered that the discharge door has closed in a timeout and an alarm will be prompted.

The signal timing diagram is as follows:



3. Motor forward and reverse rotation: The motor forward and reverse

rotation controls the Disc mechanism to open and close the discharge door.

RelatedIO: "Q10 Disc open ", "Q11 Disc close ", "I8 Disc close OK ".

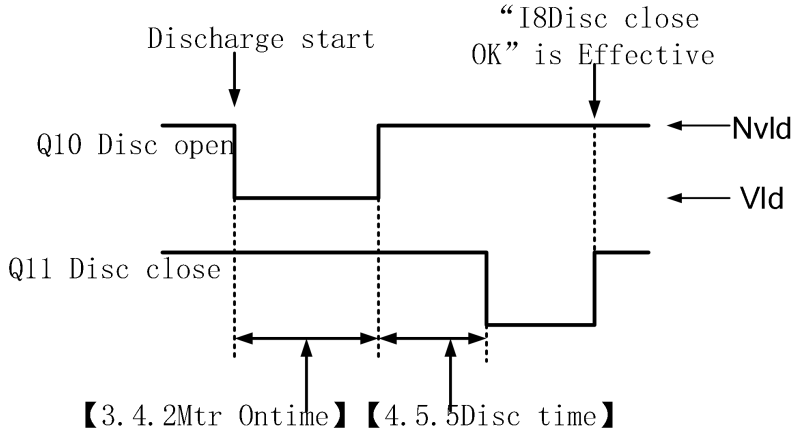
Relevant parameters: [3.4.2 Mtr Ontime], [3.4.3 Disc Timeout], [3.4.6 Zero range], [3.4.7 DscEndMode], [4.5.5 Disc time].

When [3.4.7 DscEndMode] is set to "① time judgment", the discharging process is as follows:

At the beginning of Disc, "Q10 Disc open" signal output is valid, and after [3.4.2 Mtr Ontime], it is considered that the Disc door has been opened. At this time, "Q10 Disc open" signal output is invalid, and after waiting [4.5.5 Disc time], it is considered that the Disc is completed. "Q11 Disc close" signal output is valid to control the Disc door to close. After the input signal "I8 Disc close OK " is detected to be valid, it is considered that the Disc door has been closed in place. "Q11 Disc close" signal output is invalid, and the Disc process ends.

If the Disc door is closed for more than [3.4.3 Disc Timeout] time, and the "I8 Disc close OK " signal input is still not detected to be valid, it is considered that the Disc door has timed out, and an alarm prompt is issued.

The signal timing diagram is as follows:

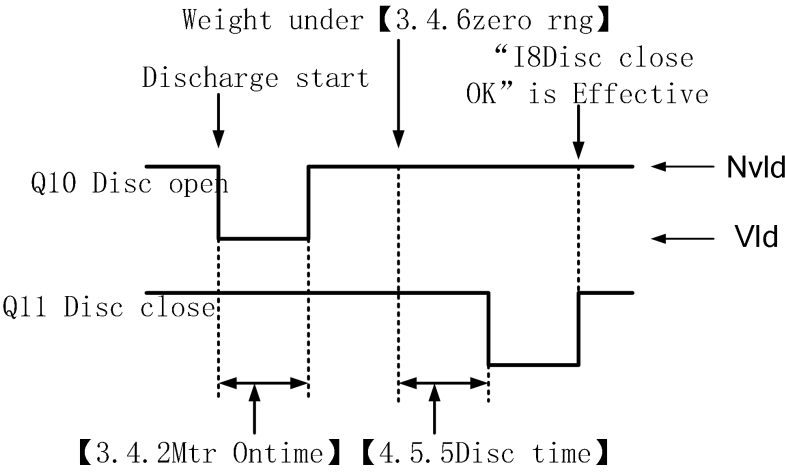


When [3.4.7 DscEndMode] is set to “② Zero zone value judgment”, the discharge process is as follows:

At the beginning of Disc, “Q10 Disc open” signal output is valid, and after [3.4.2 Mtr Ontime], it is considered that the Disc door has been opened. At this time, “Q10 Disc open” signal output is invalid. When the weight value is lower than [3.4.6 Zero range], and after [4.5.5 Disc time] time, it is considered that the Disc is completed, and the “Q11 Disc close” signal output is valid to control the Disc door to close. After the input signal “I8 Disc close OK ” is detected to be valid, it is considered that the Disc door has been closed in place, “Q11 Disc close” signal output is invalid, and the Disc process ends.

If the [3.4.3 Disc Timeout] time is exceeded during the closing process of the discharge door, and the “I8 Disc close OK ” signal input is still not detected to be valid, it is considered that the discharge door closing timeout has occurred and an alarm is issued.

The signal timing diagram is as follows:



2.3.5.Clr Material(analog expansion board is required)

Parameter settings related to the clearing function.

When the material cleaning starts, the controller will output the switch quantity and analog quantity to control the vibration plate to add material, and open the discharge door to quickly remove the remaining material in the hopper.

Serial	Parameter	Description	Initial
3.5	Material level setting		
3.5.1	U1 clr U	0.000~10.000V; The voltage value of U1 output during material cleaning.	3.500
3.5.2	U2 clr U	0.000~10.000V; The voltage value of U2 output during material cleaning.	3.500
3.5.3	Close Dly	0~9999ms; When the material cleaning is turned off, first turn off the analog output signal to stop adding material, and then delay this time before	1000

		turning off the discharge.	
--	--	----------------------------	--

2.3.6.level setting

Set the function parameters related to the material level signal input and feeding control.

No.	Parameter	Description	Initial
3.6	Material level setting		
3.6.1	level mode	①None ②only lower ③Up and lower ④only upper Note: If the mode including down material level is selected, the feeding will not be started when the down material level signal input is invalid.	①none
3.6.2	Sply trgr	①none: Turn off the feeding output function ②lower trigger: The feeding function is triggered when the "I20 lower" signal input is invalid. ③upper trigger: The feeding function is triggered when the "I19 upper" signal input is invalid. For detailed introduction of the feeding function, please refer to the 2.3.6.1 chapters.	①None
3.6.3	Sply dlyOn	0.0~99.9s After the feeding function is triggered, the "Q16 Supply fill " signal is output after this delay.	0.0

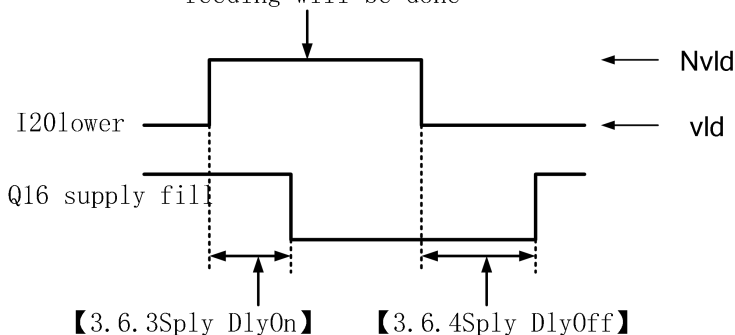
3.6.4	Sply dlyOff	0.0~99.9s After the feeding is completed, the "Q16 Supply fill " signal is turned off after this delay.	3.0
3.6.5	work time	①run & stop: feeding is performed both when running and stopping. ②only run: feeding is only performed when running.	① run &stop

2.3.6.1. Detailed description of the feeding function

1. Material level mode: single material level; feeding trigger: material level trigger.

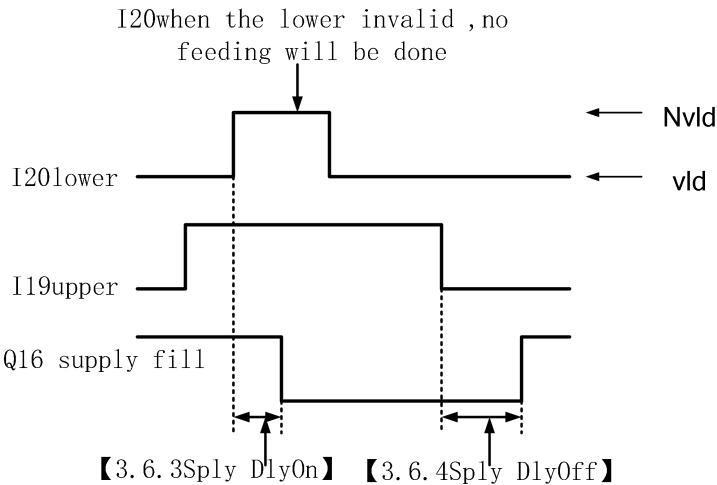
The timing diagram is as follows:

I20when the lower invalid ,no
feeding will be done



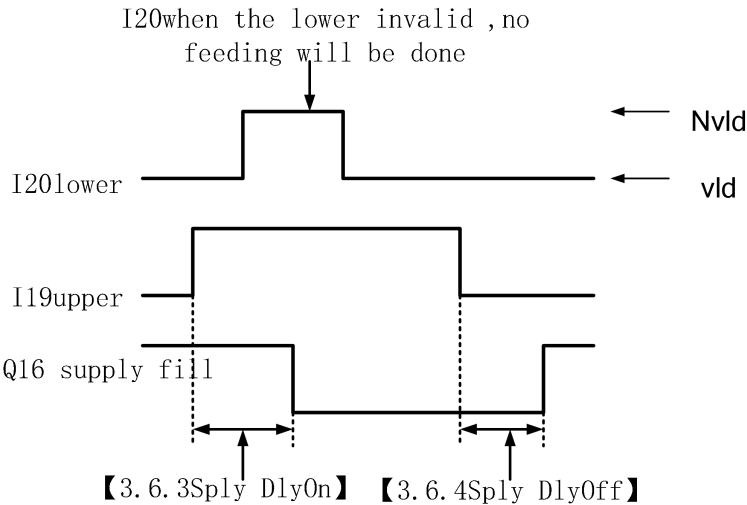
2. Material level mode: upper and lower material levels; feeding trigger: material level trigger.

The timing diagram is as follows:



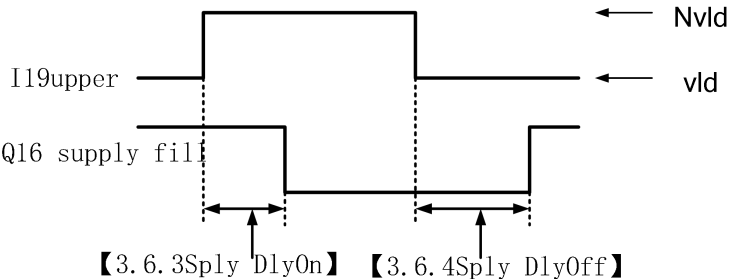
3. Material level mode: upper and lower material levels; feeding trigger: material level trigger.

The timing diagram is as follows:



4. Material level mode: single loading level; feeding trigger: loading level trigger.

The timing diagram is as follows:



c

2.3.7.Clamp & Code

Parameter settings for bag clamping and coding functions.

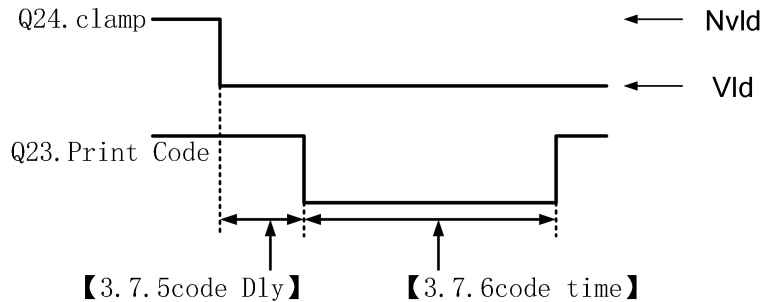
No.	Parameter	Description	Initial
3.7	Bag clamping and coding		
3.7.1	Clamp Dly	0~9999ms After the "Q24.clamp" signal is output, after this time, the bag clamping action is considered to be completed, and the subsequent process can continue.	500ms
3.7.2	Unclamp Dly	0~9999ms After the "Q24. clamp " signal is turned off, after this time, the bag release action is considered to be completed, and the subsequent process can continue.	500ms
3.7.3	Unclamp Mode	①Auto Unclamp: Automatic bag release after unloading is completed. ② Manual Unclamp: After unloading is completed, external input "I23. Clamp bag release" signal is used to release the bag manually.	①Auto Unclamp

3.7.4	Code func	① off ② On Coding function master switch. When the function is turned on, after clamping the bag, the "Q23.Coding" signal is output to control the coding machine to print code on the bag. For the timing diagram of the coding function, please refer to chapter2.3.7.1 Detailed description of the coding function	① off
3.7.5	Code Dly	0~9999ms After the "Q24.Clamp" signal is output, the "Q23.print Code" signal is output after the time.	500ms
3.7.6	Code time	0~9999ms The effective time of the "Q23. Print Code" signal output.	1000ms
3.7.7	Don't Disc	① Off ② On: When the "Q23.print Code" signal output is valid, the unloading process will not be started. Wait until the "Q23.print Code" signal output is closed before starting the unloading process.	① Off
3.7.8	Stop clamp	Used to set the bag clamping mechanism processing method after the equipment turns to the stopped state: ① [Ignore]: After stopping, the bag clamping mechanism is not controlled and the state before stopping is maintained.	① [Ignore]

		②[Unclamp]: After stopping, the bag clamping mechanism is in the loose bag state.	
		③[Clamp]: After stopping, the bag clamping mechanism is in the clamping bag state.	

2.3.7.1 Detailed description of coding function

The timing diagram of coding function is as follows.



2.4. Recipe setting

The controller has 20 groups of formula parameters for setting. Users can set the commonly used formula parameters in advance and switch to the corresponding formula number when using.

2.4.1 Formula number

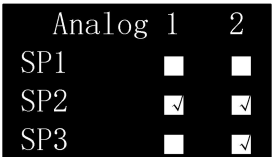
Set the currently selected formula number.

number	Parameter	Description	Initial
4.1	Rec num	1~20	1

2.4.2 Material speed selection

Set the corresponding large, medium and small switch outputs for

fast feeding, medium feeding and slow feeding, and the combination of U1 and U2 analog outputs.

No.	Parameter	Description
4.2	Material speed selection	
4.2.1	Feed speed(analog)	Set the analog outputs of U-1 and U-2 for fast feeding, medium feeding and slow feeding respectively. The outputs under the default settings as shown in the figure below are as follows: Fast feeding: U-1, U-2. Medium feeding: U-1, U-2. Slow feeding: U-2.  Note: This parameter will only work when the option "Determined by recipe" in parameter [3.2.3 Material speed selection (analog quantity)] is checked.
4.2.2	Feed speed(IO)	Set the corresponding large, medium and small throw switch outputs for fast feeding, medium feeding and slow feeding. The output under the default setting shown in the figure below is as follows: Fast:: fast, med , fine. Med: med, fine. Slow: fine.

		<table><tr><td></td><td>F</td><td>M</td><td>S</td></tr><tr><td>SP1</td><td>☒</td><td>☒</td><td>☒</td></tr><tr><td>SP2</td><td>☐</td><td>☒</td><td>☒</td></tr><tr><td>SP3</td><td>☐</td><td>☐</td><td>☒</td></tr></table>		F	M	S	SP1	☒	☒	☒	SP2	☐	☒	☒	SP3	☐	☐	☒
	F	M	S															
SP1	☒	☒	☒															
SP2	☐	☒	☒															
SP3	☐	☐	☒															

Note: This parameter will only work when the option "Determined by recipe" in parameter [3.2.4 Material speed selection (switch quantity)] is checked.

2.4.3 Product specifications

Set the target value under the current recipe and other product specification related parameters.

number	Parameter	Description	Initial
4.3	Product specifications		
4.3.1	Target	Set the target weight of the product to be packaged.	0
4.3.2	Fast feed	When the weight value $\geq$ target- Fast feed, turn off the fast feed. When set to 0, it means that the fast output process is not started.	0
4.3.3	Med feed	When the weight value $\geq$ target - Med feed, turn off the Med feed. When set to 0, it means that the Med output process is not started.	0
4.3.4	Fine feed	When adding materials, when the weight value $\geq$ target - Fine feed, close the Fine feed.	0
4.3.5	Over value	During excess and over/under detection, if the weighing result $>$ target + Over value, it is	0

		judged as over;	
4.3.6	Under value	During excess and over/under detection, if the weighing value < target - Under value, it is judged as under.	0
4.3.7	Blow Num	1~9 Set the number of discharges for each bag clamping. For example, if the target value is 25kg: If the number of discharges is 1, the material is discharged once each time the bag is clamped, and each bag weighs 25kg; If the number of discharges is 2, the material is discharged twice each time the bag is clamped, and each bag weighs 50kg.	1

2.4.4 Feeding analog quantity

Set the voltage values output by analog quantities U1 and U2 during fast, med and fine throws.

No.	Parameter	Description	Initial
4.4	Feeding simulation		
4.4.1	U1 fast U	0.000~10.000V; The voltage value output by U1 during fast feeding.	0
4.4.2	U1 med U	0.000~10.000V; The voltage value output by U1 during med feeding.	0
4.4.3	U1 fine U	0.000~10.000V; The voltage value output by U1 during fine feed.	0
4.4.4	U2 fast U	0.000~10.000V; The voltage value output by U2 during fast feed.	0
4.4.5	U2 med U	0.000~10.000V; The voltage value output by U2 during med feed.	0

4.4.6	U2 fine U	0.000~10.000V; The voltage value output by U2 during fine feed.	0
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2.4.5 Time parameter

Related time parameter settings during the feeding process.

No.	Parameter	Description	Initial
4.3	Time parameter		
4.5.1	Fast NoCmp	0~9999ms The time to eliminate vibration at the beginning of big throw. During this time, the big throw signal is always valid and is not affected by weight. After this time, it is determined whether the weight reaches the big throw advance amount to end the big throw.	500
4.5.2	Med NoCmp	0~9999ms The time to eliminate vibration at the beginning of mid throw. During this time, the mid throw signal is always valid and is not affected by weight. After this time, it is determined whether the weight reaches the mid throw advance amount to end the mid throw.	500
4.5.3	Fine NoCmp	0~9999ms The vibration elimination time at the beginning of fine throw. During this time, the fine throw signal is always valid and is not affected by weight. After this time, it is judged whether the weight reaches the fine throw drop value	800

		to end the fine throw.	
4.5.4	Fixed time	0~9999ms After the feeding is completed, wait for this time before performing result accumulation, over-under detection and other functions and outputting the "Q14 feed end " signal.	1000
4.5.5	Disc time	0~9999ms During Disc, the retention time after the Disc door is opened. For detailed description of the related functions of this parameter, please refer to the 2.3.4.1 section.	1000
4.5.6	DEL Unclamp	0~9999ms The delay time from the completion of unloading to the automatic bag release during operation.	500
4.5.7	Fast time	0~9999ms When feeding large feed, if this value is not 0, the large feed will be fixed for this time and no weight judgment will be performed.	0

2.4.6 Motor group number

Set the motor num corresponding to the currently selected recipe.

num	Parameter	Description	Initial
4.6	Motor num	1~5	1

2.5 AI intelligent packaging

The controller has the AI intelligent packaging algorithm

developed by AMP for the packaging process. It can collect characteristic parameters of each feeding process, calculate the collected data through machine learning AI algorithm, and automatically adjust the parameters to make the packaging scale run fast and accurate.

2.5.1 Smart packaging switch

No.	Parameter	Description	Initial
5.1	AI pack SW	①Off ②On	①Off

When the smart packaging function is turned on, the controller will automatically adjust the following parameters:

[4.3.2 fast feed]

[4.3.3 med feed]

[4.3.4 fine feed]

[4.5.2 med NoCmp]

[4.5.3 fine NoCmp]

In addition, when the feeding voltage [4.4.1~4.4.6] or the feeding advance [4.3.2~4.3.4] are all set to 0, the automatic learning process of the analog quantity or advance will be started first. For details, see the description of the 2.5.6 section.

2.5.2 Sampled data

The AI smart packaging function will save up to the last 100 weighing data, perform machine learning AI smart packaging algorithm calculations, and obtain relevant parameters for feeding that are suitable for the current state.

This item can view the number of saved sampling data. Press the  to clear the sampling data and restart statistical sampling.

No.	Parameter	Description	Initial
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5.2	Sampled data	0~100; Display the number of packaging process data that the smart packaging function has sampled and saved. Press the  to clear the sampling data.	0
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2.5.3 Material type

Select the type of material to be packaged. The AI smart packaging algorithm can optimize for different types of materials to obtain relevant parameters that are more suitable for the characteristics of the material.

No.	Parameter	Description	Initial
5.3	Material type	①Granule ②Powder	①Granule

2.5.4 Speed control

The AI intelligent packaging function has relevant parameters for packaging speed control. The AI intelligent packaging algorithm can be set to automatically calculate and control the packaging speed, or the customer can manually set the packaging speed to be controlled, and the AI intelligent packaging algorithm can adjust the parameters to achieve the set speed.

Note: If the manually set packaging speed is too fast and exceeds the speed that the equipment can achieve, there may be inaccurate packaging accuracy.

No	parameter	illustrate	Initial
5.4	Speed control		
5.4.1	Ctrl mode	①Auto: The controller automatically controls the packaging speed ② Manual: The packaging speed is	①Auto

		determined by the set parameters [5.4.3 fine min T] and [5.4.4 Fine error T].	
5.4.2	Speed grade	0~4; 【 5.4.1 Ctrl Mode 】 It works when set to automatic, the finer the number, the faster it is.	1
5.4.3	Fine min T	0~9999ms [5.4.1 Ctrl Mode] When set to manual, use these two parameters to determine the standard time of the fine feed.	800
5.4.4	Fine error T	Fine NoCmp + Fine min T ≤ fine investment standard time ≤ Fine NoCmp + Fine min T + Fine error T. The intelligent packaging function controls the Fine time in standard time by adjusting the advance quantity parameters.	500
5.4.5	Fine Min T	0~9999ms These two parameters determine the standard time of the med feed	500
5.4.6	Fin Err T	Med NoCmp + Fine Min T ≤ mid-range shot standard time ≤ Med NoCmp + Fine Min T + Fin Err T The intelligent packaging function controls the med feed to always be within the standard time by adjusting the advance amount parameter.	500
5.4.7	Fast Buff	Add this buffer value on the basis of the fast feed when decelerating.	
5.4.8	Med Buff	Add this buffer value on the basis of the med feed when decelerating.	
5.4.9	Start slow	①Off ②0n: At start, increase the fast feed and the med feed to reduce the packaging speed.	①Off
5.4.10	Lack slow	①Off ②0n: When there is a shortage of	① Off

		materials, increase the fast feed and the med feed to reduce the packaging speed.	
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2.5.5 Correction switch

The correction switches of fast, med and fine can be controlled separately. After turning off, the AI intelligent packaging algorithm will no longer adjust the corresponding lead time.

5.5	AI choose		
5.5.1	Fast AI	① Off: Do not correct [4.3.2 fast feed] ② 0n	② 0n
5.5.2	Med AI	① Off: Do not correct [4.3.3 med feed]	② 0n
5.5.3	Fin AI	① Off: Do not correct [4.3.4 fin feed] ② 0n	② 0n

2.5.6 AI init value

AI intelligent packaging algorithm control is divided into two stages: 1 automatic learning stage, 2 automatic correction stage.

The automatic learning stage is further divided into self-learning of feeding simulation and self-learning of advance amount.

When the feeding voltage [4.4.1~4.4.6] is all set to 0 to start, the controller will enter the voltage self-learning process. The feeding voltage learning process is carried out first, and then normal feeding will begin, and automatic correction will be carried out based on the various values learned automatically.

When the feeding voltage [4.4.1~4.4.6] is set, but the advance amount [4.3.2~4.3.4] are all set to 0 to start, the controller will enter the advance amount automatic learning process. First, the learning process of the advance amount is carried out, and then the normal feeding will begin. Automatic correction will be made based on the values learned automatically.

5.6	Learning initial value		
5.6.1	Fast init	1%~99%	80%
5.6.2	Med init	Start when the fast med and fine feed are all set to 0. The initial value of the fast feed and the med feed when the controller performs self-learning advance amount.	40%
5.6.3	Fine time	0~9999ms The feeding time of the controller when learning the fine feed drop value.	2000
5.6.4	U increase	0~10.000V/s; (analog expansion board is required) Start when all the feed analog values are set to 0. When the controller automatically learns the feed voltage value and advance amount, the voltage increase amplitude.	0.3V/s

2.6 Switch quantity

The functions corresponding to the switch quantity input and output ports can be defined, and the switch quantity test function can be used to test whether the external switch quantity circuit is normal.

2.6.1 Switch quantity definition

Define the functions of switch quantity input ports IN1~IN3 and switch quantity output ports OUT1~OUT5. Select the switch port to be set, and select the function to be defined in the option box list.

No.	Parameter	Description	Initial value
6.1	Switch quantity		
6.1.1	IN1	Switch quantity input port function definition. For option list, see 2.6.1.1	I15. Run/SlowStop
6.1.2	IN2		I17. Disc enable
6.1.3	IN3		I18. Disc close OK

6.1.4	OUT1	Switch quantity output port function definition. For the option list, see 2.6.1.2	Q4. med
6.1.5	OUT2		Q5. fine
6.1.6	OUT3		Q14. feed end
6.1.7	OUT4		Q10. Disc Open
6.1.8	OUT5		Q9. Disc (Lock)

2.6.1.1 Switch input function list

num	name	Description
I0	None	No function definition.
I1	Start	Start operation.
I2	Stop	Stop operation.
I3	Slowly stop	Enter the slow stop process, that is, automatically stop the operation after completing the current packaging process.
I4	Zeroing	Perform a clear operation.
I5	Clear warning	Clear the alarm status.
I6	Change Rec	Automatically switch to the next recipe whose target value is not 0 after valid once.
I7	Disc Enale	It is the Disc signal when running. After the feeding is completed, wait for the Disc signal to be valid before starting to unload. It is the manual Disc signal when stopped. The Disc process is executed once the input is valid.
I8	Disc close OK	[3.4.1 Disc mode] takes effect when set to "② Motor one Dir" or "③ Motor Two Dir". When valid, it means that the Disc door has been closed in place.
I9	Manual fine	In the stopped state, turn on the fine throw when valid, and turn off the fine throw when valid again.

I10	Manual med	In the stopped state, turn on the middle throw when valid, and turn off the middle throw when valid again.
I11	Manual fast	In the stop state, turn on the fast injection when it is valid, and turn off the fast injection when it is valid again.
I12	Clr All Acc.	Clear the total accumulation data.
I13	Clr Rec Acc.	Clear the current recipe accumulation data.
I14	Run/stop	Start running when valid. Stop running when invalid.
I15	Run/slow stop	Start running when valid. Enter slow stop process when invalid.
I16	Manual fine-L	In stop state, turn on fine throw when valid, turn off fine throw when invalid.
I17	Manual med-L	In stop state, turn on middle throw when valid, turn off middle throw when invalid.
I18	Manual fast-L	In stop state, turn on fast throw when valid, turn off fast throw when invalid.
I19	upper	upper input signal. When valid, it is considered that the material has reached the loading position.
I20	lower	lower input signal. When valid, it is considered that the material has reached the Disc position. When invalid, it is considered that the material has fallen below the Disc position and is in a state of lack of material.
I21	Clr material	In stop state, start the clearing process once if valid, and turn off the clearing process when valid again.

I22	clamp	Control clamp
I23	unclamping	Control unclamp

2.6.1.2 Switch output function list

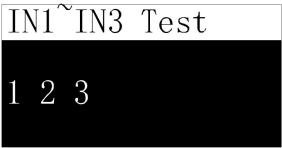
number	name	Description
Q0	None	No function definition.
Q1	Running	The output is valid when in the running state.
Q2	Stop	The output is valid when in the stop state.
Q3	Fast	Fast feeding control signal.
Q4	Med	Med speed feeding control signal.
Q5	Fine	Fine feeding control signal.
Q6	Fixed	Output is valid when feeding is finished. The duration can be set by parameter [4.5.4 Fixed time]. After the time is up, the result is recorded.
Q7	Over/under	The over/under tolerance function is turned on. When the feeding result has an over/under alarm, the output is valid.
Q8	warning	The output is valid when the controller has an alarm.
Q9	Disc (lock)	It is valid during Disc and can be used to judge the Disc state when the external logic performs Disc interlock.
Q10	Disc open	Control the action of the Disc mechanism.
Q11	Disc close	Control the action of the Disc mechanism.
Q12	U1 Enable	This output is valid when analog 1 outputs a feeding signal.
Q13	U2 Enable	This output is valid when analog 2 outputs a feeding signal.
Q14	feed end	After the feeding and setting process is

		completed, the signal output is valid. At this time, the Disc starts after receiving the valid input "I7 disc enable " signal.
Q15	Batch end	The set batch is completed
Q16	Supply fill	The feeding control output signal. When the signal is valid, the feeding device is started to feed the material into the storage hopper.
Q17	starving	Lack of material state output signal. When the "Disc position" signal input is invalid, it is in the state of lack of material.
Q18	Slow stop	The output is valid when it is in the slow stop process.
Q19	Disc end	The signal is output after the Disc is completed, and it will be turned off after 1 second.
Q20	Clamp bag	Control the action of the clamp bag mechanism

2.6.2 Switch quantity test

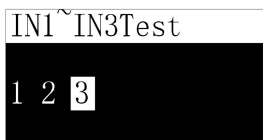
num	Parameter	Description	Initial
6.2	Switch quantity test		

Switch quantity test is used to test whether the switch quantity function is normal, which is divided into input switch quantity test and output switch quantity test. After entering the interface, the first step is the digital input test, as shown in the following figure:



Numbers 1 to 3 represent IN1 to IN3. When an input is

active, it is displayed in reverse color. For example, when IN3 is active, the display is as shown below.



Press  to switch to the output switch test. In this mode, you can manually set the ON/OFF state of each OUT port. The display interface is shown in the figure below:



Numbers 1 to 5 represent OUT1 to OUT5. When a number 1 is flashing, it means you can press  to manually toggle the output of the corresponding OUT port OUT1. Press  to switch to other OUT ports, or press  to switch to the input switch test.



2.7 Analog (analog expansion board is required)

Set the range of the controller analog output and analog calibration

related operations.

Note: The analog function requires an analog expansion board, otherwise this function will not be available.

2.7.1 Analog range

Set the minimum and maximum values of analog output.

No.	Para	Description	Initial value
7.1	Analog range		
7.1.1	Min	0.000~10.000V; Minimum value of analog output.	0.000
7.1.2	Max	0.000~10.000V; Maximum value of analog output.	0.000

2.7.2 Analog U1 calibration

Analog U1 calibration operation. When the analog output value deviates from the actual value, the analog calibration function can be used to calibrate the analog output.

Analog calibration method:

- (1) Enter the [7.2 U1 Cal] interface.
- (2) Enter the [7.2.1 [0V]] option interface. At this time, use a multimeter to measure the voltage output of analog U1 (normally it should be around 0V), enter the measured value into the interface and press Confirm.
- (3) Enter the [7.2.2 [2.5V]] option interface. At this time, use a multimeter to measure the voltage output of analog U1 (normally it should be around 2.5V), enter the measured value into the interface and press Confirm.
- (4) Enter the [7.2.3 [5V]] option interface. Use a multimeter to measure the voltage output by analog quantity U1 (normally it should be around 5V). Enter the measured value into the interface and press Confirm.
- (5) Enter the [7.2.4 [7.5V]] option interface, use a multimeter

to measure the voltage output of analog quantity U1 (normally it should be around 7.5V), enter the measured value into the interface and press Confirm.

- (6) Enter the [7.2.5 [10V]] option interface, use a multimeter to measure the voltage output of analog quantity U1 (normally it should be around 10V), enter the measured value into the interface and press Confirm.

- (7) After the above operations, the calibration of analog quantity U1 can be completed.

Tip: When measuring the output voltage of U1, please make sure that the multimeter is in the DC voltage range, the positive probe is connected to the output port of the controller U1 terminal, and the negative probe is connected to the output port of the controller GND terminal.

number	Parameter	Description	Initial
7.2	Analog quantity U1 calibration		
7.2.1	[0V]	-1.000~15.000V Analog quantity output 0V calibration point	0.000
7.2.2	[2.5]	-1.000~15.000V Analog output 2.5V calibration point.	2.500
7.2.3	[5V]	-1.000~15.000V Analog output 5V calibration point.	5.000
7.2.4	[7.5V]	-1.000~15.000V Analog output 7.5V calibration point.	7.500
7.2.5	[10V]	-1.000~15.000V Analog output 10V calibration point.	10.000

2.7.3 Analog U2 calibration

The calibration operation of analog U2 is the same as U1. For specific operation instructions, please refer to the 2.7.2 section.

2.7.4 Analog test

The analog test function can control the analog value corresponding to the analog port output by inputting a numerical value, which can be used to test whether the analog output is normal.

No.	Parameter	Description	Initial value
7.1	Analog test		
7.4.1	U1 test	0.000~10.000V; Entering a value can control the output size of the analog signal U1.	0.000
7.4.2	U2 test	0.000~10.000V Entering a value can control the output size of the analog signal U2.	0.000

2.8 Communication interface

2.8.1 Serial port 1

Serial port 1 is the standard RS485 communication serial port of the controller. The relevant parameters are as follows:

num	parameter	explain	starter
8.1	Com 1		
8.1.1	Slave ID	1~99; Set the communication address of the device (slave station number).	1
8.1.2	Rate	①4800 ②9600 ③19200 ④38400 ⑤57600 ⑥115200	②38400

8.13	protocol	① [Modbus-RTU-H]: Modbus-RTU communication protocol (two-word data high word first). ② [Modbus-RTU-L]: Modbus-RTU communication protocol (two-word data low word first).	①MODBUS-RTU-H
8.1.4	Data format	①7-E-1/②7-O-1/③8-N-1/④8-E-1/⑤8-O-1	③8-N-1

2.8.2 Serial port 2 (serial Comm expansion board is required)

Note: Serial port 2 needs to be equipped with a serial communication expansion board, otherwise this function will not be available.

The relevant parameters are same as COM1

2.9 Acc and Bat

View and clear the accumulation, and set the batch number.

No.	Parameter	Description	Initial
9.1	Acc Num	View the accumulation times. Press  to clear the accumulation.	
9.2	Acc Wt	Cumulative weight check. Press  to clear the cumulative weight.	
9.3	Batch set	0~9999 Set the preset batch number. After the set batch number is accumulated, the controller will alarm to prompt the	0

		batch completion and stop.	
9.4	Batch Cmplt	View the number of completed batches	
9.5	Acc time set	① Disc end: After the Disc is completed, the result of this time will be stored in the cumulative value. ② Fixed value end: After the fixed value is completed, the result of this time will be stored in the cumulative value.	① Disc end
9.6	Batch alarm	① Off: After the batch is completed, it will automatically switch to the stop state, and the batch completion alarm prompt will not be output. ② On: After the batch is completed, it will automatically switch to the stop state, output the batch completion alarm prompt, and the alarm needs to be cleared manually.	② On

2.10 Parameter reset

All controller parameters can be reset or a certain type of parameter can be reset separately.

No.	Parameter	Description	Description
10.1	Reset	1. All para 2. Basic Wt 3. Calib 4. Ctrl para 5. Recipe 6. AI pack 7. IO 8. Analog 9. Comm Port	Press  to reset the selected parameter.

		10. Acc& bat 11. Motor 12. Password	
10.2	Password	Change the password of the instrument function menu page.	

Note: When resetting all parameters, the analog parameters will not be reset. If you need to reset the analog parameters, select [10.8 Analog] to reset the analog parameters.

2.11 System

Set the system language and view the system version information.

num	Para	Description	Initial
11.1	language	① 简体中文/② English	① 简体中文
11.2	About	View the model and version number of the controller.	
11.3	Boot screen	① On: Display company logo at startup ② Off: Do not display company logo at startup	① On
11.4	Screen save		
11.4.1	Screen saver type	① Screen off: If no key is pressed during the screen saver time, the screen will be off. ② Display weight: During the screen saver time. If no key operation is performed, only weight will be displayed, and the weight display position will change with time.	② Display weight
11.4.2	Screen saver time	0~600s If no key operation is performed during this time, the screen saver interface will be entered. Set to 0 to turn off the screen saver.	30s

2.12 Stepper motor parameters

2.12.1. Motor group number

Set the currently selected stepper motor parameter group number.

num	Parameter	Description	Initial
12.1	group num	1~5	1

2.12.2. Feeding step

num	Parameter	Description	Initial
12.2	Feed motor		
12.2.1	Run Freq	1.0~60.0KHz Control the pulse frequency of the stepper motor rotation. The higher the frequency, the faster the action.	20.0KHz
12.2.2	Fast pls	0~250000 Number of pulses required for the feeding door to rotate from the closed position to the large feed opening position.	9000
12.2.3	Mid Pls	0~250000 The number of pulses required for the feeding door to rotate from the closed position to the middle opening position.	6000
12.2.4	Slow Ols	0~250000 The number of pulses required for the feeding door to rotate from the closed position to the small opening position.	3000
12.2.5	Start freq	1.0~60.0KHz; The frequency when the stepper motor starts.	2.0KHz

12.2.6	Start FN	0~250000 The number of pulses required for the stepper motor to accelerate from [starting frequency] to [pulse frequency].	1000
12.2.7	Stop freq	1.0~60.0KHz The frequency after the stepper motor decelerates.	2.0KHz
12.2.8	Stop FN	0~250000 The number of pulses required for the stepper motor to decelerate from [operating frequency] to [deceleration frequency].	1000
12.2.9	Close over	0~999000 After outputting the door closing pulse, if the feeding door in place signal is not detected after this time, it is considered that the feeding door in place switch is damaged and the pulse output will be stopped directly.	5000
12.2.10	DIR Def	① on-close : "Q21. Feeding direct" signal The output is invalid when the door is open, and the output is valid when the door is closed. ② off-close : "Q21. F Feeding direct" signal The output is valid when the door is open, and the output is invalid when the door is closed.	② off-close
12.2.11	F. origin	① OFF : The stepper motor does not perform the reset action of searching for the origin when executing the door closing signal. ② ON : The stepper motor performs the	① OFF

		reset action of searching for the origin when executing the door closing signal.	
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2.12.2.1 Detailed description of stepper motor motion control

The controller wiring refers to the feeding step, and the feeding step switch quantity is defined as follows:

OUT2	Q21. Feeding motor direction
OUT1	P1. Feeding pulse
IN2	I22. Feeding door closed in place

The pulse signal frequency of the stepper motor controls the speed of the stepper motor. The frequency parameter needs to be matched with the subdivision parameter of the stepper motor driver. If the subdivision parameter of the stepper motor is set to 1000 pulses/turn, then when using a 2.0KHz pulse for control, the speed of the stepper motor is 2 turns/second.

When the stepper motor is in motion, in order to prevent the torque required for large load rotation from being too large, causing problems such as lost steps, the stepper motor is gradually accelerated when starting and gradually decelerated when stopping, so that the action is smooth and stable, and problems such as lost steps are prevented. The following figure illustrates the action of the stepper motor when starting and stopping:

[12.2.1 Run Freq] is set to 20.0KHz.

[12.2.2 fast Pls] is set to 9000.

[12.2.3 Mid Pls] is set to 5000.

[12.2.4 Slow Ols] is set to 2000.

[12.2.5 Start freq] is set to 5.0KHz.

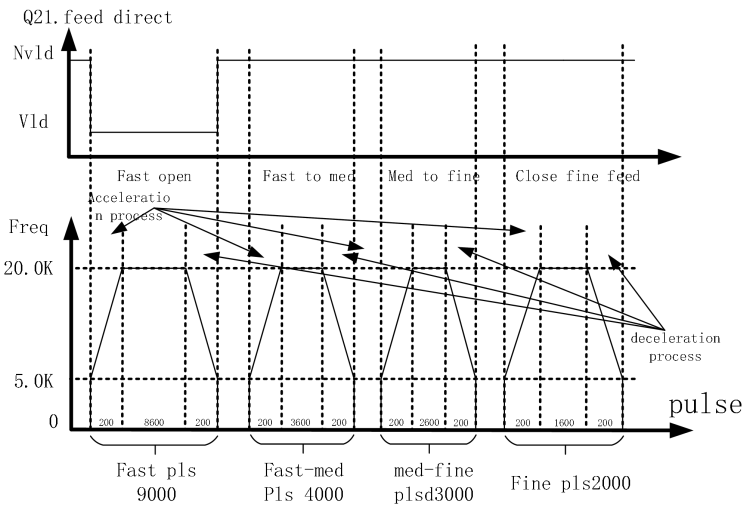
[12.2.6 Start FN] is set to 200.

[12.2.7 Stop freq] is set to 5.0KHz.

[12.2.8 Stop FN] is set to 200.

[12.2.10 DIR Def] is set to ②off-close.

Based on the above parameters, the relationship between the frequency and pulse number of the feeding stepper motor during small and medium throws is as follows:



2.12.2.1 Detailed description of the origin search action

When the stepper motor is in motion, in order to prevent the position of the origin from being inconsistent after each closing of the feeding door, an option switch for finding the origin is added. The following figure illustrates the action of the stepper motor from the middle feeding to the stepper motor returning to the origin:

[12.2.1 Run Freq] is set to 20.0KHz.

[12.2.3 Mid Pls] is set to 5000.

[12.2.4 Slow Ols] is set to 2000.

[12.2.5 Start freq] is set to 5.0KHz.

[12.2.6 Start FN] is set to 0.

[12.2.7 Stop freq] is set to 3.0KHz.

[12.2.8 Stop FN] is set to 0.

[12.2.10 DIR Def] is set to ② **off-close**

Based on the above parameters, the relationship between the feeding stepper motor and the origin detection switch is as follows:

① The feeding door executes 3000 pulses from the middle throw position to the small throw position at a running frequency of 20KHz in the door closing direction.

② The feeding door executes the return to origin action from the small throw position at a running frequency of 20KHz in the door closing direction.

③ The feeding door executes the leaving origin action in the door opening direction at a deceleration frequency of 3KHz until the origin signal is invalid and stops.

④ The feeding door returns to the origin at a deceleration frequency of 3KHz in the direction of closing the door until the origin signal stops effectively.

2.12.3. Unloading stepper

Set the relevant action parameters of the channel unloading stepper motor.

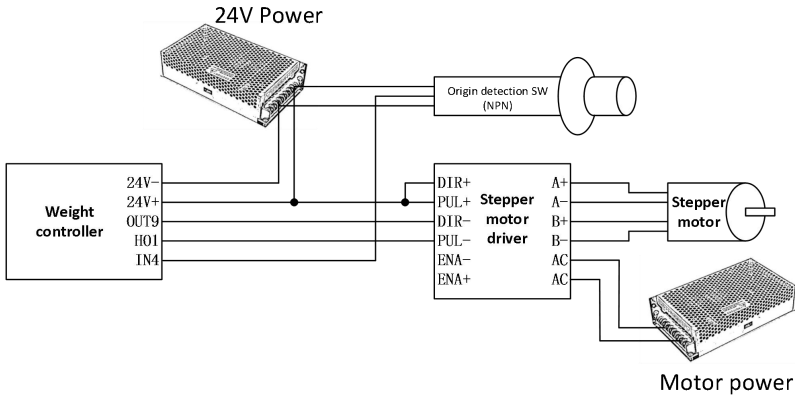
num	Parameter	Description	Initial
12.3.1	Disc Moror		

12.3.1	Run Freq	1.0~60.0KHz Control the pulse frequency of the stepper motor rotation. The higher the frequency, the faster the action.	20.0KHz
12.3.2	open pls	0~250000 The number of pulses required for the unloading door to rotate from the closed position to the open position.	10000
12.3.3	Close pls	0~250000 The number of pulses required for the unloading door to rotate from the open position to the closed position. This parameter can be set to 0. When closing the door, the stepper motor will continue to rotate until the door is closed.	0
12.3.4	Start freq	1.0~60.0KHz The frequency when the stepper motor starts.	2.0KHz
12.3.5	start FN	0~250000 The number of pulses required for the stepper motor to accelerate from [starting frequency] to [pulse frequency].	1000
12.3.6	Stop freq	1.0~60.0KHz The frequency after the stepper motor deceleration is completed.	2.0KHz
12.3.7	Stop FN	0~250000 The number of pulses required for the stepper motor to decelerate from [operating frequency] to [deceleration frequency].	1000

12.3.8	Close over	0~99.9 After the door closing pulse is output, if the discharge door in-position signal is not detected after this time, it will be considered that the discharge door in-position switch is damaged and the pulse output will be stopped directly.	5.0s
12.3.9	Dir-Def	① On - close: "Q22. Discharging step direction" signal The output is invalid when the door is opened and valid when the door is closed. ② Off - close: "Q22. Discharging step direction" signal The output is valid when the door is opened and is invalid when the door is closed.	② Off - clos

2.12.3.1 Detailed description of stepper motor action control

This controller uses the "pulse" + "direction" signal control method to control the rotation of the stepper motor. The "pulse" signal controls the rotation of the stepper motor, and the "direction" signal controls the rotation direction of the stepper motor. The following figure is a common wiring reference for stepper motor drivers:



The controller switch quantity in the figure is defined as follows:

OUT4	Q22. Discharge motor direction
OUT3	P2. Discharge pulse
IN3	I8. Discharge closed in place

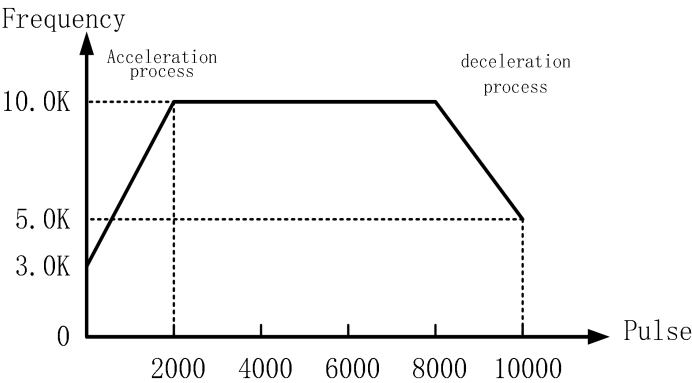
The pulse signal frequency of the stepper motor controls the speed of the stepper motor. The frequency parameter needs to be matched with the subdivision parameter of the stepper motor driver. If the subdivision parameter of the stepper motor is set to 1000 pulses/turn, then when a 2.0KHz pulse is used for control, the speed of the stepper motor is 2 turns/second.

When the stepper motor is in motion, in order to prevent the load from rotating due to excessive torque, resulting in lost steps and other problems, the stepper motor is gradually accelerated when starting and gradually decelerated when stopping, so that the action is smooth and stable, and the problem of lost steps is prevented. The following figure illustrates the action of the stepper motor when starting and stopping:

- [12.3.1 Run Freq] is set to 10.0KHz.
- [12.3.2 open pls] is set to 10000.
- [12.3.4 Start freq] is set to 3.0KHz.
- [12.3.5 start FN] is set to 2000.
- [12.2.6 Stop freq] is set to 5.0KHz.

[12.3.7 stop FN] is set to 2000.

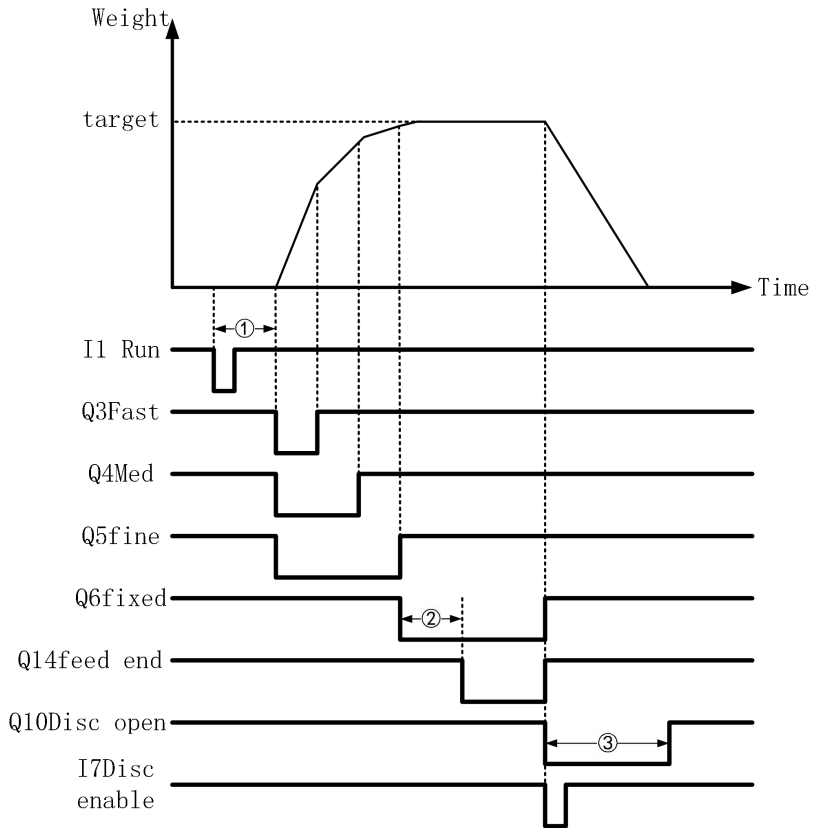
Based on the above parameters, the relationship between the frequency and pulse number of the unloading stepper motor when opening the door is as shown in the figure below:



3. Packaging process

3.1. Main process timing diagram

After the packaging process is started, the main signal output timing and weight change trend are shown in the figure below:

**Note:**

All signals in the figure are valid at low level.

The timing diagram of the fast, med and fine throw signals in the figure is the timing diagram when [3.2.2 Switching mode] is set to "① combination".

The numbers in the figure represent the following:

- ①: [3.1.1 Feeding delay] time.
- ②: [4.5.4 Fixed time].
- ③: [4.5.5 Disc time].

3.2. Process description

1. Start running.
2. Start feeding after the [3.1.1 start dly] time is over. **Output fast, med and fine throw signals and analog signal①.**
3. When the weight value $\geq$ target - fast feed, close the fast and enter the med.
4. When the weight value $\geq$ target value - med feed, close the med and enter fine feed.
5. When the weight value $\geq$ target value - fine feed, close the fine, end the feeding process, and start [4.5.4 Fixed time].
6. After the [4.5.4 Fixed time] time is over, record the weight of the feeding result this time, and determine whether to perform over-under detection based on the control parameter settings.
7. After the fixed value is completed, output the "Q14 feed end" signal, **wait for the external input "I7 disc enable" signal ②.**
8. After the external input "I7 disc enable" signal, start Disc process ③.
9. After Disc is completed, start [3.4.4 Restart delay].
10. After [3.4.4 Restart Delay] ends, according to the setting of [3.4.5 Rerun mode], it is determined that the restart condition is met and the next feeding process cycle is entered.

Note:

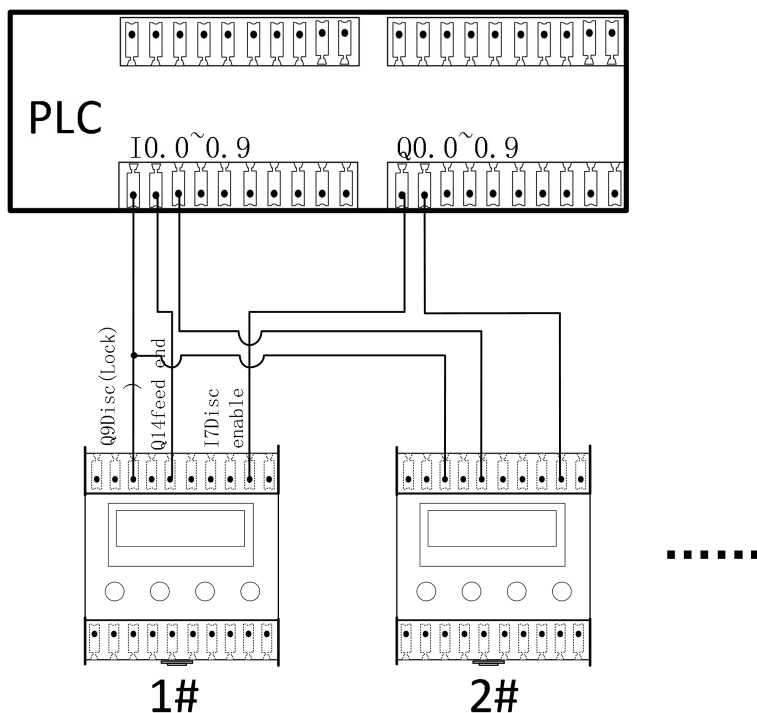
①: According to the setting of [4.2feed speed] and the setting of [3.2.1 Signal SW], the output of fast, med and fine switch quantity or analog quantity signal is determined.

②: According to the setting of [3.4.8 DscOn Mode], you can choose to wait for the "I7 disc enable" signal to be effective for Disc, or directly unload without waiting for the Disc allowed signal.

③: For the specific functions of the Disc process, please refer to the description of the 2.3.4.1 section.

3.3. Multi-scale Disc interlocking description

Multi-scale Disc can use PLC to control interlocking. The following takes the interlocking of two scales as an example to introduce a solution for implementation. The basic wiring diagram is as follows:



Signals used: Q9 Disc (lock), Q14 feed end, I7 disc enable.

The connection line is as shown in the figure above:

PLC-IO.0: 1#Q9 Disc (lock) and 2#Q9 Disc (lock)

PLC-IO.1: 1#Q14 feed end

PLC-IO.2: 2#Q14 feed end

PLC-Q0.0: 1#I7 disc enable

PLC-Q0.1: 2#I7 disc enable

When the subsequent packaging mechanism is ready and the controller can be unloaded, the processing logic of the PLC program is as follows:

1. Judge whether I0.0 is valid. If valid, wait (a certain controller is Disc). If invalid, go to step 2.
2. Determine the last Disc scale number. If the last time was 1#, go to step 5. If the last time was 2#, go to step 3.
3. Scan I0.1 to see if it is valid. If it is valid, output Q0.0 (1# starts Disc) and go to step 7; if it is invalid, go to step 4.
4. Scan I0.2 to see if it is valid. If it is valid, output Q0.1 (2# starts Disc) and go to step 7; if it is invalid, go to step 8.
5. Scan I0.2 to see if it is valid. If it is valid, output Q0.1 (2# starts Disc) and go to step 7; if it is invalid, go to step 6.
6. Scan I0.1 to see if it is valid. If it is valid, output Q0.0 (1# starts Disc) and go to step 7; if it is invalid, go to step 8.
7. Save the Disc scale number.
8. Return to step 1.

Note: Steps 3, 4, 5, and 6 are basically the same. The purpose is to determine the priority of this Disc through step 2, so as to determine which number to start scanning for this Disc, so as to prevent the problem that 1# scale always takes priority in Disc. There are many ways to handle the priority of Disc sorting. Here we only give one example for reference.

4. Alarm information

When the controller alarms, the alarm information will be displayed on the bottom line, as shown in the figure below:



Press the  key or enter "I5 clear alarm" to clear the alarm.

For detailed description of specific alarms, please refer to the table below:

No.	Content	Description
1	 Target value not set	The recipe parameter [4.3.1 Target value] is not set and cannot be started. The target value must be set before starting.
2	 OFL cannot be started	Cannot be started when the weight overflows.
3	 Exceed zeroing range	During zeroing operation, the weight exceeds the zeroing range and cannot be zeroed. The [1.2 Zeroing range] parameter setting can be adjusted.
4	 Weight is unstable	During the zeroing operation, the weight is unstable and cannot be reset. It is necessary to check the cause of the unstable weight fluctuation to see if it is caused by mechanical vibration. You can also adjust [1.3 Stability judgment range] and [1.4 Stability judgment time] to adjust the judgment of stability

		conditions.
5	 OFL cannot be cleared	Cannot be cleared when weight overflows.
6	 Zeroing is not allowed during operation	Manual zeroing is not allowed during operation.
7	 Over/under tolerance alarm	The controller has enabled the [3.3.3 Over/under tolerance detection] function, and the feeding result has an over/under tolerance situation.
8	 Over/under tolerance pause	The controller has enabled the [3.3.3 Over/under tolerance detection] function and the [3.3.5 Over/under tolerance pause] function, and the feeding result has an over/under tolerance situation, pause and wait for user processing.
9	 Batch completed	[9.3 Batch setting] has been set, and the set number of batches has been run and completed, and the alarm prompts.
10	 Stop signal is valid	When starting, it is detected that the "I2 stop" signal is in a valid state and cannot be started, and an alarm prompts.
11	 Switch value test status	The controller is in switching value test state and cannot be started. It is necessary to turn off the switching value test state before starting it again.
12	 Unstable and unable to calibrate	During the quick zero calibration operation, the weight needs to be stable for the calibration to be successful, otherwise an alarm will appear.
13	 Disc door close timeout	When the motor is discharging and closing the door, if the "I8 Disc close OK " signal input is not detected to be valid after the [3.4.3 Disc Timeout]

		time, it will be considered that the discharging door has closed overtime, and an alarm will be prompted.
14	 Learning small betting mistakes	An error occurred when self-learning the small drop difference. No material fell. Please check whether the feeding mechanism is normal.
15	 Feeding door closing timeout	During the power-on and before Disc, check whether the feeding mechanism closes the door normally.

Appendix

Update record

Time	Content
2021-1-15	First edition.
2021-1-26	Correct some parameter default values.
2022-7-9	Added the definition of the switch output "Q19. Disc completed". Added the [3.4.8 DiscOn Mode] parameter. Added the description of the optional analog quantity or serial port in the basic characteristics description of Chapter 1.1. Added the wiring port diagram when the optional serial port communication is selected. Added the different setting instructions of the [3.4.8 DiscOn Mode] function in the process description of Chapter 3.2.
2023-2-24	Added the [9.6 Batch alarm] parameter.

	Added 2.8.2 chapter descriptions and some tips for optional expansion boards. Adjusted page number display.
2023-10-13	Added [3.3.9 fast res] parameter.
2023-10-16	Added [3.3.10 res hold] parameter.
2023-12-25	Added the description and function of turning on the analog quantity and switch quantity at the same time in the clearing state.
2024-4-1	Added the stepper motor enable configuration in [3.2.1 signal SW].
2024-5-9	Added [11.3 boot screen ③ Custom.
2024-6-19	Corrected the display logo of [3.2.1 Feeding SW].
2024-7-3	Updated the RS485 wiring diagram in chapter 1.3.3. Updated the detailed description of the stepper motor motion control in [2.12.2 Feeding Step]. Added the [3.7 clamp & code] function. Added [3.4.8 DscOn Mode] ③ clamp bag
2024-7-19	Added the [3.7.8 stop clamp] function.
2024-9-21	Added the [3.4.9 Manual Disc] function. Added the [4.3.7 blow Num] function.
2025-3-5	2.3 Ctrl paras Added the following parameters: [3.2.3 feed speed (analog)], [3.2.4 feed speed (IO)], [3.3.13 hold filter], [3.4.10 Disc filter]. 2.4 Recipe parameters add the following parameters: [4.2.1 feed speed(analog)], [4.2.2 feed speed (IO)], [4.5.7 fast time].

	[10 reset] option is changed to [10 reset& password], and password management is removed from each submenu and merged into the [10.2 Password] menu. 11 System Added [11.4 Screen save time] function. 12 Stepper motor parameters Added [12.2.11F. Origin] and related instructions.
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