Coolmay®
Automation expert

# L02S-1LC
# Dynamic weighing module

## Using instructions


www.coolmay.com

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## Content

# 1. Product Overview

L02S-1LC is the latest dynamic weighing module developed by Coolmay. On the basis of inheriting the original functions (such as A/D conversion, digital calibration, peeling, zeroing, zero tracking, serial communication, etc.), the module further strengthens the dynamic digital filtering function, making the product more complete and reliable, especially suitable for various industrial dynamic weighing occasions.

The module uses advanced microprocessor technology to ensure high accuracy and stability of weighing data. Its built-in dynamic digital filtering algorithm can effectively reduce interference caused by environmental vibration or material movement, thereby providing more accurate weighing results. In addition, the L02S-1LC module also supports a variety of communication protocols, including but not limited to the modbus RTU protocol, which facilitates seamless connection with various industrial control systems. The module is easy to install and maintain, and the user-friendly interface allows operators to quickly get started, greatly improving work efficiency.

**Features:**

- Adopt dynamic digital filter to quickly filter out various electromagnetic interference and mechanical vibration interference
- Support RS485 /RS232 serial communication
- Stable performance, strong anti-interference ability, low power consumption and high reliability
- Non-volatile storage of characteristic parameters

**Technical parameters:**

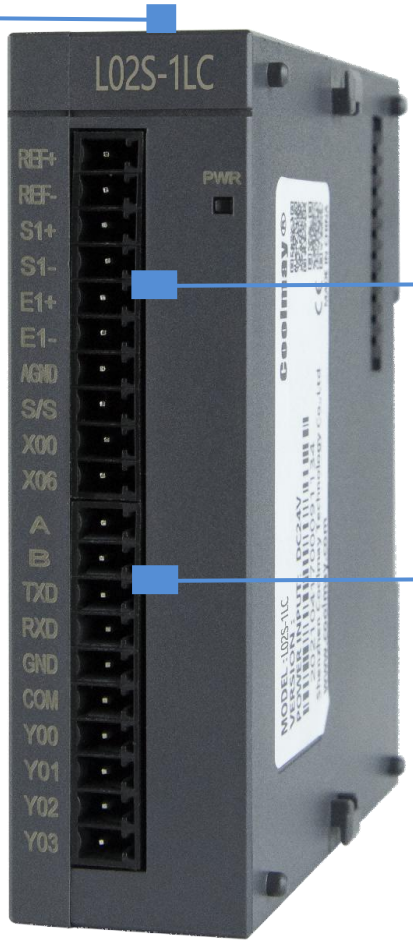
| **Technical indicators** | **illustrate** |
|---|---|
| Dimensions | 88*75*32mm |
| Installation | 35mm rail installation |
| Operating voltage | DC24V |
| AD resolution | 24-bit |
| Weighing module output rate | 6.25, 12.5, 25, 50, 100, 200 times/second optional (default 50) |
| Analog input range | DC 0-39mv (sensor 7.8mv/v) |
| Non-linear accuracy | 0.01%F·S |
| Conversion speed | 73-100Hz |
| Communication | RS485 serial communication (computer needs to set COM1), RS232 |
| Communication parameters | Fixed 19200, 8 , N , 1 ; station number 1 |

| | |
|---|---|
| Work Environment | -20 ～ 60℃, relative humidity 10% ～ 85%, non-condensing |
| Storage environment | -40 ～ 80℃, relative humidity 10% ～ 85%, non-condensing |

# 2. Hardware Introduction

## 2.1 Front Interface Introduction

| Power Terminals |
|---|
| 24V |
| 0V |
| FG |




| Silkscreen | Functional Description |
|---|---|
| REF+ | Feedback+ |
| REF- | feedback- |
| S1+ | Signal+ |
| S1- | Signal- |
| E1+ | Incentive+ |
| E 1 - | excitation- |
| AGND | shield |

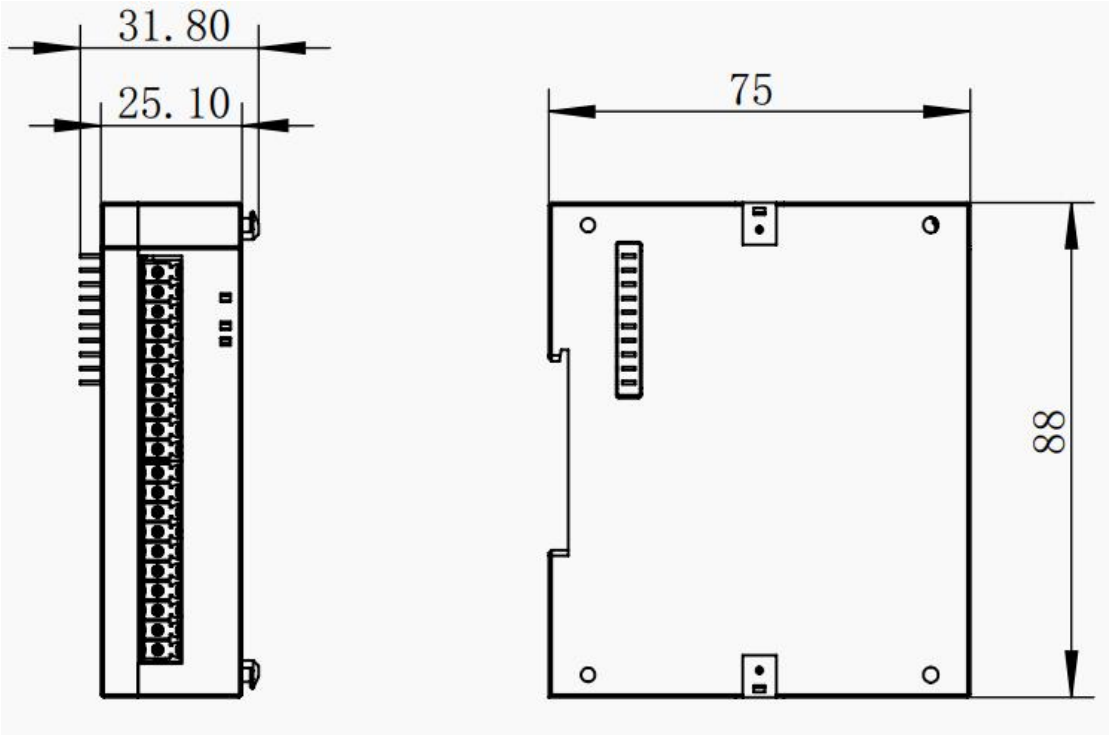
| | | |
|---|---|---|
| A | 485+ | RS485 communication serial port |
| B | 485- | |
| TXD | send | RS232 communication serial port |
| RxD | take over | |
| GND | Ground | |

## 2.2 Silkscreen Description

| Silkscreen | Functional Description | Remark |
|---|---|---|
| REF+ | Feedback+ | Dynamic weighing sensor signal line<br>Six-wire system: The six signal wires of the weighing sensor are connected one by one according to their functions. |
| REF- | feedback- | |
| S1+ | Signal+ | |
| S1- | Signal- | |
| E1+ | Incentive+ | |
| E 1 - | excitation- | |

| | | |
|---|---|---|
| | | Four-wire system: the feedback line and the signal line are connected one by one, the excitation + and feedback + are short-circuited, and the excitation - and feedback - are short-circuited. |
| AGND | shield | Connect the shielded wire of the weighing sensor |
| S/S | Input signal common terminal | External DC 24V required |
| X0 | Digital input | Connect to the signal of material sensor, normally open |
| X1 | | spare |
| A | 485+ | RS485 communication serial port |
| B | 485- | |
| TXD | send | RS232 communication serial port |
| RxD | take over | |
| GND | Ground | |
| COM | Output signal common terminal | External DC 0V required |
| Y0 | Digital transistor output | Can be customized according to needs, maximum load 0.5A |
| Y1 | | |
| Y2 | | |
| Y3 | | |

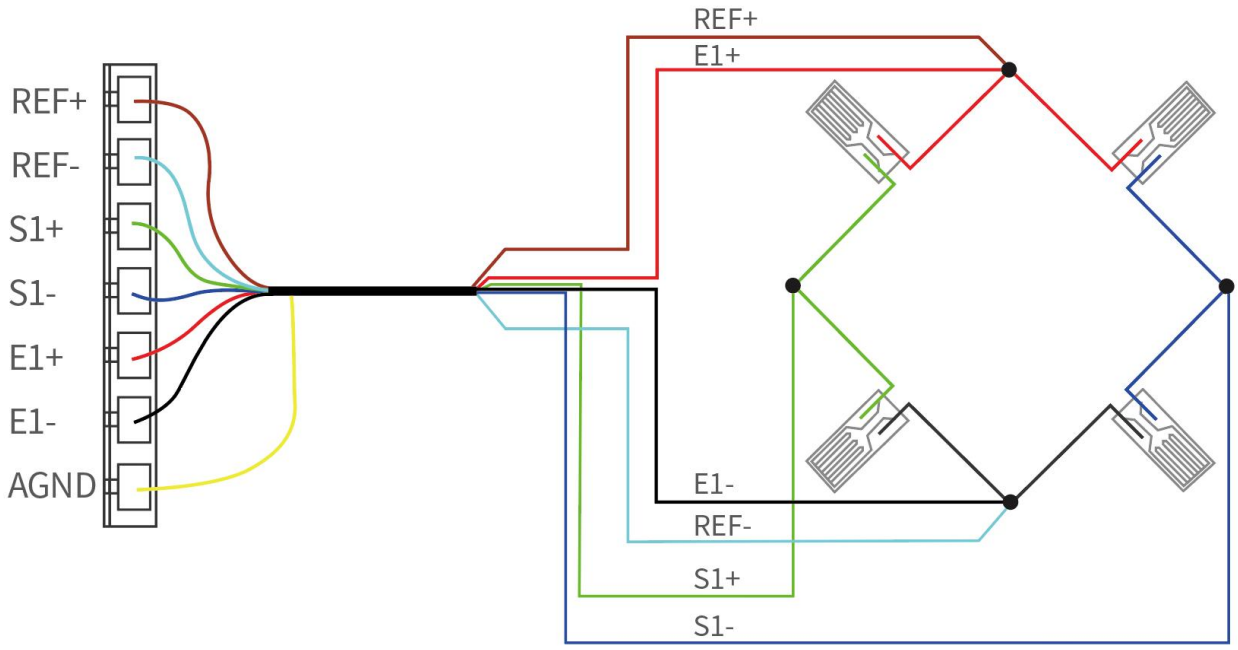
## 2.3 Product size




Installation method: 35mm rail installation

# 3. Communication parameters and wiring introduction

## 3.1 Sensor Wiring




Six-wire load cell connection diagram

The six-wire sensor plus the outer shielding wire has a total of 7 connecting wires. For specific connections, see the connection diagram and the terminal description below.

| Silkscreen | Function | |
|---|---|---|
| REF+ | Feedback+ | |
| REF- | feedback- | |
| S 1 + | Signal+ | |
| S 1 - | Signal- | |
| E 1 + | Incentive+ | |
| E 1 - | excitation- | |
| AGND | Shield/empty | |

## 3.2 RS485 communication interface

This weighing module can communicate with other devices via RS485 and supports modbus RTU protocol.

Communication parameters:

| Station No. | Baud rate | Data bits | Check digit | Stop bits |
|---|---|---|---|---|
| 1 | 19200 | 8 | none | 1 |

## 3.2.1 Modbus communication protocol

Modbus is a software layer that defines a message structure that a controller can recognize and use, regardless of the network through which they communicate. The transmission mode can be ASCII characters (not supported yet) or RTU binary mode (supported by this module). RTU is suitable for computers and PC hosts programmed in machine language. When using RTU mode, the message characters must be transmitted in the form of a continuous data stream. The Modbus protocol establishes the format of the master device query: device (or broadcast) address, function code, all data to be sent, and error detection domain.

**1、Read measured weight data (read holding register):**

| Order | 01 | 03 | 00 60 | 00 02 |
|---|---|---|---|---|
| explain | Module address | Function code | Register first address | Number of registers |

Hexadecimal 0x01 is the module default address 01 , command function code 0x03 is the read holding register command, address 0x0060 is the first address of the weight value register (corresponding to the current weight 32-bit 96 in 3.2.2 modbus communication address description table ) , 0x02 indicates that the number of registers is 2 (4 bytes in total).

At this time, it is assumed that the received data is 01 03 04 00 00 07 D 0 F9 9F

The last two bytes are CRC check bits, which can be ignored. 01 and 03 have the same meaning as above, and 04 indicates that the following 4 bytes are the return value, that is, the return value is Ox000007D 0 , which corresponds to decimal 2000 .

## 3.2.2 Modbus communication address description

| MODBUS Address | Corresponding functions | Data Types | Function code | unit | illustrate |
|---|---|---|---|---|---|
| #twenty three | Start/Stop the Motor | uint16_t | 6 | \ | Motor stop->0, motor running->1 |
| #29 | Start/stop weighing | uint16_t | 6 | \ | Weighing stop->0, weighing running->0 |
| #30 | Total number | uint16_t | 3 | indivual | |
| #31 | Overweight | uint16_t | 3 | indivual | |
| #32 | Number of underweight | uint16_t | 3 | indivual | |
| #33 | Qualified number | uint16_t | 3 | indivual | |

| | | | | | |
|---|---|---|---|---|---|
| #34 | Pass rate | uint16_t | 3 | % | |
| #35 | Average weight | uint16_t | 3 | g/kg | |
| #36 | Product Weight | uint16_t | 3 | g/kg | Calculated product weight |
| #37 | Real-time weight | uint16_t | 3 | g/kg | Real-time weight |
| #38 | Product Status | uint16_t | 3 | \ | 0->initial state, 1->underweight, 2->qualified, 3->overweight |
| #39-40 | gross weight | uint32_t | 3 | g/kg | |
| #202 | Target weight | uint16_t | 3 | g/kg | |
| #203 | Maximum weight | uint16_t | 3 | g/kg | |
| #204 | Lower weight limit | uint16_t | 3 | g/kg | |
| #300 | Zero point calibration | uint16_t | 6 | \ | Zero calibration->1 |
| #301 | Data Clearing | uint16_t | 6 | \ | Data clearing on this page->1 |
| #109 | Real-time weight | uint16_t | 3 | g/kg | Real-time weight |
| #110 | Calibration Status | uint16_t | 3 | \ | 0->Please reset<br>1->Reset completed, please put weights and enter weight<br>2->Press full scale value to calibrate<br>3->Calibration failed, please recalibrate<br>4->Calibration successful, you can exit the interface |
| #111 | Zero point calibration | uint16_t | 6 | \ | The weighing platform cannot be loaded with weights. It needs to be reset to zero. Write 1 to reset. |
| #112 | Weight calibration | uint16_t | 6 | \ | Write 1 to start gain calibration, read the weight first and then calculate the 1g proportional coefficient |
| #150 | Switch to calibration page | uint16_t | 6 | \ | To switch to the calibration screen, you must write 1 |
| #302 | Calibration weight | uint16_t | 6 | g/kg | Weight of the calibration weight |
| #199 | Buffer section speed | uint16_t | 6, 10 | m/min | Motor speed in the buffer section, reserved (not used yet) |
| #200 | Rejection speed | uint16_t | 6, 10 | m/min | Motor speed of the rejection section, reserved (not used yet) |
| #201 | Parameter number->Go to configuration | uint16_t | 6, 10 | \ | Deprecation |

| | | | | | |
|---|---|---|---|---|---|
| | screen | | | | |
| #202 | Target weight | uint16_t | 6, 10 | g/kg | Target weight of the check weighed product |
| #203 | Maximum weight | uint16_t | 6, 10 | g/kg | Upper limit weight of check weighing products |
| #204 | Lower weight limit | uint16_t | 6, 10 | g/kg | The minimum weight limit of the product to be weighed |
| #205 | Motor speed | uint16_t | 6, 10 | m/min | Motor speed of weighing section |
| #206 | Overweight rejection delay | uint16_t | 6, 10 | ms | Delay time for rejecting overweight defective products |
| #207 | Overweight removal time | uint16_t | 6, 10 | ms | Rejection and retention time of overweight defective products |
| #208 | Delay in removing underweight | uint16_t | 6, 10 | ms | Delay time for rejecting underweight defective products |
| #209 | Underweight rejection time | uint16_t | 6, 10 | ms | Rejection and retention time of underweight defective products |
| #210 | Learning the mean | uint16_t | 6, 10 | g/kg | The average weight of the self-learning results |
| #211 | Target learning ratio | uint16_t | 6, 10 | \ | The ratio of the self-learning target weight to the self-learning average weight |
| #212 | Learning Standard Deviation | uint16_t | 6, 10 | \ | Standard deviation of self-learning results |
| #213 | Photoelectric trigger delay -> Move to system interface | uint16_t | 6, 10 | \ | Deprecation |
| #214 | Weight compensation | uint16_t | 6, 10 | g/kg | Compensation for check weighing product weight |
| #215 | Trigger Mode | uint16_t | 6, 10 | \ | 0->Photoelectric mode, 1->Threshold mode |
| #216 | Weight threshold | uint16_t | 6, 10 | g/kg | Threshold mode triggers weighing threshold |
| #217 | Weighing mode | uint16_t | 6, 10 | \ | 0->dynamic mode, 1->static mode |
| #218 | Stop delay | uint16_t | 6, 10 | ms | The time spent in the weighing section |
| #twenty three | Start/Stop the Motor | uint16_t | 6 | \ | Motor stop->0, motor running->1 |
| #twenty four | Start/stop self-learning | uint16_t | 6 | \ | Self-learning stop->0, self-learning operation->1 |

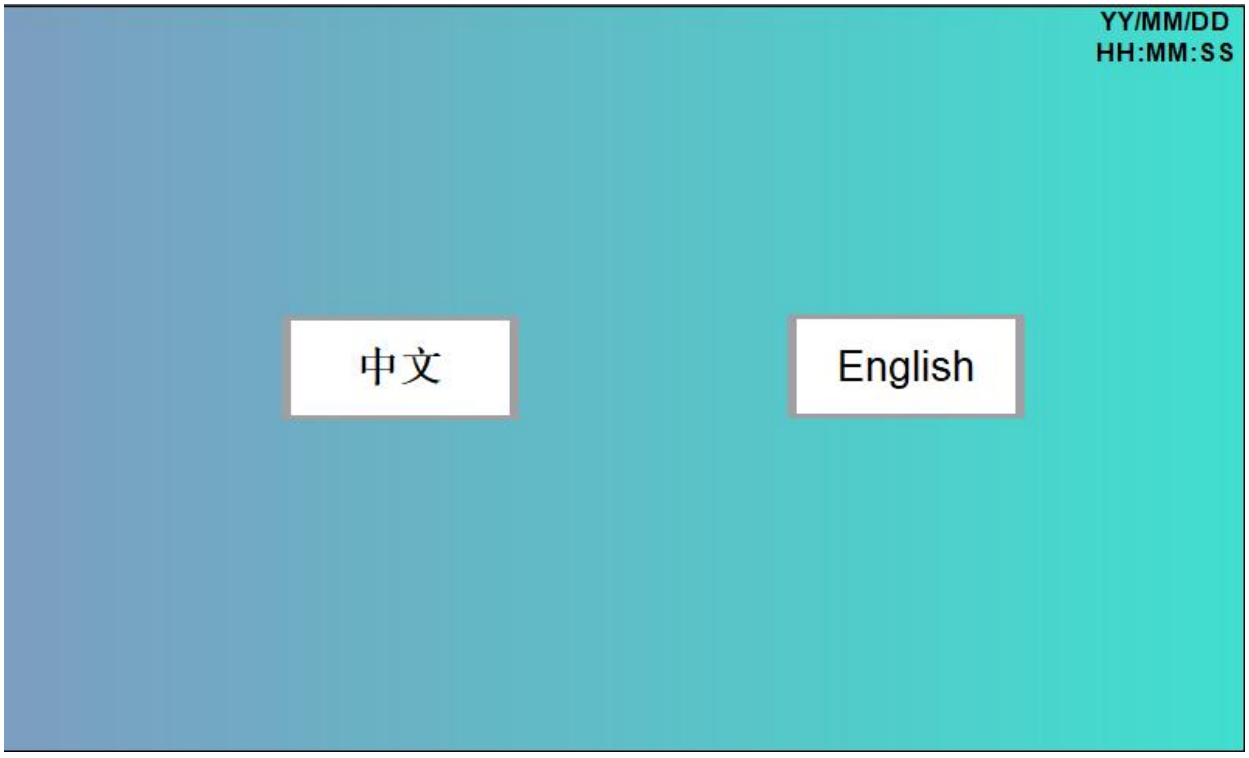
| | | | | | |
|---|---|---|---|---|---|
| #49-68 | Learning Outcomes | uint16_t/ | 3 | g/kg | 20 learning results, currently only 10 are used |
| #69 | Real-time weight | uint16_t | 3 | g/kg | |
| #70 | Learning the mean | uint16_t | 3 | g/kg | The average weight of the self-learning results |
| #71 | Target learning ratio | uint16_t | 3 | \ | The ratio of the self-learning target weight to the self-learning average weight |
| #72 | Learning Standard Deviation | uint16_t | 3 | \ | Variance of self-learning results |
| #73 | Target weight | uint16_t | 6 | g/kg | |
| #74 | Number of studies | uint16_t | 6 | indivu al | The default is 10 times, which is usually not open to users. |
| #303 | Learning status | uint16_t | 3 | \ | 0->Wait for learning, 1->Clear learning results, start learning, 2->Complete learning |
| #89 | Graduation value | uint16_t | 6, 10 | \ | 0.01g->1, 0.1g->0, 1g->2. |
| #90 | Photoelectric false touch delay | uint16_t | 6, 10 | ms | Working mode->Photoelectric false touch delay; Photoelectric will not be triggered for ? ms after photoelectric trigger |
| #91 | RS485 serial port baud rate | uint16_t | 6, 10 | \ | 9600->0, 19200->1, 38400->2, 57600->3, 115200->4 |
| #92 | unit | uint16_t | 6, 10 | \ | 0->g unit; 1->kg unit |
| #93 | Weighing section speed ratio | uint16_t | 6, 10 | \ | Inverter speed ratio of weighing section, reserved (temporarily unused) |
| #94 | Clear range | uint16_t | 6, 10 | g/kg | Shield some messy data, for example, if you set 0.50g, the jump below 0.5g will shield these data |
| #95 | Zero tracking range | uint16_t | 6, 10 | g/kg | To solve the temperature drift, collect data below 0.80g every once in a while (no data will be collected if it exceeds 0.80) |
| #96 | Static zero tracking | uint16_t | 6, 10 | g/kg | Maximum range->static zero tracking; static zero tracking, no weighing will be performed if the weight is below a certain g |
| #97 | Filter 1 | uint16_t | 6, 10 | \ | AD conversion rate at 0-30min/m speed (for internal use, not open) |
| #98 | Filter 2 | uint16_t | 6, 10 | \ | AD conversion rate at 31-50min/m speed (for internal use, not open to the |

| | | | | | |
|---|---|---|---|---|---|
| | | | | | public) |
| #99 | Filter 3 | uint16_t | 6, 10 | \ | AD conversion rate at 51-70min/m speed (for internal use, not open to the public) |
| #100 | Filter 4 | uint16_t | 6, 10 | \ | AD conversion rate at 71-90min/m speed (for internal use, not open to the public) |
| #101 | Weighing section station number | uint16_t | 6, 10 | \ | Modbus communication address of the inverter in the weighing section, reserved (not used yet) |
| #102 | Buffer segment station number | uint16_t | 6, 10 | \ | The inverter Modbus communication address of the buffer segment, reserved (temporarily unused) |
| #103 | Eliminate segment station number | uint16_t | 6, 10 | \ | Modbus communication address of the inverter to be removed, reserved (temporarily unused) |
| #104 | Buffer section speed ratio | uint16_t | 6, 10 | \ | Inverter speed ratio of the buffer section, reserved (temporarily unused) |
| #105 | Rejection section speed ratio | uint16_t | 6, 10 | \ | The inverter speed ratio of the eliminated segment is reserved (not used yet) |
| #149 | Run interface | uint16_t | 6 | \ | Enter this interface->1, reserved (not used yet) |
| #150 | Calibration Page | uint16_t | 6 | \ | Enter this interface->1 |
| #151 | Fault Detection | uint16_t | 6 | \ | Enter this interface->1, reserved (not used yet) |
| #152 | Parameter settings | uint16_t | 6 | \ | Enter this interface->1, reserved (not used yet) |
| #153 | Statistical Reports | uint16_t | 6 | \ | Enter this interface->1, reserved (not used yet) |
| #154 | System Parameters | uint16_t | 6 | \ | Enter this interface->1, reserved (not used yet) |
| #155 | Self-learning | uint16_t | 6 | \ | Enter this interface->1, reserved (not used yet) |
| #304 | 10-code status | uint16_t | 3 | \ | Detect 10-code completion status (1 recipe parameter, 2 system parameter) |
| #305 | Hardware detection on/off | uint16_t | 6 | \ | Write 1 to turn on the test hardware mode and input detection (all outputs are turned off for input testing).<br>Write 0 to turn off hardware testing |
| #306 | Detect Y0 on/off | uint16_t | 6 | \ | Write 1 to enable output Y0 detection; |

| | | | | | |
|---|---|---|---|---|---|
| | | | | | Write 0 to turn off output detection |
| #307 | Detect Y1 on/off | uint16_t | 6 | \ | Write 1 to enable output Y1 detection; Write 0 to turn off output detection |
| #308 | Detect Y2 on/off | uint16_t | 6 | \ | Write 1 to enable output Y2 detection; Write 0 to turn off output detection |
| #309 | Detect Y3 on/off | uint16_t | 6 | \ | Write 1 to enable output Y3 detection; Write 0 to turn off output detection |
| #310 | Save parameters to flash | uint16_t | 6 | \ | Write 1, write all parameters to flash (this operation will also be automatically executed when power is off) |
| #311 | Detection X0 | uint16_t | 6 | \ | Detection X0 |
| #312 | Detection X1 | uint16_t | 6 | \ | Detection X1 |

# 4. Communication case with Coolmay touch screen TK8070H

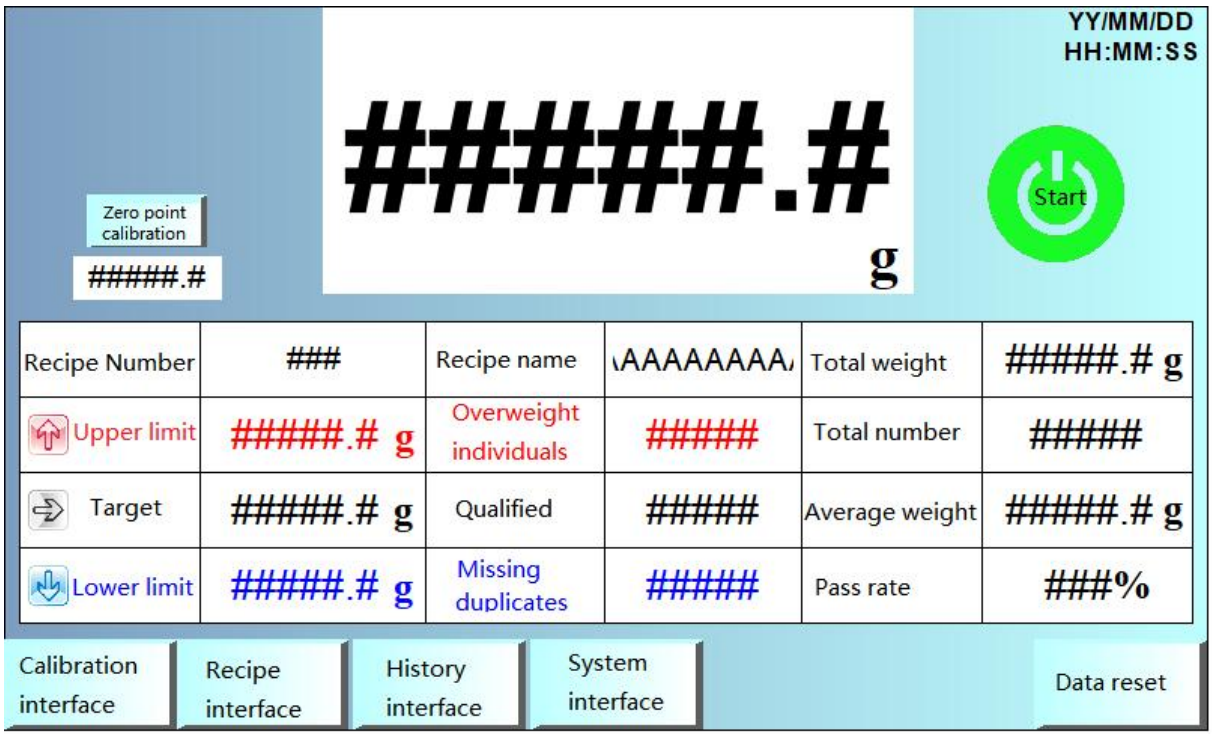
## 4.1 Startup interface




- This system supports free switching between Chinese and English
- Enter this interface after power on

- ❖ The current time and date are displayed in the upper right corner
- ❖ After selecting the language, you will automatically jump to the home page interface

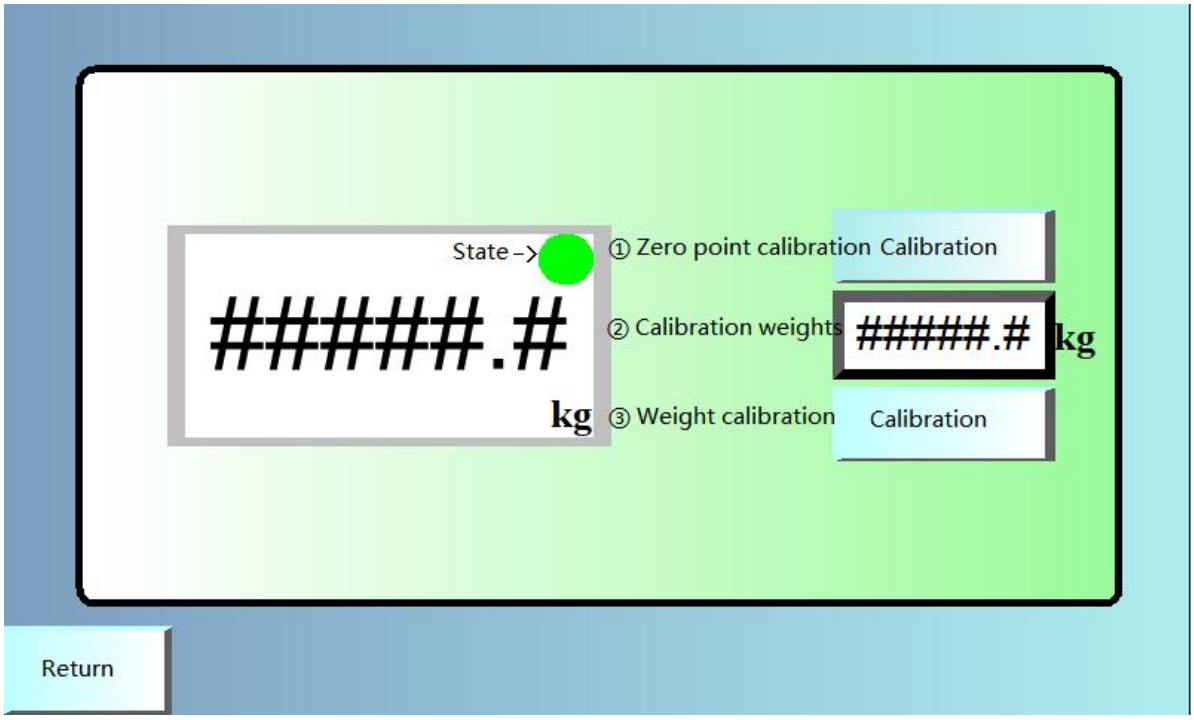
## 4.2 Home page interface




| | |
|---|---|
| start up | Start and stop motor operation and weighing operation |
| Weight display | Displays the recorded product weight |
| Zero point calibration | Clear the real-time weight value to facilitate zero point calibration |
| Real-time weight value | Display the current weight in real time, without recording, only display |
| Recipe Number | Displays the recipe number currently in use |
| Recipe Name | Displays the name of the recipe currently in use |
| gross weight | The total weight of all weighed products |
| Total number | The total quantity of all weighed products |
| Average weight | Total weight ÷ total number = average weight |
| Pass rate | The ratio of qualified products to the total number; qualified number/total number*100% |
| Maximum weight | Products that exceed this parameter weight are overweight products |
| Target weight | Weight of qualified products |
| Lower weight | Products with a weight lower than this parameter are considered |

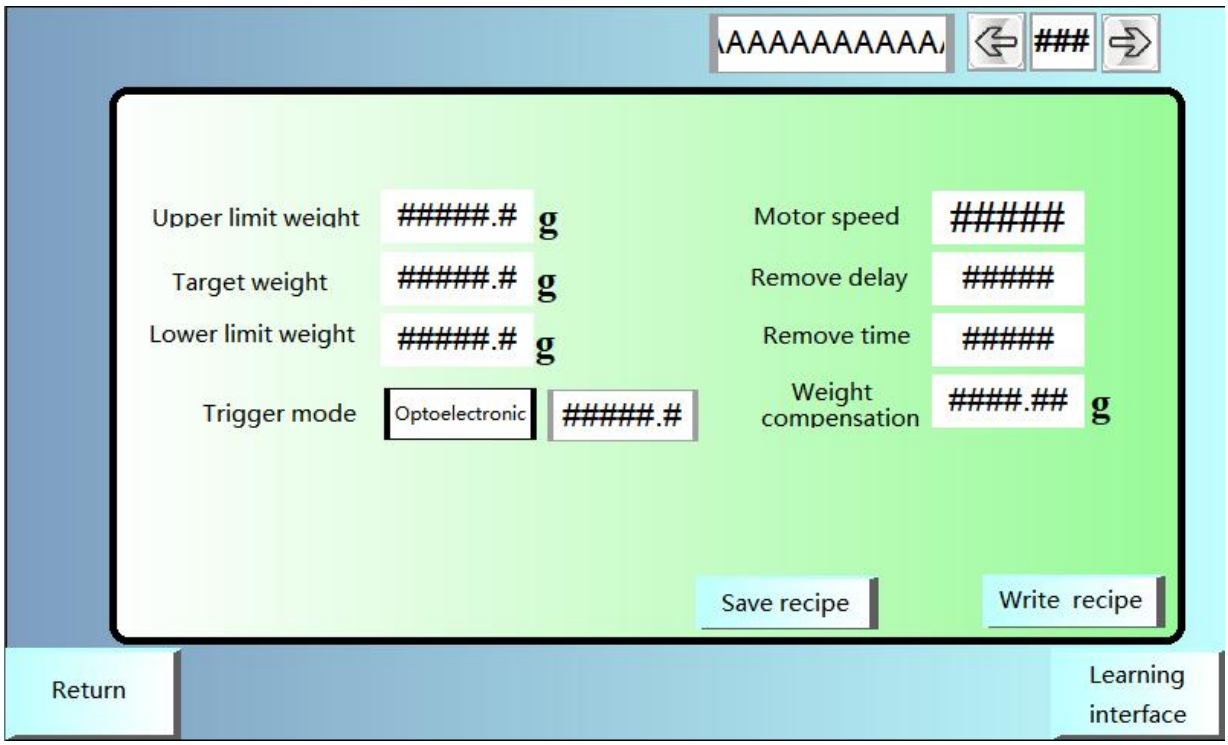
| | |
|---|---|
| limit | underweight products. |
| Overweight | Record the number of overweight products |
| Qualified number | Record the number of qualified products |
| Number of underweight | Record the number of underweight products |
| Data clearing | Clear all data in the table |

## 4.3 Calibration interface




| | |
|---|---|
| Real-time weight | Unfiltered real-time weight |
| state | White light -> Please reset<br>Yellow light -> Clearing completed, please put weights and enter the weight , press the full value, and calibrate.<br>Red light -> Calibration failed, please recalibrate<br>Green light -> Calibration successful, you can exit the interface |
| Zero point calibration | The weighing platform cannot be loaded with weights, and the weight is reset to zero in real time |
| Calibration weights | Enter the actual weight of the calibration weight |
| Weight calibration | Read the weight of the weight and calculate the proportional coefficient |

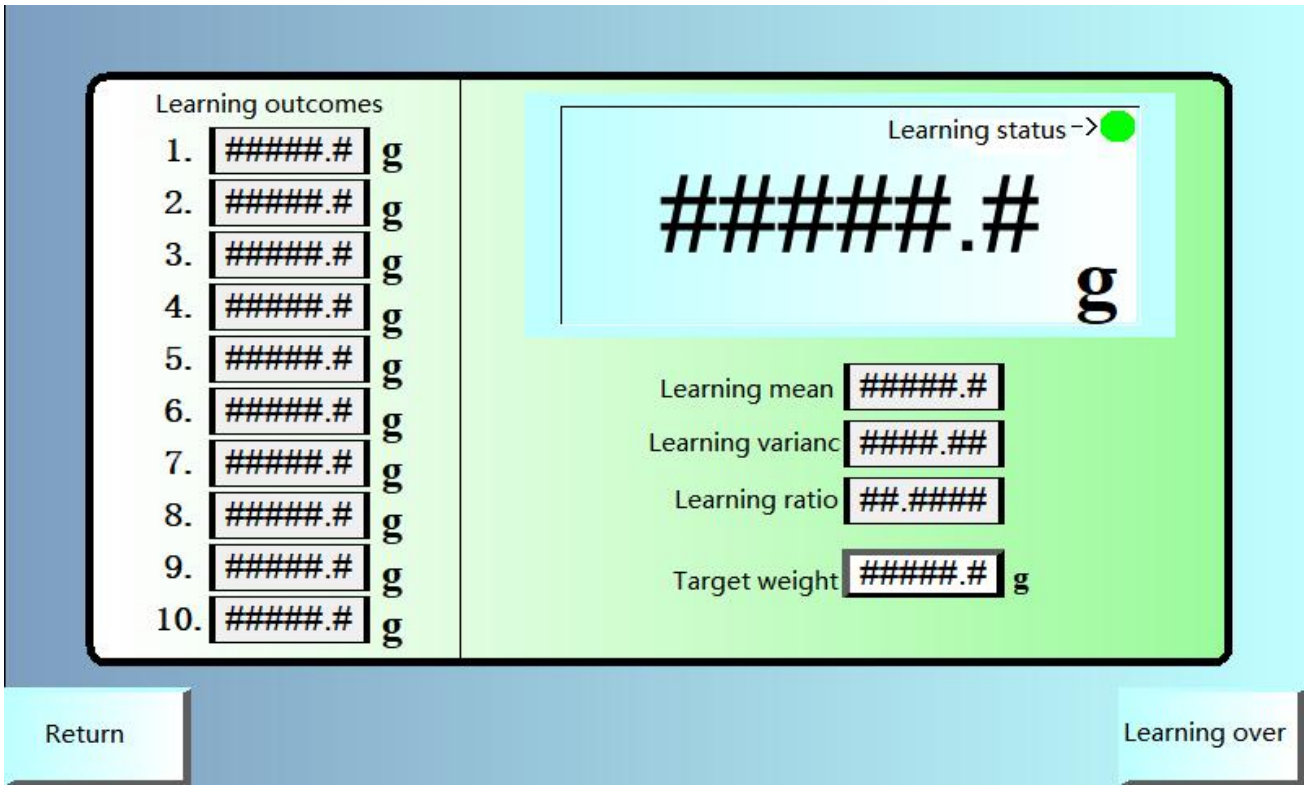
## 4.4 Recipe interface




❖ Back up all the parameters on this page. The upper right corner is the current recipe number . The left and right arrows can be used to add or subtract the recipe number .

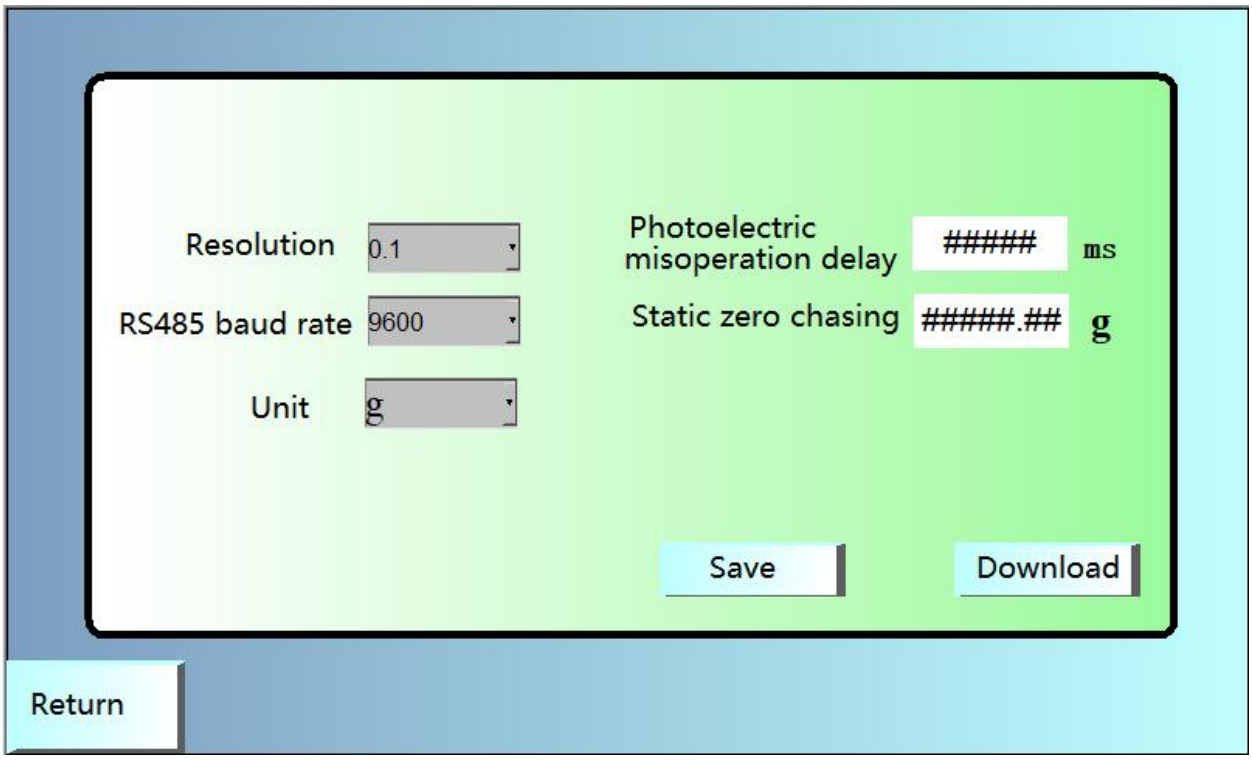
| | |
|---|---|
| Maximum weight | Products that exceed this parameter weight are overweight products |
| Target weight | Products with this parameter weight are qualified products |
| Lower weight limit | Products with a weight lower than this parameter are considered underweight products. |
| Trigger Mode | Photoelectric mode/Threshold mode |
| Threshold mode value | Threshold mode triggers weighing threshold |
| Motor speed | Motor speed of weighing section |
| Eliminate delay | How long does it take for the cylinder to remove the underweight defective product after it is detected? |
| Elimination time | The time for the cylinder to hold the rejection action, and reset after the time is up |
| Weight compensation | Compensation for check weighing product weight |
| Save Recipe | Save the current data by recipe number after power failure |
| Write recipe | Download the currently displayed recipe data into the module |

## 4.5 Learning interface



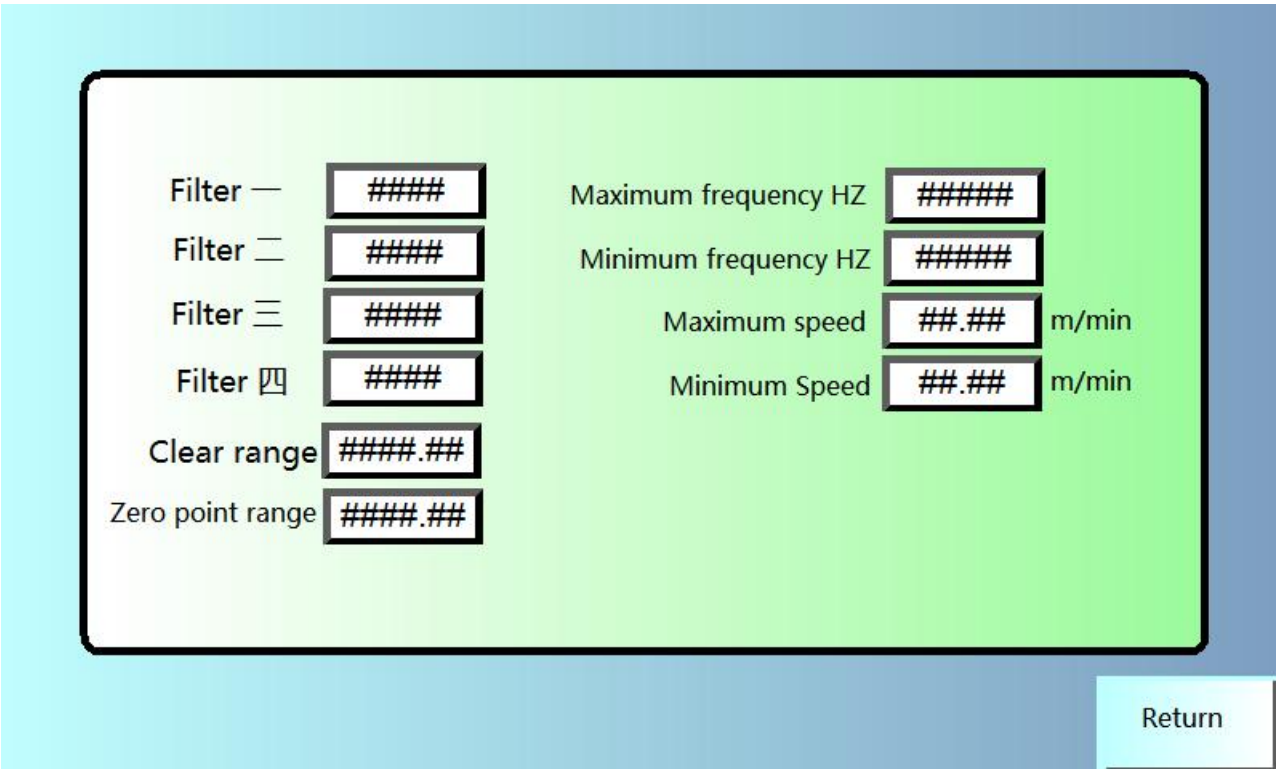

| | |
|---|---|
| Real-time weight | Unfiltered real-time weight |
| Learning status | Yellow light -> Waiting for learning , clearing learning results, and starting learning<br>Green Light -> Learning completion |
| Target weight | The weight of the product to be learned, enter the target weight of the product |
| Number of studies | The default is 10 times, and the results are obtained after 10 learnings. |
| Learning Outcomes | If the weight recorded each time is very different from the result of each learning, it is recommended to learn again. |

## 4.6 System Interface




| | |
|---|---|
| Graduation value | Accurate to several decimal places, you can choose the division value 1, 0.1, 0.01 |
| RS485 Baud Rate | You can choose 9600, 19200, 38400, 57600, 115200 |
| unit | The unit required for weighing, you can choose g or kg |
| Photoelectric false touch delay | After the parameter delay, the photoelectric signal will take effect and record the product weight only when it is triggered again. Unit: ms |
| Static zero tracking | Weigh within this range to zero |
| save | Save the current parameters after power off |
| download | Download the current parameters into the module |

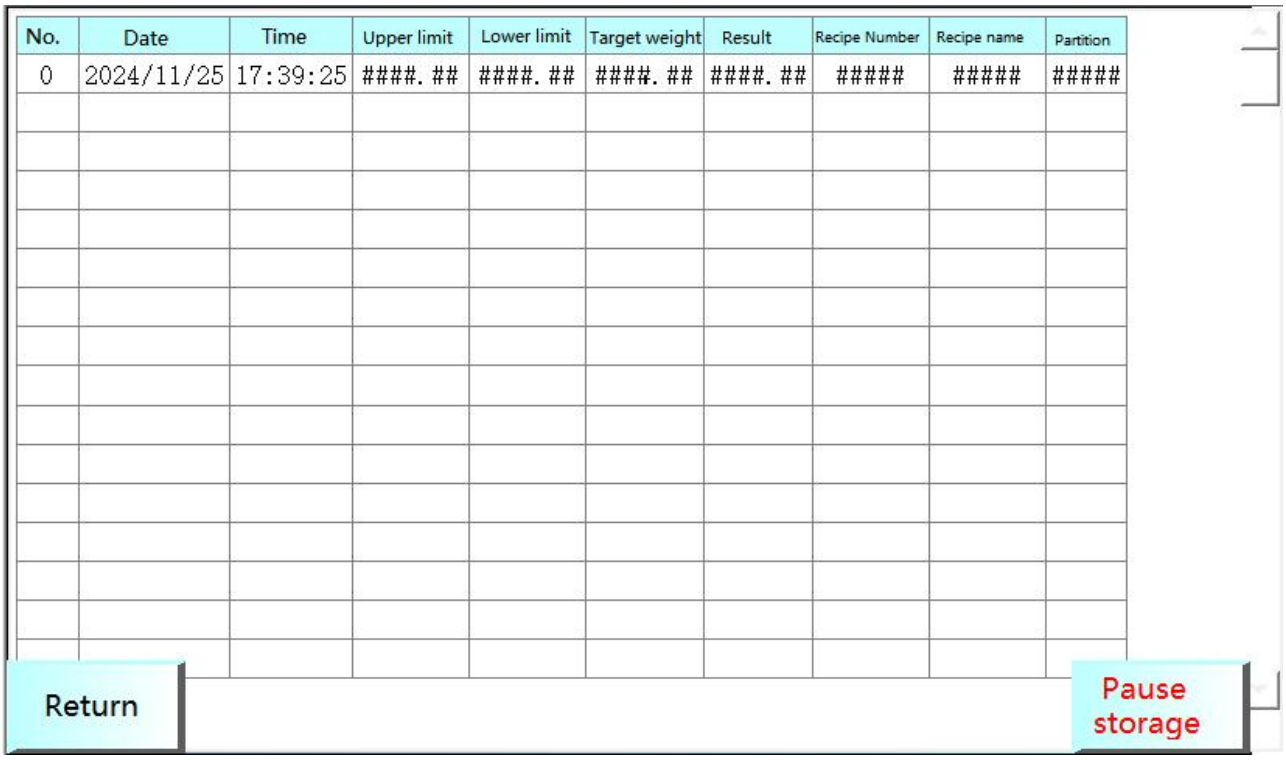
## 4.7 System Hiding




- The filter parameters on this page have default values and are not recommended to be modified.
- After filling in the correct motor frequency and speed, fill in the motor speed on the recipe interface, and it will automatically convert into the corresponding inverter frequency in Hertz.

| | |
|---|---|
| Filter 1 | AD conversion rate at speeds of 0-30min/m, generally not open to users |
| Filter 2 | AD conversion rate at 31-50min/m speed, generally not open to users |
| Filter three | AD conversion rate at 51-70min/m speed, generally not open to users |
| Filter 4 | AD conversion rate at speeds of 71-90min/m, generally not open to users |
| Clear range | Minimum weighing weight, generally not open to users |
| Zero range | Automatic zero tracking range |
| Maximum frequency HZ | The maximum HZ number of the motor corresponds to the maximum speed |
| Minimum frequency HZ | The minimum HZ number of the motor corresponds to the minimum speed |
| Top speed | The maximum speed of the motor corresponds to the highest frequency HZ |
| Minimum speed | The minimum speed of the motor corresponds to the lowest frequency HZ |

## 4.8 History records




- ❖ Record the weight of each product and display it in the results column
- ❖ Record the current recipe data
- ❖ Partition: 1 represents the product is underweight, 2 represents the product is normal, 3 represents the product is overweight
- ❖ Historical data recording can be started, paused and switched
- ❖ Data can be exported to Excel

**For details, please refer to the case " Coolmay-dynamic weighing.rar "**

# Attachment version change record

| date | Changed version | Changes |
|---|---|---|
| Apr. 2024 | V24.41 | ◆ First version released |
| Feb. 2025 | V25.21 | ◆ Modified to L02S-1LC, and the parameters are the latest version |
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