

**GM7702**

User Manual

GM7702-00180101

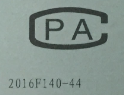
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Website: http://www.szgmt.com.cn/

Implementation of standards: **GB/T 7724—2008**

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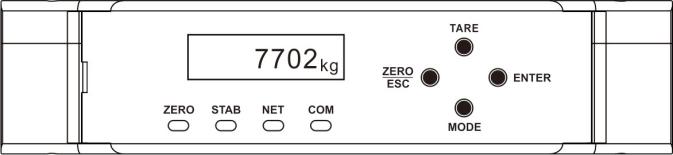
# 1 General Description

**GM7702** weighing indicator is specially designed for weight transmitting in industrial fields. This indicator has the features of small volume, plenty communicating commands, stable performance, easy operation and practicability. It can be widely applied to concrete and bitumen mixing equipment, metallurgy furnace and converter, chemical industry and feed, etc..

## 1.1 Functions and Characteristics

* small volume, unique design and easy operation
* applicable to all kinds of resistance strain gauge bridge load cell
* front panel numerical calibration
* multilevel of digital filter
* automatic zero-tracking
* automatically zero when power on
* serial communication interface: RS232 or RS485
* calibration via serial interface (Serial interface sets ON)
* support 16 bits **DA** output
* 2 In and 3 Out, support limit control output
* online upgrade via **RS232** serial port
* tare weight function

## 1.2 Front Panel Description



Status:

* **ZERO**: Light on when material weight is 0±4d.
* **STAB**: Light on when material weight is within stable range.
* **NET** : Light on when indicator is in net weight status.
* **COM**: Light on when in communication status.

Keypad:

* **ZERO/ESC**: Used to exit from current operation or go previous page.

In the status of net weight, press this key will enter gross weight status.

* **TARE:** In the status of gross weight, press OPTION will tare and indicator show net weight value.

When data input, the main display flash and the flash position will move.

* **MODE**：To make flashing position move to the right digit when data inputting.
* **ENTER**: Enter option when calibration or in parameter setting.

## 1.3 Technical Specifications

### 1.3.1 Common:

Power supply: **DC24V±5%**

Working temperature: **-10～40℃**

Max humidity: **90%R.H** without dew

Power consumption: about **10W**

### 1.3.2 Analog:

Load cell power: **DC5V 100mA（MAX）**

Input impedance: **10MΩ**

Zero steady range: 0.00~12mA (Load cell 3mV/V)

Input sensitivity: **0.1uV/d**

Input range: **0.00～15mV(**Load cell **3mV/V)**

Transfer mode: **Sigma - Delta**

**A/D** conversion speed: **120/240/480** times/sec.

Non-linearity: **0.01% F.S**

Gain drift: **10PPM/℃**

Display precision: **1/100000**

### 1.3.3 Digital:

Weight display: **128\*32 0.91”** White light **OLED**

Minus display: “-”

Overload display: Voltage overlimit/underlimit

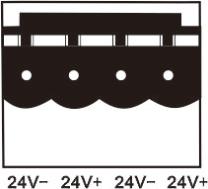
Decimal point: **5** types (optional)

Function keys: **4** keys soniferous keypad

# 2 Installation and Wiring

## 2.1Connection of Power Supply

**GM7702** weighing indicator connects with DC24V power supply as follows, which has two lines connecting ports.



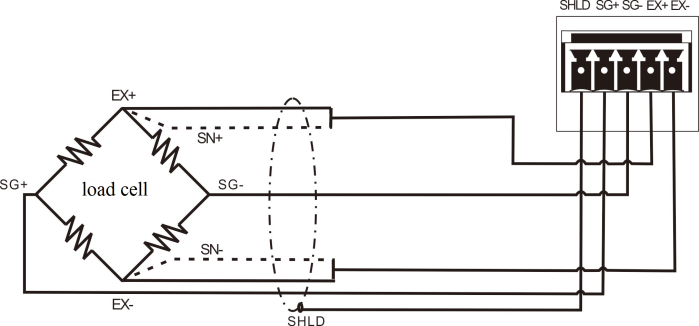
## 2.2 Connection of Load Cell

**GM7702** weighing indicator connects with bridge type resistance strain gauge load cells by 4 wires. (When use 6-wired load cells, you must bridge the EX+ with SN+ and bridge the EX- with SN-.) It could connect with 4 units load cell of 350**Ω.**



|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **4 wires** | **EX+** | **EX-** | **SG+** | **SG-** | **SHLD** |

### 2.2.1 Load Cell Connection



**Note:**

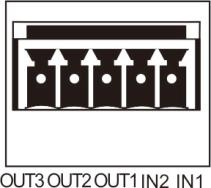
**1**. As load cell output signal is sensitive to electronic noise, the wiring should be shield cable and separate with other cables, especially AC power.

**2**．4 wires connection is suitable for short distance and stable temperature or low precision field, otherwise use 6 wires connection.

**3**．For more load cells parallel connection, their sensitivity (mV/V) should be the same.

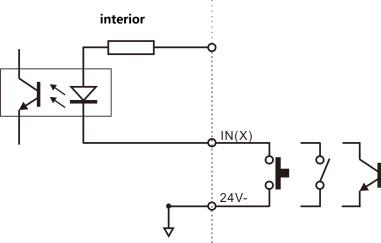
## 2.3 Connection of I/O Terminal

**GM7702** weighing indicator has equipped with I/O module of 2 IN and 3 OUT.

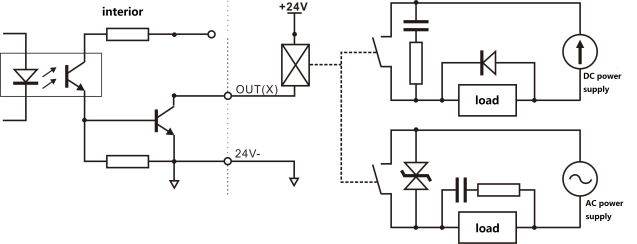


|  |  |  |  |
| --- | --- | --- | --- |
| Output | | Input | |
| **OUT1** | stable | **IN1** | zero |
| **OUT2** | overlimit | **IN2** | tare |
| **OUT3** | set point 1 |  |  |

Indicator input terminal connection:



Indicator output terminal connection:



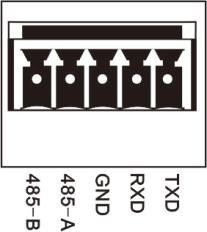
## 2.4 Serial Port Output

**GM7702** weighing indicator possesses RS232 and RS485 serial port, which support Modbus-RTU protocol, r-SP1 and r-Cont.

Communication parameters:

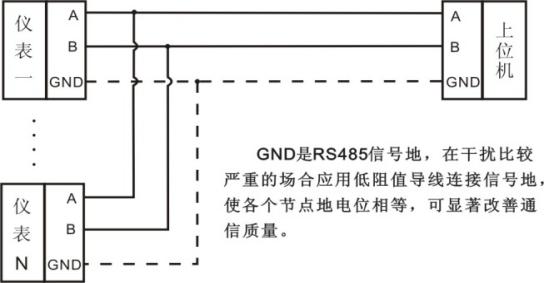
|  |  |  |
| --- | --- | --- |
| **Item** | **Option** | **Description** |
| 1. serial port RS232  2. serial port RS485 | ID No. | initial value: 01; range: 01-99. |
| baud rate | initial value: 38400; option: 9600, 38400, 57600, 115200. |
| data format | initial value: 8-E-1; option: 8-E-1, 8-O-1, 8-N-1, 7-E-1, 7-O-1. |
| communication | initial value: Modbus-RTU; option: Modbus-RTU, r-SP1 and r-Cont. |
| Modbus Hi-Lo | initial value: AB CD; option: AB CD(Hi-Lo), CD AB(Lo-Hi) |
| sending interval | initial value: No interval; option: no interval, 10msec, 20msec, 50msec.  data sending interval in r-Cont mode |

**RS485** Connection mode:



computer

Indicator1



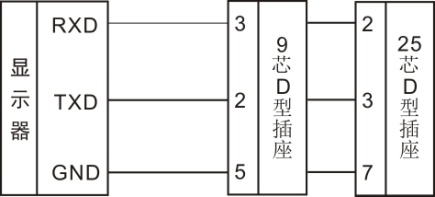
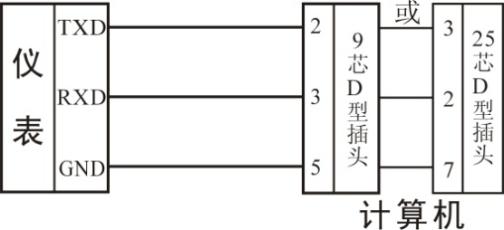
GND is ground of RS485, it can very much improve communication quality via connecting with GND by low-resistance wire when there is a lot of disturbance in working field.

Indicator N

**RS232** Connection mode:

or

25pin connector



computer

9 pin connector

Indicator

更换

## 2.5 Connection of Analog

There are two types of analog output:

**1)** Voltage output: 0-5V, 0-10V.

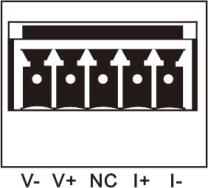
**2)** Current output: 0-24mA.

**3)** User-define function: user can define analog output type and output range.

**Analog parameter**

|  |  |  |
| --- | --- | --- |
| **Item** | **Option** | **Description** |
| Working mode | **0-24mA** | Weight value could be converted to current of 0-24mA. |
| **0**-**5V** | Weight value could be converted to voltage of 0-5V. |
| **0**-**10V** | Weight value could be converted to voltage of 0-10V. |
| user-defined current | User can define the current or voltage. |
| user-defined voltage |
| Min. output value | initial value: **00**.**000** | To set min. analog output value. (The value will not change if the converted value smaller than set value.) |
| Zero output value | initial value: **00**.**000** | To set analog output value of zero point weight value. |
| Max. capacity output value | initial value: **00**.**000** | To set analog output value of max. capacity. |
| Max. output value | initial value: **00**.**000** | To set max. analog output value. (It will not change if converted value bigger than set value.) |

Analog output ports defined as below:



**V+**: Positive voltage output；**V-**: Negative voltage output

**I +**: Positive current output；**I-**: Negative current output

Analog calibration method: (connecting analog output port with multimeter)

|  |
| --- |
| 1. Working parameter |
| 1. Calibration parameter   ※In parameter interface, pressing TARE and ENTER simultaneously to enter analog calibration. |

|  |
| --- |
| 1. 4mA calibration |
| 1. 12mA calibration |

※Select calibration point and press ENTER. Contact to multimeter and input the display value, finally press ENTER to complete.

※Analog calibration has 4 steps to complete.

Change option by pressing MODE key.

|  |
| --- |
| 1. 20mA calibration |
| 1. 24mA calibration |

# 3 Data Input and Parameters

## 3.1 Parameters List

In the status of weighing, user could enter parameter interface by MODE key, and change item by TARE or MODE, then press ENTER to edit parameter.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Item No. | Parameter | Parameter item | Description | |
| 1 | Working parameter | power-up zero | initial value: OFF (option: ON / OFF)  To proceed zero judgment when power on. | |
| zero tracking range | initial value: 0. (range: 0~9d)  Automatic judgment of zero point if weight value is within set time and range. | |
| zero tracking time | initial value: 1.0 (0.0~9.9s)  Automatic judgment of zero point if weight value is within set time and range. | |
| stable range | initial value: 01. (range: 00~99d)  Stable if weight value changes within set time and range. | |
| stable time | initial value: 1.0. (Range: 0.0~9.9s) | |
| zero range | initial value: 01 (1%~99% of full capacity)  Zero range allowed. | |
| digital filter grade | initial value: 5 (Range: 0~9)  Stronger filter grade, more stable weight value. | |
| stable filter grade | initial value: **0** (Range: 0~9)  To proceed second filter on the base of digital filter. | |
| AD sample rate | initial value: 120 times /sec. (120/240/480 times/sec.) | |
| 2 | Calibration | unit | calibration parameters | |
| decimal point |
| division |
| max. capacity |
| remote calibration ON/OFF |
| calibration with weight |
| calibration without weight |
| 3 | Communication parameter | RS232 | RS232/RS485 parameter setting:  Including: ID no., baud rate, data format, communication protocol, MODBUS Hi-Lo, transfer interval (r-Cont mode) | |
| RS485 |
| 4 | Control parameter | control mode | weight control mode |  |
| parameter setting | control parameter setting |
| 5 | Analog parameter | working mode | To set analog output mode |  |
| min. output value | The value is displayed if analog is below this value. | Can be set in user-defined mode |
| zero point output value | Analog value when weight value is zero. |
| max. capacity output | The analog value matches with max. capacity value. |
| max. output value | The value is displayed if analog is over this value. |
| 6 | I/O define |  | Define input and output ports. |  |
| 7 | I/O test |  | Test input and output connecting ports |
| 8 | Reset | reset working parameter | Reset to factory defaults. | |
| reset serial port parameter | Reset to factory defaults. | |
| reset all parameters | Reset to factory defaults. | |
| 9 | System info. | password | Password protection of all parameters or change password. | |
| language | Language version change. (Chinese / English) | |
| automatic lock screen | The indicator will lock screen automatically if there are not any operation during set time. (Option: OFF, 1 min., 2min., 5min. and 10min.) | |
| version | Version information display | |
| compile information | Version compiles information display. | |
| test | Light on to check whether any damage on the screen or indicator light. | |

## 3.2 Data Input

Change or input of parameters value could be proceeding through 4 function keys.

Change of parameters: TARE—Upturn, MODE—Downturn, Enter—Confirm.

Press ENTER and select parameter

|  |
| --- |
| 0：OFF |
| 1：ON |

|  |
| --- |
| 1. Power-up zero |
| 2. Zero tracking range |

Press ENTER to save and complete setting.

Press TARE or MODE to select.

|  |
| --- |
| 0：OFF |
| 1：ON |

|  |
| --- |
| 1. Power-up zero |
| 2. Zero tracking range |

Parameter value input: TARE—value plus one, MODE—change position, ENTER—confirm.

Press ENTER to select parameter

Press TARE to adjust input position.

Press MODE to change input position

Press ENTER to save setting.

|  |
| --- |
| 1. Zero tracking time |
| 1. Stable range |

|  |
| --- |
| 1.0 |

|  |
| --- |
| 2.0 |

|  |
| --- |
| 1.0 |

|  |
| --- |
| 1. Zero tracking time |
| 1. Stable range |

# 4. Calibration

## 4.1 Description

GM7702 indicator should proceed calibrated if the parameters can’t meet users’ requirement. Calibration can fix zero point and gain voltage.

User can make record of calibration parameter value, which could be used in calibration without weight.

## 4.2 Calibration Parameter

|  |  |  |
| --- | --- | --- |
| **Calibration parameter** | **Parameter** | **Description** |
| Unit | **g；kg；t；lb** | initial value: kg |
| Decimal point | **0；0.0；0.000.000；0.0000** | initial value: 0.00 |
| Division | **1**；**2**；**5**；**10**；**50** | initial value: 1 |
| Max. capacity | **≤**division \***100000** | initial value: 10000 |
| Remote calibration ON/OFF | OFF or ON | Calibration through serial port when set ON. |
| Calibration with weight | empty scale calibration | Press ENTER key and set present status as zero point. |
| weight value 1 | The weight value is base of the material. |
| weight value 2 |
| weight value 3 |
| weight value 4 |
| Calibration without weight | zero calibration | Proceeding empty scale calibration and weight calibration if urgent. |
| gain voltage calibration |
| gain weight calibration |

### 4.2.1 Empty Scale Calibration

To set empty scale as zero point

|  |  |
| --- | --- |
| Weight: | **2**.**100kg**  Note:  ※The scale must be empty before pressing ENTER key.  ※Empty scale calibration can only competed when stable.  ※Please record voltage value displayed in empty scale status. |
| Voltage: | 1.**843mV** |

Press confirm key

（to set present status as zero）

|  |  |
| --- | --- |
| Weight: | **0.000kg** |
| Voltage: | **1.843mV** |

### 4.2.2 Weight Calibration

In order to meet the demands of multiple weight standards, user could set parameters of weight point 1, weight point 2, weight point 3, weight point 4, which are helpful to calibrate gain weight.

In status of empty scale, pressing confirm key to enter weight value 1, display weight and voltage will show 0.

|  |  |
| --- | --- |
| Weight: | **0.000kg** |
| Voltage: | **0.000mV** |

Adding weight

Adding weights, also recording both weight value and voltage

|  |  |
| --- | --- |
| Weight: | **0.302kg** |
| Voltage: | **1.000mV** |

Pressing ENTER

Pressing MODE key could shift set point position. Press OPTION key could edit value.

|  |
| --- |
| Input weight value |

Pressing ENTER

to complete calibration.

|  |  |
| --- | --- |
| Weight: | 1.000kg  Calibration completed. |
| Voltage: | 1.000mV |

### 4.2.3 Calibration without Weight

There is a certain error available for calibration without weight. If in urgent condition, please follow below operations.

|  |  |  |  |
| --- | --- | --- | --- |
| Zero calibration | |  | | --- | | 01.843 | | Press zero calibration to enter zero millivolt manually interface, then input the millivolt of calibration with weight record and press ENTER to complete |
| Gain voltage calibration | |  | | --- | | 00.000 | | Press gain voltage calibration to enter manually interface, then input the calibration with weight record and press ENTER to complete. |
| Gain weight calibration | |  | | --- | | 00.000 | | Press gain weight calibration to enter manually interface, then input the gain voltage calibration value and press ENTER to complete. |

# 5 Control Parameter

**GM7702** controlling mode: upper/lower limit mode and set point mode.

**Controlling parameters:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Mode** | **Parameters** | **Description** | | | |
| Upper/Lower limit | output stable judgment | initial value: ON  Whether limit output proceeded when stable. | | | |
| min. duration | initial value: **0**；range: **0-99.9S**； | | | |
| upper limit value | initial value: 0. Valid when present weight value>upper limit value. (Define OUT port as upper limit) | | | Middle limit valid when lower limit<present weight<upper limit |
| lower limit value | initial value: 0. Valid when present weight value<lower limit value. (Define OUT port as lower limit) | | |
| Set point mode | set point **1**  set point **2**  set point **3**  set point **4** | output stable judgment | initial value: ON  Whether set point output when stable. | | |
| min. duration | initial value: **0**；Range: **0-99.9S**； | | |
| comparing conditions | initial value: greater than or equal to. Option: greater than or equal to, less than or equal to, in the range or out of range. | | |
| preset value 1 | initial value: **0**； | ※The indicator will judge preset value 1 when the comparison condition is greater than or equal to, less than or equal to. | |
| preset value 2 | initial value: **0**； |

※Upper limit value must be greater than lower limit value.

※For example,

**1**. Select parameter: Upper/lower limit setting mode, stable judgment when output: ON; min. duration: 2s. Upper limit: 1000. Lower limit: 500.

I/O module definition: OUT1: upper limit. OUT2: middle limit. OUT3: lower limit.

Load weight meter output: Before the weight is stable, the external switch quantity maintains the state before the weight change; when the weight is stable, if the current weight is greater than 1000, the output port 1 is valid. In the effective 2S time, if the weight is reduced to 800, the output port 1 will continue to remain valid for 2 seconds.

# 6 I/O Module

## 6.1 I/O Module Define

**GM7702** has equipped with 2 input ports and 3 output ports and could be defined freely.

**I/O module parameters**

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Define item** | **Description** |
| IN-**1**  IN**-2** | **0**: no definition | When the input port is defined as the corresponding function, the trigger input port is valid and the function is executed. |
| **1**: zero |
| **2**: tare |
| **3**: trigger set point 1 |
| **4**: trigger set point 2 |
| **5**: trigger set point 3 |
| **6**: trigger set point 4 |
| OUT-**1**  OUT**-2**  OUT-**3** | **0**: no definition | When the output port is defined as the corresponding function, the trigger output port is valid. |
| **1**: stable |
| **2**: overlimit |
| **3**: set point 1 output |
| **4**: set point 2 output |
| **5**: set point 3 output |
| **6**: set point 4 output |
| **7**: upper limit |
| **8**: middle limit |
| **9**: lower limit |

## 6.2 I/O Module Test

The purpose of I/O module test is to check whether the connection is correct.

**I/O module test parameters**

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Description** | |
| IN**-1** OFF | connect external switch correctly (DC 24V)  When external trigger switch is valid, and input port parameter sets on, means connection is already. | If the input and output status is not valid as preset, check whether the wiring and power connections are correct. |
| IN-**2**  OFF |
| OUT-**1** OFF | connect external switch correctly (DC 24V)  To press ENTER and set parameter ON. Output indicator light is on at the same time, means connect already. |
| OUT-**2** OFF |
| OUT-**3** OFF |

# 7. Password Management

Password function can protect indicator parameters and could be edit in system information parameter.

Password must set ON and input correct password when enter.

Initial password: 000000.

|  |  |
| --- | --- |
| **Parameter** | **Description** |
| Password ON/OFF | option: ON, OFF. User has to input password if set ON. |
| Change password | There is 3 steps:   1. input original password 2. input new password 3. input new password again  * Password input must be in accordance. |

# 8. Serial Port Communication

**GM7702**has optional RS232 or RS485 to connect withcomputer. It supports **r-Cont** protocol, **r-SP1** protocol, **Modbus-RTU** protocol.

## 8.1 **r-Cont** Mode

Indicator will transfer data to computer automatically.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **STX** | ID no. | Channel no. | Status | Weight value | **CRC** | **CR** | **LF** |
| **02** | **2** bits | **31** | **2 bits** | **7**bits | **2bits** | **0D** | **0A** |

ID no.—— **2** bits, range: 01~99

Status—— **2** bits, High byte: 40H. Definition of low byte as below:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **D6** | **D5** | **D4** | **D3** | **D2** | **D1** | **D0** |
| null | null | G/N weight | positive/ negative | zero | OFL | stable |
| **fix:** 1 | **fix:** **0** | **0: G**  **1: N** | **0**: P  **1**: N | **0**: NZ  **1**: Zero | **0**: Normal  **1**: OFL | **0**：unstable  **1**: stable |

Weight value —— 7 bits without symbol, if overweight or underweight and then return, indicator will show **OFL**.

**CRC** —— 2 bits, check sum

**CR** —— 1 bit, **0DH**

**LF** —— 1 bit, **0AH**

For example,

Indicator is showing below data: **02 30 31 31 40 41 20 20 20 37 30 30 32 34 0D 0A**

Means present status: gross weight, stable, positive value, weight value is 700.

## 8.2 **r-SP1** Protocol

Code: **ASCII**

Support opcodes: W: write. R: read. C: calibration. O: Zero.

### 8.2.1 Parameter code table

|  |  |  |  |
| --- | --- | --- | --- |
| **Op.** | **Code** | **Name** | **Symbols** |
| **R** | **WT** | read present status and weight | **8** |
| **R** | **SP** | read set point status | **4** |
| **W** | **DC** | write division and max. capacity | **8** |
| **R/W** | **UN** | unit | **1** |
| **R/W** | **PT** | decimal point digit | **1** |
| **R** | **DD** | division | **2** |
| **R** | **CP** | max. capacity | **6** |
| **R/W** | **AC** | auto-zero ON/OFF | **1** |
| **R/W** | **TR** | zero-tracking range | **1** |
| **R/W** | **MR** | stable range | **1** |
| **R/W** | **ZR** | zero range | **2** |
| **R/W** | **FL** | filter parameter | **1** |
| **R/W** | **VC** | stable filter | **1** |
| **R/W** | **AD** | AD sampling rate | **1** |
| **R/W** | **LG** | control mode | **1** |
| **R/W** | **JS** | stable judgment | **1** |
| **R/W** | **MI** | min. duration | **3** |
| **R/W** | **WH** | upper limit | **6** |
| **R/W** | **WL** | lower limit | **6** |
| **R/W** | **P1M~P4M** | preset point stable judgment | **1** |
| **R/W** | **P1T~P4T** | preset point min. duration | **3** |
| **R/W** | **P1F~P4F** | preset point comparison judgment | **1** |
| **R/W** | **P1L~P4L** | preset point lower value judgment | **6** |
| **R/W** | **P1H~P4H** | preset point higher value judgment | **6** |
| **R** | **AM** | absolute millivolt | **7 symbols**  **D6D5D4D3D2D1D0;**  **D6:+;D5-D0: 6** digit millivolt **ASCII** code **(**3 decimal point**)** |
| **R** | **RM** | zero point relative millivolt | **7** symbols  **D6D5D4D3D2D1D0**  **D6**：+/-;**D5-D0**: **6** digit millivolt **ASCII** code **(**3 decimal point**)** |
| **C** | **ZY** | calibration zero point with weight |  |
| **C** | **ZN** | calibration zero point without weight | **6** |
| **C** | **GY** | gain calibration with weight | **6** |
| **C** | **GN** | gain calibration without weight | **12** |
| **O** | **CZ** | zero order |  |
| **R** | **ID** | read ID no. | **6** |

### 8.2.2 Error code explanation

If the transmitter received wrong data and which had sent to computer, the error code will display as below:

**1**: **CRC** check error

**2**: opcode error

**3**: parameters code error

**4**: write data error

**5**: operation invalid

**6**: channel no. error

Note: default channel mo.: **1（31H）**

### 8.2.3 Command

Indicator will send weighing data to host computer after received command.

#### 8.2.3.1 Host computer read present status

Order send format:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **STX** | ID no. | Channel no. | **R** | **WT** | **CRC** | **CR** | **LF** |

Correct response format:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **STX** | ID no. | Chanel no. | **R** | **WT** | Status | Display value | **CRC** | **CR** | **LF** |

Wrong response format:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **STX** | ID no. | Chanel no. | **R** | **WT** | **E** | Error code | **CRC** | **CR** | **LF** |

Here:

**STX** —— **1** bit, start character, **02H**

**R** —— **1** bit，**52H**

**WT** —— **2** bits, **57H 54H**

**E** —— **1** bit, **45H**

Status —— **2** bits, high byte: **40H**, low byte definition as below:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **D6** | **D5** | **D4** | **D3** | **D2** | **D1** | **D0** |
| null | null | G/N weight | positive/Negative | zero point | OFL | stable |
| **fix:** 1 | **fix:** **0** | **0**: G  **1**: N | **0**: P  **1**: N | **0**: NZ  **1**: Zero | **0**: Normal  **1**: OFL | **0**: Unstable  **1**: Stable |

Display value**——** 6 bits without symbols, when weight is overlimit or underlimit, return

For example,

Indicator sending order: **02 30 31 31 52 57 54 30 31 0D 0A**

Correct response format: **02 30 31 31 52 57 54 40 41 30 30 33 37 35 33 33 36 0D 0A** (In stable status, present value is 3753)

Wrong response format: **02 30 31 31 52 57 54 45 31 31 39 0D 0A**（**CRC** check wrong）

#### 8.2.3.2 Read other parameters

Send order format:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **STX** | ID no. | Channel no. | **R** | Parameter code | **CRC** | **CR** | **LF** |

Correct response format:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **STX** | ID no. | Channel no. | **R** | Parameter code | Value | **CRC** | **CR** | **LF** |

Wrong response format:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **STX** | ID no. | Channel no. | **R** | Parameter code | **E** | Wrong code | **CRC** | **CR** | **LF** |

Here:

Parameter value**—— 1** bit, parameter code value

Parameter code——**2** bits. Input code as per parameter list and then input **MR(4DH 52H)** if need read stable range.

Send order: **02 30 31 31 52 4D 52 38 39 0D 0A**

Correct response format: **02 30 31 31 52 4D 52 36 34 33 0D 0A（**stable range: **6）**

Wrong response format: **02 30 31 31 53 4D 52 45 32 30 39 0D 0A**（wrong opcode）

#### 8.2.3.3 Write max. capacity and min. division

Send order format:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **STX** | ID no. | Channel no. | **W** | **DC** | Division | Max. capacity | **CRC** | **CR** | **LF** |

Correct response format:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **STX** | ID no. | Channel no. | **W** | **DC** | **O** | **K** | **CRC** | **CR** | **LF** |

Wrong response format:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **STX** | ID no. | Channel no. | **W** | **DC** | **E** | Wrong code | **CRC** | **CR** | **LF** |

Here:

**DC**——**2** bits，**44H 43H**

**O**——**1** bit，**4FH**

**K**——**1** bit，**4BH**

Division**——2** bits，**1/2/5/10/20/50**

Max. capacity**——6** bits.

For example,

Send order: **02 30 31 3157 44 43 30 35 30 31 30 30 30 30 36 30 0D 0A（**division is 5, max. capacity is 10000**）**

Correct response format：**02 30 31 31 57 44 43 4F 4B 32 34 0D 0A**

Wrong response format：**02 30 31 31 57 44 43 45 35 39 32 0D 0A**（invalid operation）

#### 8.2.3.4 Write other parameters

Send order format:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **STX** | ID no. | Channel no. | **W** | Parameter code | Value | **CRC** | **CR** | **LF** |

Correct response format:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **STX** | ID no. | Channel no. | **W** | Parameter code | **O** | **K** | **CRC** | **CR** | **LF** |

Wrong response format:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **STX** | ID no. | Channel no. | **W** | Parameter code | **E** | Wrong code | **CRC** | **CR** | **LF** |

For example,

Send order: **02 30 31 31 57 5A 52 35 30 30 38 0D 0A (**Zero range: 50**)**

Correct response format: **02 30 31 31 57 5A 52 4F 4B 36 31 0D 0A**

Wrong response format: **02 30 31 31 57 5A 53 45 33 32 38 0D 0A** (wrong parameter code)

#### 8.2.3.5 Zero calibration

1) Zero calibration with present weight value

Send order format:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **STX** | ID no. | Channel no. | **C** | **ZY** | **CRC** | **CR** | **LF** |

Correct response format:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **STX** | ID no. | Channel no. | **C** | **ZY** | **O** | **K** | **CRC** | **CR** | **LF** |

Wrong response format:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **STX** | ID no. | Channel no. | **C** | **ZY** | **E** | Wrong code | **CRC** | **CR** | **LF** |

Here:

**Z**——**1** bit，**5AH**

**Y**——**1** bit，**59H**

For example,

Send order: **02 30 31 31 43 5A 59 39 34 0D 0A**

Correct response format: **02 30 31 31 43 5A 59 4F 4B 34 38 0D 0A**

Wrong response format: **02 30 31 34 43 5A 59 45 36 32 30 0D 0A**（wrong channel no.）

2) Calibration without weight

Send order format:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **STX** | ID no. | Channel no. | **C** | **ZN** | Zero millivolt | **CRC** | **CR** | **LF** |

Correct response format:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **STX** | ID no. | Channel no. | **C** | **ZN** | **O** | **K** | **CRC** | **CR** | **LF** |

Wrong response format:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **STX** | ID no. | Channel no. | **C** | **ZN** | **E** | Wrong code | **CRC** | **CR** | **LF** |

Here:

**ZN**——**2** bits，**5AH4EH**

Zero millivolt——**6** bit.

For example,

Send order: **02 30 31 31 43 5A 4E 30 31 32 36 31 30 38 31 0D 0A**

Correct response format: **02 30 31 31 43 5A 4E 4F 4B 33 37 0D 0A**

Wrong response format: **02 30 31 31 43 5A 4E 45 34 30 34 0D 0A** (data write in invalid)

#### 8.2.3.6 Gain calibration

1) Calibration with weight

Adding weight, about 80 percent of max. capacity and then write weight value in to complete gain calibration.

Send order format:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **STX** | ID no. | Channel no. | **C** | **GY** | Weight value | **CRC** | **CR** | **LF** |

Correct response format:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **STX** | ID no. | Channel no. | **C** | **GY** | **O** | **K** | **CRC** | **CR** | **LF** |

Wrong response format:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **STX** | ID no. | Channel no. | **C** | **GY** | **E** | Wrong code | **CRC** | **CR** | **LF** |

Here:

**GY**——**2** bits，**47H 59H**

Weight value——**6** bits: weight value write in

For example,

Send order: **02 30 31 3143 47 59 30 30 30 32 30 30 36 35 0D 0A (write in: weight value 200)**

Correct response format：**02 30 31 31 43 47 59 4F 4B 32 39 0D 0A**

Wrong response format: **02 30 31 35 43 47 59 45 36 30 32 0D 0A** (wrong channel no.)

**2**) Calibration without weight

Gain calibration proceeds with standard weight value and corresponding millivolt.

Send order:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **STX** | ID no. | Channel no. | **C** | **GN** | Millivolt | Weight value | **CRC** | **CR** | **LF** |

Correct response format:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **STX** | ID no. | Channel no. | **C** | **GN** | **O** | **K** | **CRC** | **CR** | **LF** |

Wrong response format:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **STX** | ID no. | Channel no. | **C** | **GN** | **E** | **Wrong code** | **CRC** | **CR** | **LF** |

Here:

Gain millivolt——**6** bits, corresponding gain millivolt of weight

Weight value——**6** bits, weight value

For example:

Send order: **02 30 31 3143 47 4E 30 30 31 39 34 30 30 30 30 32 30 30 35 36 0D 0A** (write in: )

Correct response format: **02 30 31 31 43 47 4E 4F 4B 31 38 0D 0A**

Wrong response format: **02 30 31 31 43 48 4E 45 33 38 35 0D 0A** (Wrong code）

#### 8.2.3.7 Zeroing

Send order format:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **STX** | ID no. | Channel no. | **O** | **CZ** | **CRC** | **CR** | **LF** |

Correct response format:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **STX** | ID no. | Channel no. | **O** | **CZ** | **O** | **K** | **CRC** | **CR** | **LF** |

Wrong response format:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **STX** | ID no. | Channel no. | **O** | **CZ** | **E** | Wrong code | **CRC** | **CR** | **LF** |

For example,

Send order: **02 30 31 31 4F 43 5A 38 34 0D 0A**

Correct response format: **02 30 31 31 4F 43 5A 4F 4B 33 38 0D 0A**

Wrong response format: **02 30 31 31 4F 43 5A 45 35 30 36 0D 0A** (invalid operation)

#### 8.2.3.8 **CRC** calculation

To sum up all the values before check bit and convert it into decimal data. Then take last two bits into **ASCII** code.

For example,

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **02** | **30** | **31** | **31** | **4F** | **43** | **5A** | **38** | **34** | **0D** | **0A** |

To sum up the values between 02~5A: 180 (Hex), and then convert to ASCII value: 384.

Therefore, the check code is 38, 34.

## 8.3 Modbus Protocol

Indicator uses **RTU mode** to communicate, each 8-bit byte of the message are divided into 2pcs of 4-bit hexadecimal characters to transmit at binary code.

Code: Binary

Function code:

|  |  |  |
| --- | --- | --- |
| **Function code** | **Definition** | **Description** |
| **03** | read register |  |
| **06** | write single register |  |
| **16** | write multiple registers | Allow to write double registers only. |
| **01** | read coil | Unit: bit |
| **05** | write coil |

Exception code response

|  |  |  |
| --- | --- | --- |
| **Code** | **Definition** | **Description** |
| **02** | illegal data address | It means the data address received is illegal. |
| **03** | illegal data | The data wrote in is illegal. |
| **04** | indicator fault | Indicator fault when operation. |
| **07** | invalid | Order received is invalid. |

### 8.3.1 Modbus Address

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **PLC addr.** | **Display addr.** | **Description** | | | |
| Read only register (function code: 0x03) | | | | | |
| **40001** | **0000** | present weight value (4 bits with symbol) | | | |
| **40002** | **0001** |
| **40003** | **0002** | **D0**: stable  **D1**: zero point  **D2**: symbol  **D3**: overflow  **D4**: weight overlimit  **D5**: weight underlimit  **D6**: voltage overlimit  **D7**: voltage underlimit  **D8**: stable millivolt  **D9**: net weight | |  | |
| **40004** | **0003** | gross weight value | | | |
| **40005** | **0004** |
| **40006** | **0005** | net weight value | | | |
| **40007** | **0006** |
| **40008** | **0007** | tare value | | | |
| **40009** | **0008** |
| **40010**  **-----**  **40015** | **0009**  **--------**  **0014** | Reserved (allow to read value: 0) | | | |
| **40016** | **00015** | **D0**: over range when zeroing  **D1**: unstable when zeroing  **D2**: overflow when zeroing  **D3**: zero calibration is unstable.  **D4**: zero voltage is too high.  **D5**: zero voltage is too low.  **D6**: gain voltage is unstable.  **D7**: gain voltage is too large.  **D8**: gain voltage is too low.  **D9**: weight input is wrong.  **D10**: calibration resolution is too low.  **D11**: previous gain has not calibrated.  **D12**: non weights for calibration | | |  |
| **40017**  **-----**  **40020** | **0016**  **--------**  **0019** | Reserved (Allow to read value: 0) | | | |
| **Read & Write (write function code: 0x06, 0x10; read function code: 0x03.)** | | | | | |
| **40021** | **0020** | unit: (**0:g, 1:kg, 2:t,3:lb)** | | | |
| **40022** | **0021** | decimal point (0: 0 digit, 1: 1 digit, 2: 2 digits, 3: 3 digits, 4: 4 digits) | | | |
| **40023** | **0022** | division(**1/ 2/ 5/ 10/ 20/ 50**) | | | |
| **40024** | **0023** | max. capacity, write range (max. capacity≤division\*100000) | | | |
| **40025** | **0024** |
| **40026** | **0025** | zero calibration with weight: write 1 and calibrate zero point with present weight value, read absolute millivolt of present load cell | | | |
| **40027** | **0026** |
| **40028** | **0027** | gain point 1 calibration with weight, 0≤weight value≤max. capacity | | | |
| **40029** | **0028** |
| **40030** | **0029** | gain point 2 calibration with weight, gain point 1≤weight value≤max. capacity | | | |
| **40031** | **0030** |
| **40032** | **0031** | gain point 3 calibration with weight, gain point 2≤weight value≤max. capacity | | | |
| **40033** | **0032** |
| **40034** | **0033** | gain point 4 calibration with weight, gain point 3≤weight value≤max. capacity | | | |
| **40035** | **0034** |
| **40036** | **0035** | zero calibration without weight:input zero millivolt. write range (load cell: 3mV/V, range: 0-12.000mV): read zero point millivolt of calibration | | | |
| **40037** | **0036** |
| **40038** | **0037** | gain calibration without weight, gain millivolt input (0.000<millivolt<15.000mV-zero point millivolt) | | | write in sequence to complete calibration |
| **40039** | **0038** |
| **40040** | **0039** | gain calibration without weight; input gain weight value≤max. capacity | | |
| **40041** | **0040** |
| **40042**  **-----**  **40050** | **0041**  **--------**  **0049** | Reserved (allow to read value: 0) | | | |
| **40051** | **0050** | auto-zero when power-up ON/OFF(0: OFF, 1: ON) | | | |
| **40052** | **0051** | zero point tracking range (0-9d) | | | |
| **40053** | **0052** | zero point tracking time (0-9.9s) | | | |
| **40054** | **0053** | stable range (1-9d) | | | |
| **40055** | **0054** | stable time (0-9.9s) | | | |
| **40056** | **0055** | zero range (0%-99%) | | | |
| **40057** | **0056** | digital filter parameter (0-9) | | | |
| **40058** | **0057** | stable filter level (0-9) | | | |
| **40059** | **0058** | **AD** sample rate: 0, 120 times/sec., 1:240 times/sec., 2:480 times/sec. | | | |
| **40060** | **0059** | control mode (0: upper and lower limit mode, 1: preset point mode) | | | |
| **40061**  **-----**  **40070** | **0060**  **--------**  **0069** | Reserved (allow to read value: 0) | | | |
| **40071** | **0070** | whether judge stable before output (0: OFF, 1: ON) | | | upper limit & lower limit mode |
| **40072** | **0071** | min. duration (0-99.9s) | | |
| **40073** | **0072** | upper limit value (0-99999) | | |
| **40074** | **0073** |
| **40075** | **0074** | lower limit value (0-99999) | | |
| **40076** | **0075** |
| **40077**  **-----**  **40080** | **0076**  **--------**  **0079** | Reserved (allow to read value: 0) | | | |
| **40081** | **0080** | Preset point 1 judge stable? (0: No, 1: Yes) | | | |
| **40082** | **0081** | preset point 1 min. duration time (0-999:0-99.9s) | | | |
| **40083** | **0082** | preset point 1 comparison condition (0: greater or equal to, 1: smaller or equal to, 2: within the range, 3: outside the range) | | | |
| **40084** | **0083** | preset point 1, preset value 1 | | | |
| **40085** | **0084** |
| **40086** | **0085** | preset point 1, preset value 2 | | | |
| **40087** | **0086** |
| **40088**  **-----**  **40090** | **0087**  **--------**  **0089** | Reserved (allow to read value: 0) | | | |
| **40091** | **0090** | preset point 2 judge stable? (0: No, 1: Yes) | | | |
| **40092** | **0091** | preset point 2 min. duration time (0-999:0-99.9s) | | | |
| **40093** | **0092** | preset point 2 comparison condition (0: greater or equal to, 1: smaller or equal to, 2: within the range, 3: outside the range) | | | |
| **40094** | **0093** | preset point 2, preset value 1 | | | |
| **40095** | **0094** |
| **40096** | **0095** | preset point 2, preset value 2 | | | |
| **40097** | **0096** |
| **40098**  **-----**  **40100** | **0097**  **--------**  **0099** | Reserved (allow to read value: 0) | | | |
| **40101** | **0100** | Preset point 3 judge stable? (0: No, 1: Yes) | | | |
| **40102** | **0101** | preset point 3 min. duration time (0-999:0-99.9s) | | | |
| **40103** | **0102** | preset point 3 comparison condition (0: greater or equal to, 1: smaller or equal to, 2: within the range, 3: outside the range) | | | |
| **40104** | **0103** | preset point 3, preset value 1 | | | |
| **40105** | **0104** |
| **40106** | **0105** | preset point 3, preset value 2 | | | |
| **40107** | **0106** |
| **40108**  **-----**  **40110** | **0107**  **--------**  **0109** | Reserved (allow to read value: 0) | | | |
| **40111** | **0110** | preset point 4 judge stable? (0: No, 1: Yes) | | | |
| **40112** | **0111** | preset point 4 min. duration time (0-999:0-99.9s) | | | |
| **40113** | **0112** | preset point 4 comparison condition (0: greater or equal to, 1: smaller or equal to, 2: within the range, 3: outside the range) | | | |
| **40114** | **0113** | preset point 4, preset value 1 | | | |
| **40115** | **0114** |
| **40116** | **0115** | preset point 4, preset value 2 | | | |
| **40117** | **0116** |
| **40118**  **-----**  **40120** | **0117**  **--------**  **0119** | Reserved (allow to read value: 0) | | | |
| **40121** | **0120** | IN-1 define | If write 2 in address 0120 (IN-1), means to define IN-1 as tare function. | | |
| **40122** | **0121** | IN-2 define |
| **40123** | **0122** | OUT-1 define |
| **40124** | **0123** | OUT-2 define |
| **40125** | **0124** | OUT-3 define |
| **40126** | **0125** | test status | Write 1 in 0125 address to enter I/O module. | | |
| **40127** | **0126** | input test |
| **40128** | **0127** | output test |
| **40129**  **-----**  **40150** | **0128**  **--------**  **0149** | Reserved (allow to read value: 0) | | | |
| **40151** | **0150** | zero / clear tare | read & write address  write:1 (zero in gross weight status, clear tare in net weight status)  read: 0 | | |
| **40152** | **0151** | tare |
| **40153** | **0152** | IN-1 status | read only address:  1: valid-status  2: invalid-status | | |
| **40154** | **0153** | IN-2 status |
| **40155** | **0154** | OUT-1 status |
| **40156** | **0155** | OUT-2 status |
| **40157** | **0156** | OUT-3 status |
| **40158** | **0157** | preset point 1 status |
| **40159** | **0158** | preset point 2 status |
| **40160** | **0159** | preset point 3 status |
| **40161** | **0160** | preset point 4 status |
| **40162** | **0161** | upper limit status |
| **40163** | **0162** | middle limit status |
| **40164** | **0163** | lower limit status |
| **Read & Write (function code of read: 0x01, function code of write:0x05)** | | | | | |
| **00000** | **0000** | zero / clear tare | read & write address:  write:1 (zero in gross weight status, clear tare in net weight status)  read: 0 | | |
| **00001** | **0001** | tare |
| **00002** | **0002** | IN-1 status | read only address:  1: valid-status  2: invalid-status | | |
| **00003** | **0003** | IN-2 status |
| **00004** | **0004** | OUT-1 status |
| **00005** | **0005** | OUT-2 status |
| **00013** | **0012** | OUT-3 status |
| **00014** | **0013** | preset point 1 status |
| **00015** | **0014** | preset point 2 status |
| **00016** | **0015** | preset point 3 status |
| **00021** | **0020** | preset point 4 status |
| **00022** | **0021** | upper limit status |
| **00023** | **0022** | middle limit status |
| **00024** | **0023** | lower limit status |
| **00025~**  **00032** | **0024~**  **0031** | Reserved (allow to read value: 0) | | | |

# 9 Dimension

