GENERAL MEASURE

Model no.: GMT-P1

User's Manual

1106110100005

V10.02.01_01

Our company reserved the right to update user's manual without additional notice to customers by reason of update, so please visit our website or contact with our service person to get update information.

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

CONTENTS

1 General Description

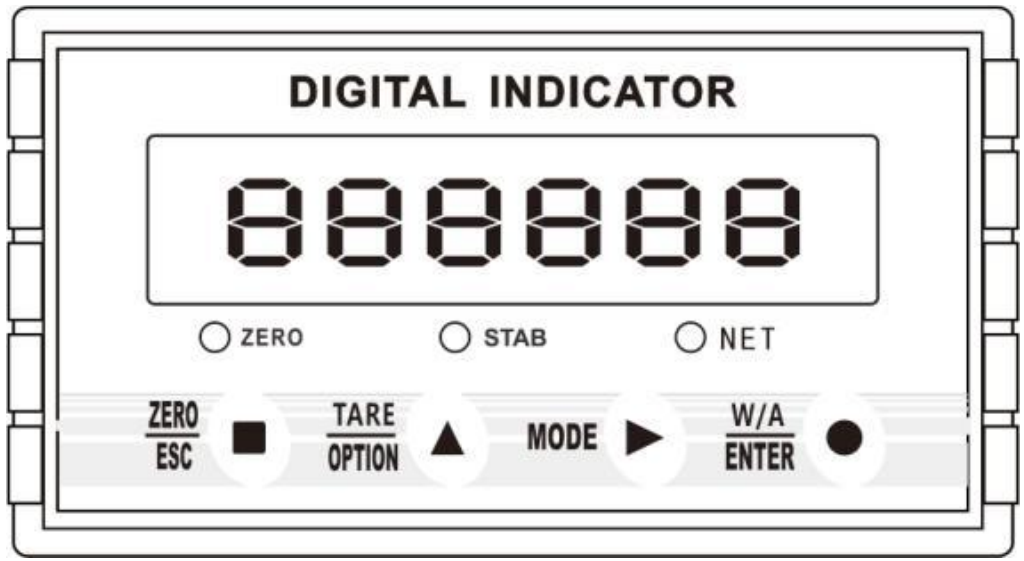
GMT-P1 weighing indicator is specially designed for weight transmitting in industrial fields.

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, 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 powered on
- 4 set points
- 1 input and 2 outputs
- Serial communication interface:RS232 or RS485
- Calibration via serial interface
- Optional interfaces: Analog output, serial interface

1.2 Front Panel



Main Display:6 digits, for displaying weight and the information of parameters.
Status Indicator Lamp:

- **ZERO:** Light on when present weight is within 0±1/4d.
- **STAB:** Light on when changes of weight values are within the range of motion detecting during motion detecting time.
- **NET:** The indicator light of gross and net weight and communication status is displayed according to the requirements of working parameter F1.8

Keypad:

: Zero/Esc, Used to exit from current operation or go previous. Long press this key for zero calibration (limited by zero clearing range, not limited by calibration lock).

: Used to scroll optional values of parameter and to make flashing digit increase 1 while data inputting.

: Function Selecting Key, to make flashing position move to the right digit when data inputting. Long-press the key will start to transmit data and it will flicker.

: Confirming Key. Used to confirm present operation.

Note: Under the status of gross weight, user could remove tare by pressing OPTION key, and if press Esc key in net weight mode, it will add tare weight, while it is zeroing under the status of net weight. It will show net weight value after tare, meanwhile the NET light is on.

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**
Dimension: **105×89×57（mm）**

1.3.2 Analog:

Load cell power: **DC5V　200mA（MAX）**
Input impedance: **10MΩ**
Zero steady range: **0.00～12mV(Load cell 3mV/V)**
Input sensitivity: **0.01uV/d**
Input range: **0.00～15mV(Load cell 3mV/V)**
Transfer mode: **Sigma - Delta**
A/D conversion speed: **15, 30, 60, 120, 480, 960 times/sec**
Non-linearity: **0.01% F.S**
Gain drift: **10PPM/**℃
Display Precision: **1,000,000d**

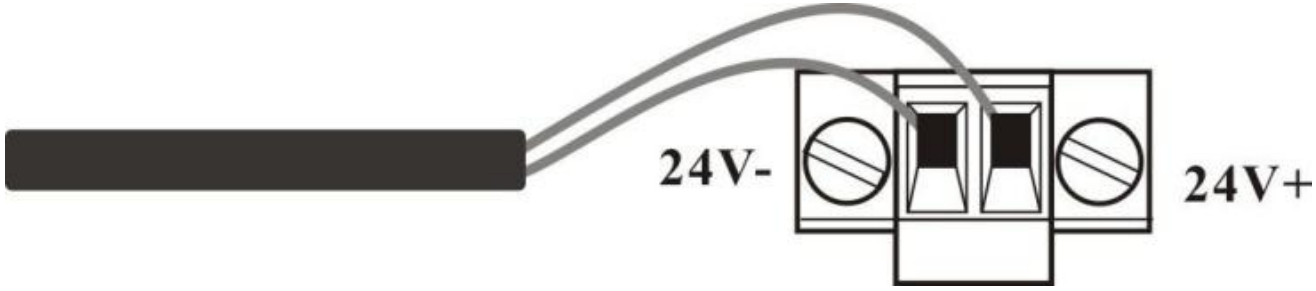
1.3.3 Digital:

Weight display: **6 digits red high-brightness LED**
Minus display: “-”
Overload display: **“OFL”**
Decimal point: **5 kinds (optional)**
Function keys: **4 keys soniferous keypad**

2 Installation and Wiring

2.1 Connection of Power Supply

GMT-P1 weighing indicator connects DC24V power supply as follows:



Power supply connection

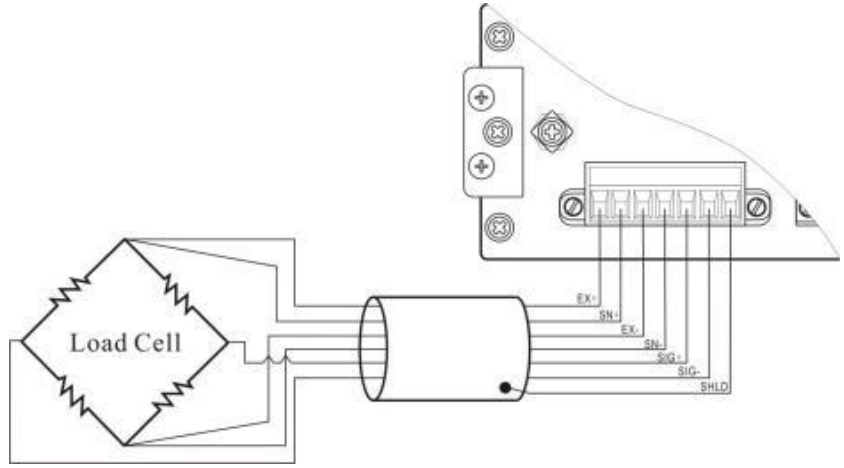
2.2 Connection of Load Cell

GMT-P1 weighing indicator connects bridge type resistance strain gauge load cells by 6 wires or 4 wires as follows. When you use 4-wired load cells, you must bridge the SN+ with EX+ and bridge the SN- with EX-.
The signal definition of each port of the load cell connector is as follows:

EX+: Excitation+ **EX-**: Excitation- **SN+**: Sense+ **SN-**: Sense- **SIG+**: Signal+ **SIG-**: Signal-

6 wires	**EX+**	**SN+**	**EX-**	**SN-**	**SIG+**	**SIG-**	**Shield**
4 wires	**EX+**		**EX-**		**SIG+**	**SIG-**	**Shield**

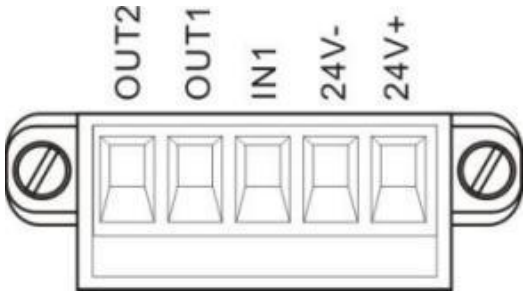
2.2.1 6 wires connection



Note:

1. As load cell output sensitive analog signal, please use shield cable to 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 same.

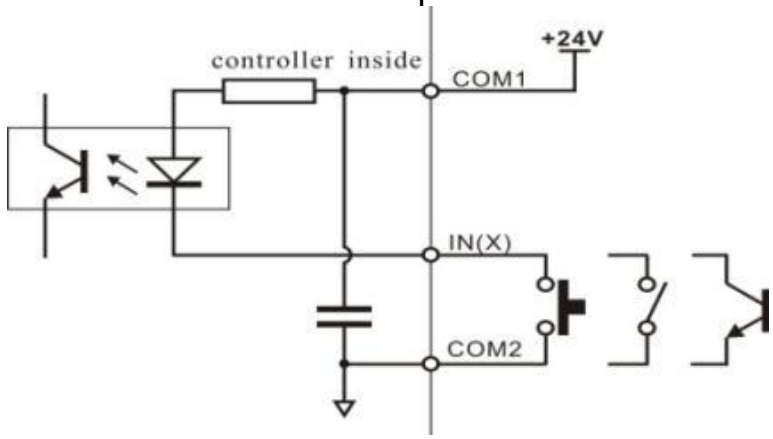
2.3 I/O terminals



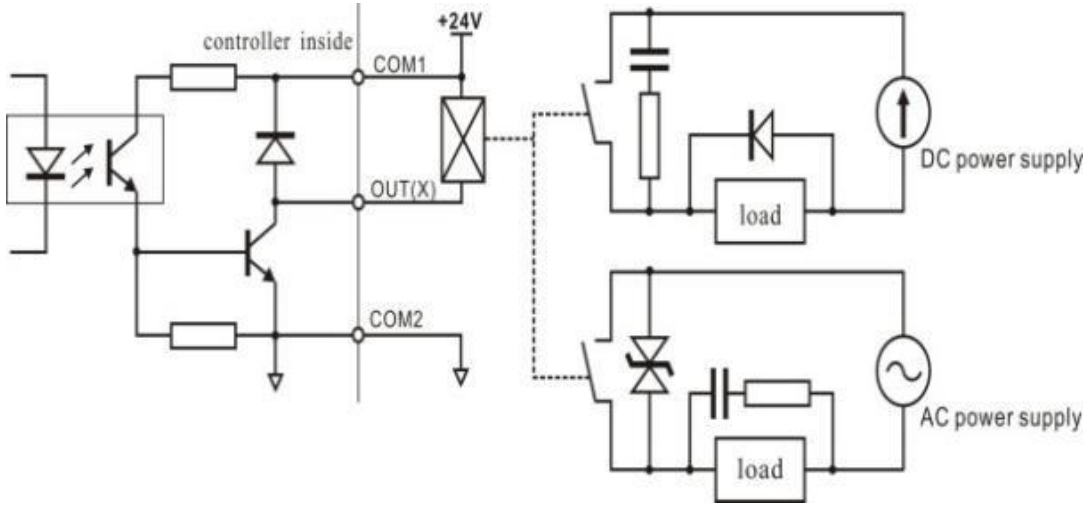
I/O tolerant definition as follows:

Output		Input	
OUT1	Stable	IN1	Reset all
OUT2	OFL		

Indicator input terminal connection:



Indicator input terminal connection:



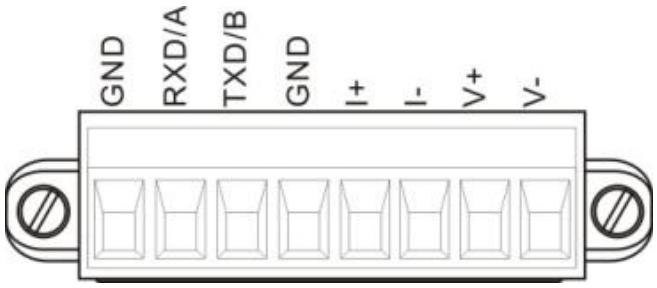
2.4 Optional Expansion Board Output

GMT-P1 weighing indicator supports analog output, RS232 or RS485 as optional output function, please confirm it when place orders.

2.4.1 Analog Output (Optional)

At normal displaying status, press W/A ENTER ● to check the analog output.

The definition of analog output as below:



The definition of analog output:
V+: voltage-output+, **V-**: voltage-output-
I+: current-output +, **I-**: current-output -

Analog output two types:
1) Voltage output: 0-5V/0-10V is optional .
2) Electric current output: 4-20mA/0-20mA/0-24mA is optional.
3) User-define function, users can define analog output type and output range.

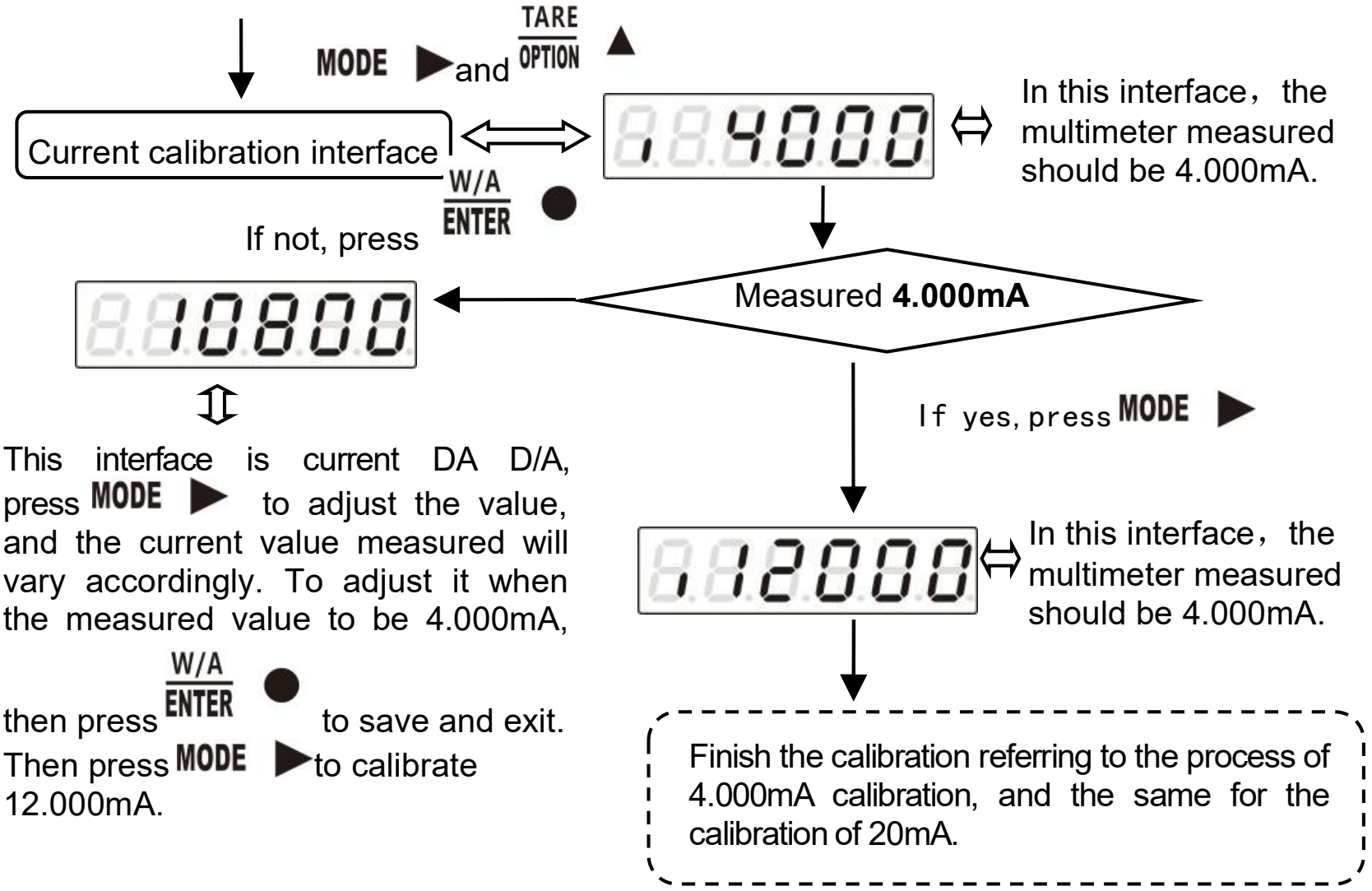
The analog output has been calibrated before the delivery of the indicators, so users do not need to make calibration. If analog output is abnormal, users can calibrate by themselves as follows:（Suggestion: please calibrate under the instruction of professionals)

Normal display status

↓

SET UP

Note: only support calibration under current mode. 4 points must be finished for current calibration.


MODE ▶ and TARE/OPTION ▲
Current calibration interface
W/A/ENTER ●
4.000
In this interface，the multimeter measured should be 4.000mA.
If not, press
Measured 4.000mA
10800
If yes, press MODE ▶
This interface is current DA D/A, press MODE ▶ to adjust the value, and the current value measured will vary accordingly. To adjust it when the measured value to be 4.000mA, then press W/A/ENTER ● to save and exit. Then press MODE ▶ to calibrate 12.000mA.
12000
In this interface，the multimeter measured should be 4.000mA.
Finish the calibration referring to the process of 4.000mA calibration, and the same for the calibration of 20mA.

This interface is the highest point calibration of analog output.

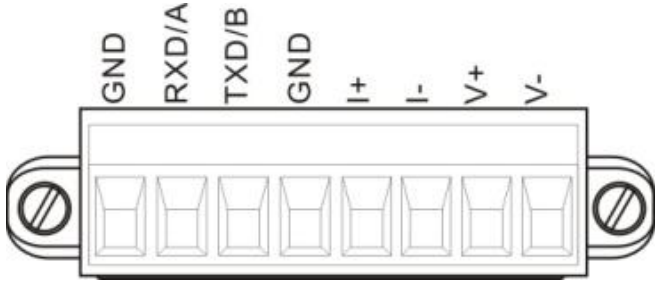
In the interface of highest point calibration,press W/A ENTER ● to enter into analog display value interface, the display will be 5 digits (initial value is **24000,** means **24.000mA**),press W/A ENTER ● to input the value measured by the multimeter.

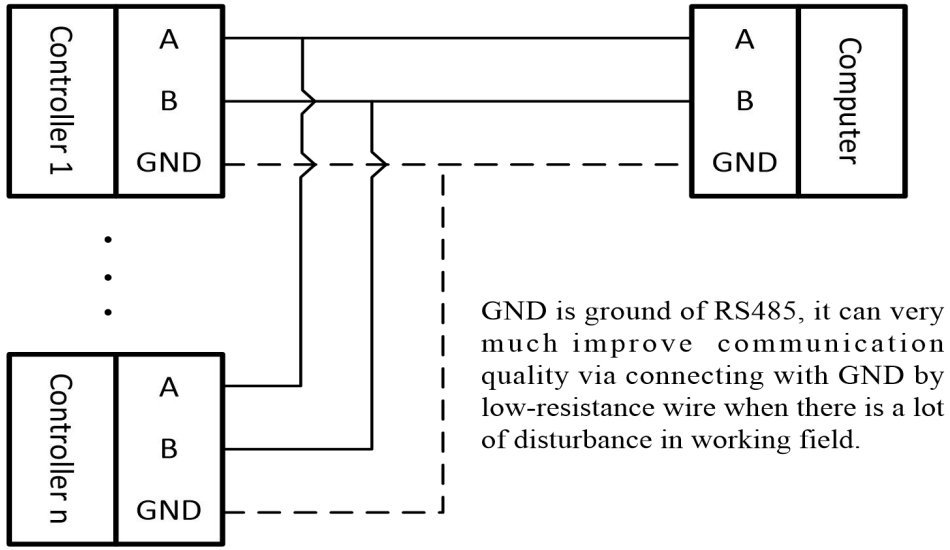
Note: Analog output calibration, highest point must be calibrated.

2.4.2 Serial Interface RS485 Output

Serial Interface RS485 output is optional, please refer to chapter 6.0 for communication protocol.

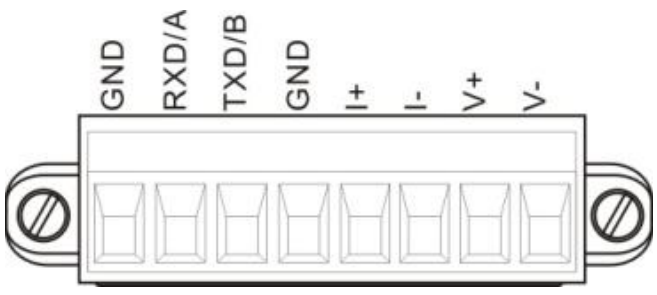
RS485 serial interface connection:

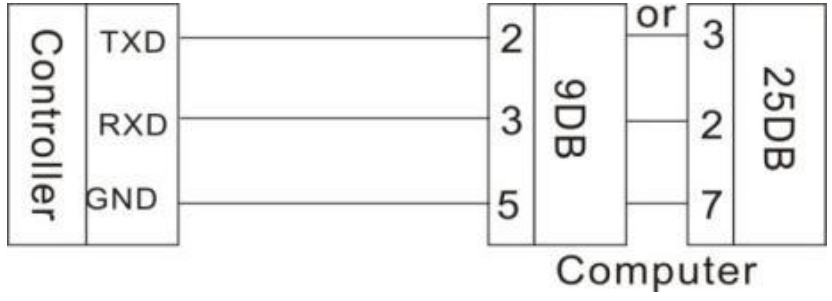




2.4.3 Serial Interface RS232 output (Optional)

RS232 serial interface connection:





3 Calibration

3.1 Instruction

（1）Calibration procedure must be executed when a GMT-P1 indicator is put in use at the first time, the preset parameters may no longer meet the user's needs, and any part of the weighing system was changed. Position of decimal point, minimum division, maximum capacity, zero, and gain can be set and confirmed through calibration.

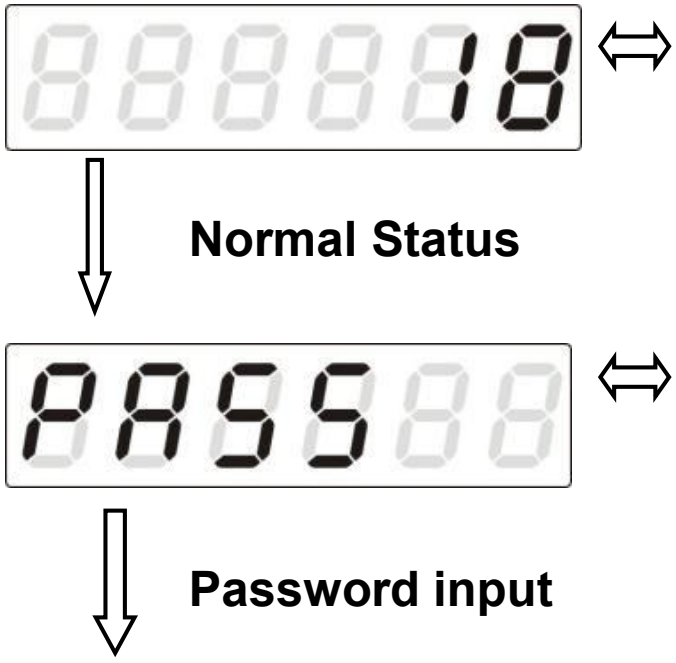
（2） If you want to set only one parameter, please press W/A ENTER ● to save parameter's value and then press ZERO ESC ■ to exit.

（3）Please see section **3.7** for parameters' instruction.

（4）Please record each value in the blank table in section 3.4 during calibration for the emergency use in future.

（5）See chapter **9** for error alarm message that may be displayed during calibration.

3.2 Flow Chart of Calibration



1. Under this status, press **MODE** ▶ (twice), indicator will display **CAL**, then press W/A ENTER ● to enter

2. After password is input, the indicator will display **CALON** for one second, then go to next step.

Decimal point

3. Press TARE/OPTION ▲ to select a desired value for decimal point among **0, 0.0, 0.00, 0.000** and **0.0000, and then press** W/A/ENTER ● to save it and enter next step.
If there's no need to change the value, press W/A/ENTER ● directly to enter next step.

Min. divistion

4. Press TARE/OPTION ▲ to select a desired value for min. division among **1**,**2**, **5**,**10**,**20** and **50**, and then to save it and enter next step.
If there's no need to change the Min,division, then press W/A/ENTER ● directly to enter next step.

Max. capacity

Millivolt value display

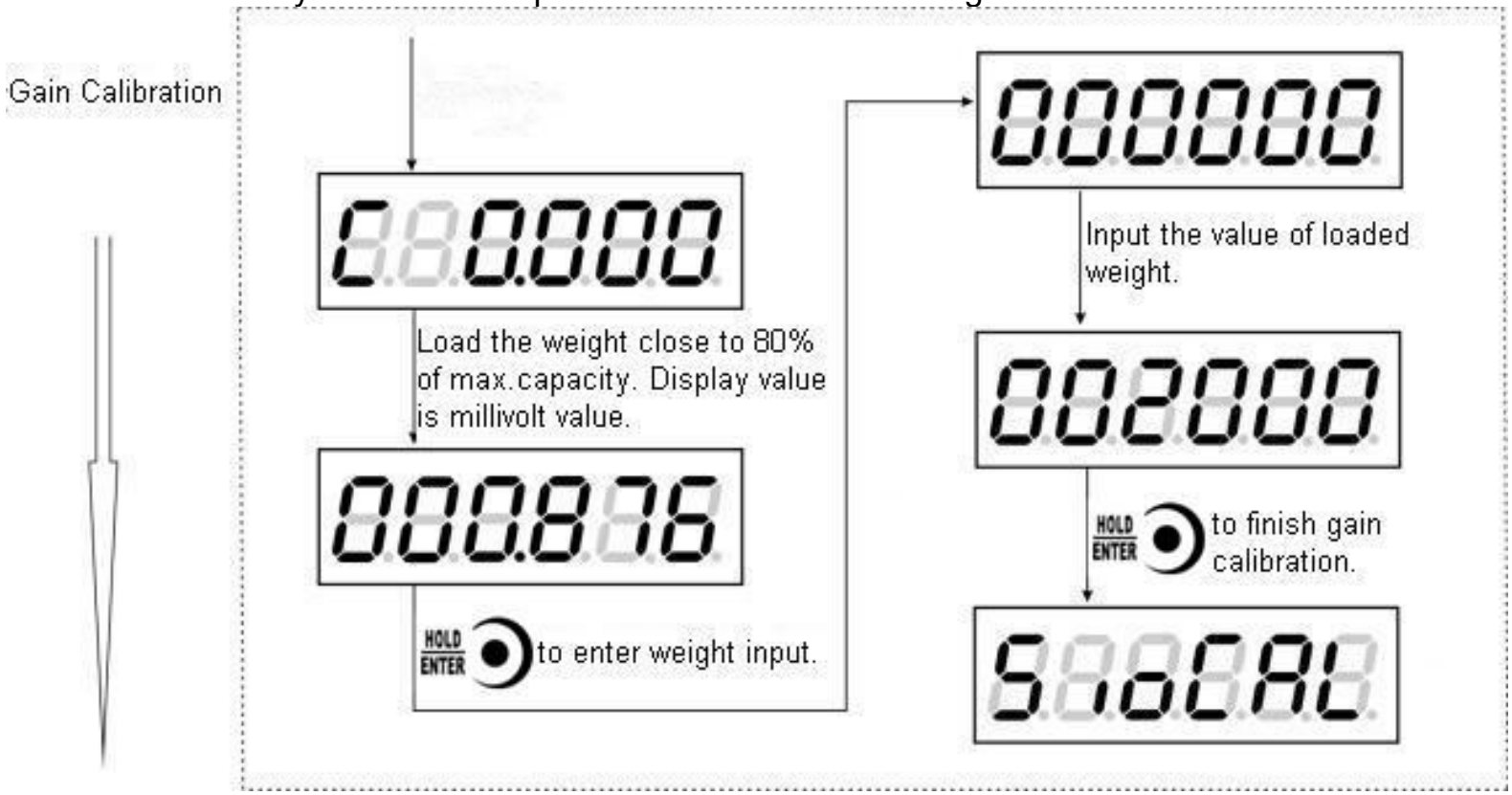
Zero calibration

5. Input max. capacity(≤min. division×**100000**), press W/A ENTER ● to save it and enter Millivolt value display interface..
If there's no need to change the max. capacity, then press W/A ENTER ● directly to enter Millivolt display interface.

6. Under this status, press W/A ENTER ● to enter zero calibration.
Display value near the output value in millivolt between **SIG+/SIG-** of load cell.
See section **3.3** for details about this function.

7. Unloaded scale first, when **STAB** lamp is on, press W/A ENTER ● to finish zero calibration.
If there's no need to calibrate zero, press ZERO ESC ■ directly to enter gain calibration.

8. The process of gain calibration is as follows. If there's no need to do gain calibration, press ZERO/ESC directly to enter serial ports calibration switch setting.



9. Press W/A ENTER ● to enter setting interface, press TARE OPTION ▲ to choose the switch position, press W/A ENTER ● to set password。If don't need to set switch position, then press ZERO ESC ■ to enter password setting.

10. See section **7.2** for reference to set password. If there's no need to set password, press ZERO ESC ■ directly to go back to normal status.

3.3 Millivolt Value Display

This function is mainly used for system test, position-error test for weighing mechanism and linearity test for load cell.

1. System Test

(1) If display data changes with loaded weight changes, it shows that connection of load cell is correct and weighing mechanism works well.

(2)If display value is OFL (or –OFL), it means that loaded weight on load cells is too large (or too small). Please unload the weight (or load more), if display value is still OFL (or –OFL), the possible reasons are as follows:

a. There is something wrong with weighing mechanism, please check and clear.

b. The connection of load cell is incorrect, please check and clear.

c. Load cells may be damaged, please replace.

2. Position-error Test for Weighing Mechanism

Load a same weight on each corner of weighing mechanism and record displayed millivolt value respectively. If differences among these values are obvious, please adjust weighing mechanism.

3. Linearity Test for Load Cell

Load same weight for several times, and record displayed value every time. If one or two values are obviously much larger or smaller than any others, it means that the linearity of load cell is bad.

***NOTE: You must use to zero display data before weight is loaded for each time.**

3.4 Calibration with Weights

In Chapter 3.2, steps 7 and 8 in the calibration flow chart are operation instructions of calibration zero point and calibration gain with weights

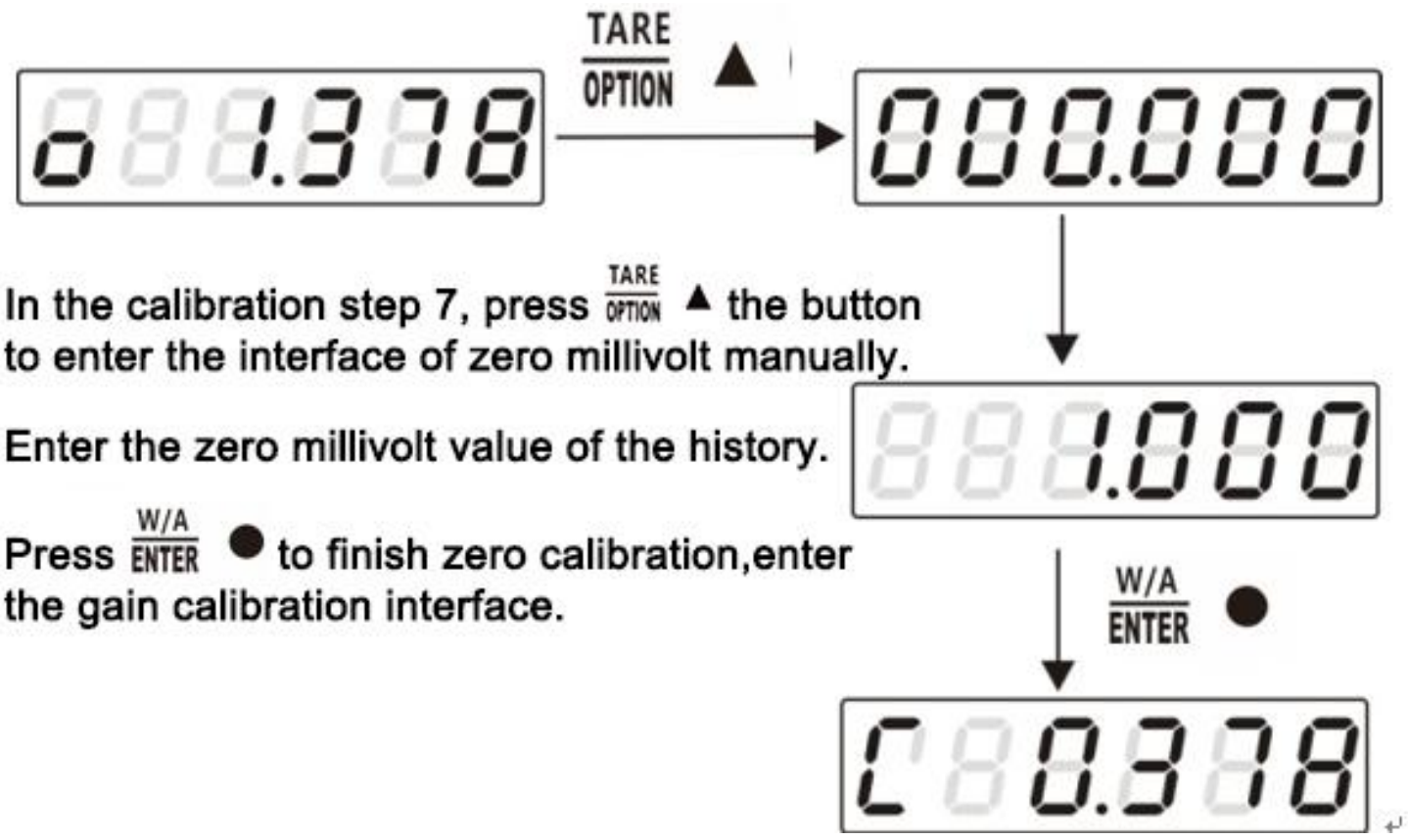
During calibration with weight， please record the zero millivolt value, gain millivolt value and the loaded weight value in the blank table below. If it is not convenient to load a weight to calibrate, these values can be used for calibration without weights.

	Zero millivolt value(mV)	Gain millivolt value(mV)	Loaded Weight	Date	Remarks
1					
2					
3					
4					
5					

3.5 No weight calibration

3.5.1 No weight zero Calibration

No weight calibration zero point, it is necessary to record the millivolt value corresponding to the empty balance when the mechanism is calibrated with weight.Zero calibration is accomplished by manually entering historical values.



1) In the calibration step 7, press TARE/OPTION ▲ the button to enter the interface of zero millivolt manually.

2) Enter the zero millivolt value of the history.

3) Press W/A/ENTER ● to finish zero calibration,enter the gain calibration interface.

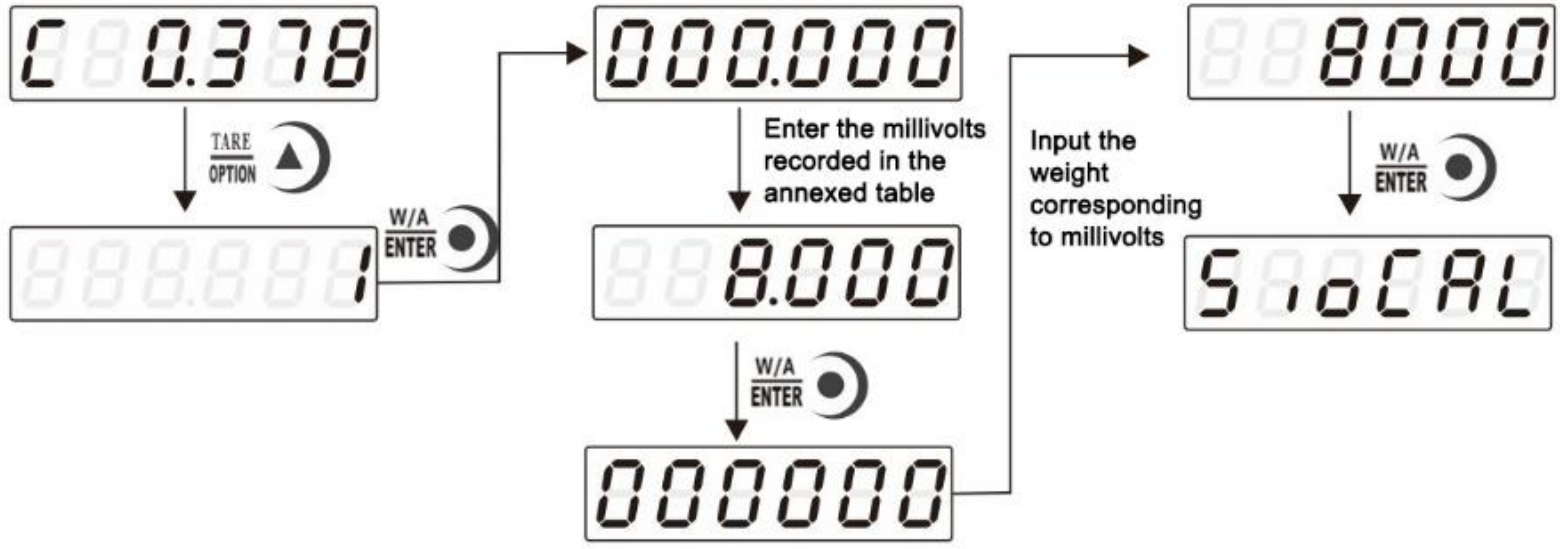
3.5.2 No weight gain Calibration

There are two methods for weighting - free calibration gain

1) Historical calibration: Gain calibration by entering historical record values

2)Theoretical calibration: Calibrate through sensor sensitivity and maximum range value of input mechanism (the sum of the average value of input sensitivity and maximum range when multiple sensors are connected)

Historical gain calibration



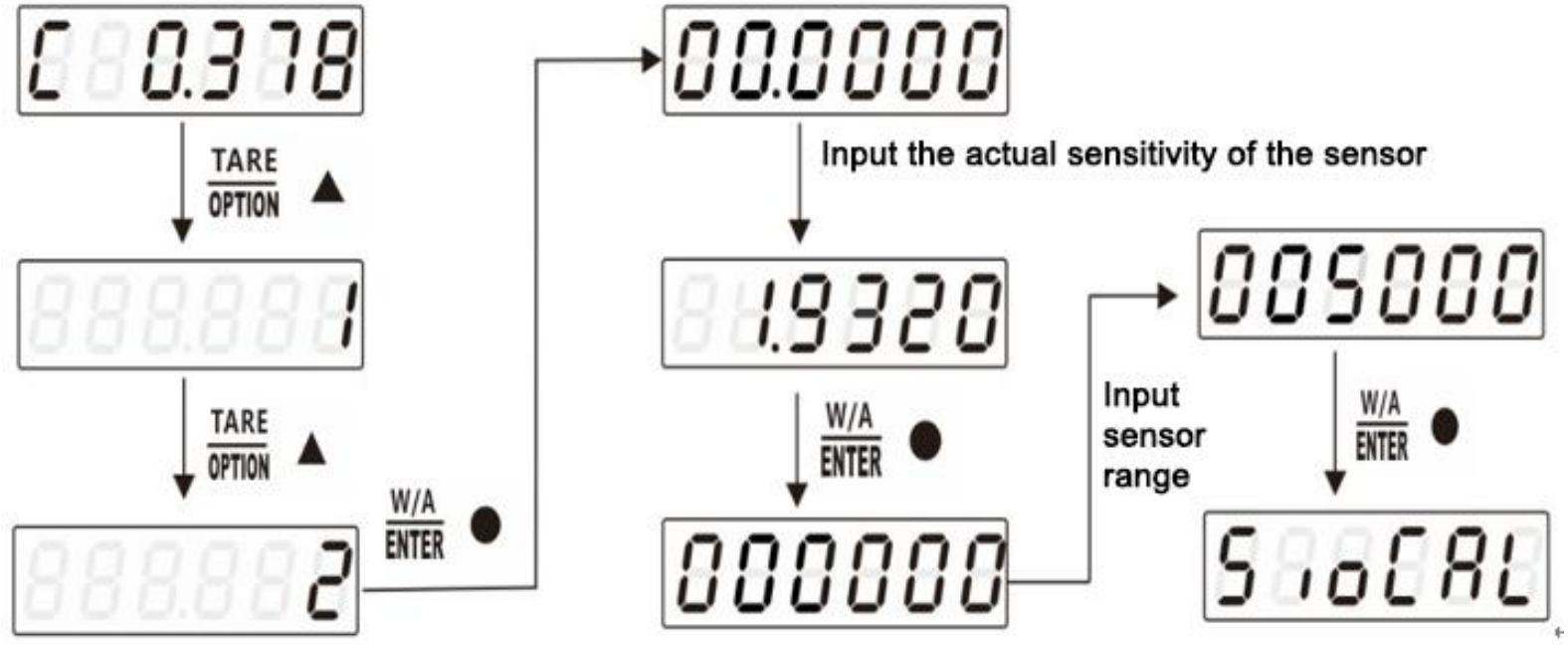
1) In gain calibration interface, press TARE OPTION ▲ , and the interface displays 1.

Press W/A ENTER ● to enter the manual gain millivolt input interface and enter the historical millivolt value.

2) Press W/A ENTER ● save to enter the weight input interface and enter the weight value corresponding to the millivolt number.

3) Press W/A ENTER ● save to complete gain calibration and enter the serial port calibration switch.

Sensitivity and gain calibration range



1) In gain calibration interface, press twice TARE OPTION ▲ to enter and choose "2" press enter interface for manual input of sensor sensitivity and input the sensitivity of the actual sensor.

2) Press W/A ENTER ● , enter the maximum range input interface and input sensor range.

3) Press W/A ENTER ● , complete gain calibration and enter serial port calibration switch.

3.6 Calibration Switch for Communication Interface

When calibrate the transmitter through serial port(Rs、SP1 or Modbus), must set to "ON" status for the calibration switch for communication interface.

3.7 Explanation for Calibration Parameters

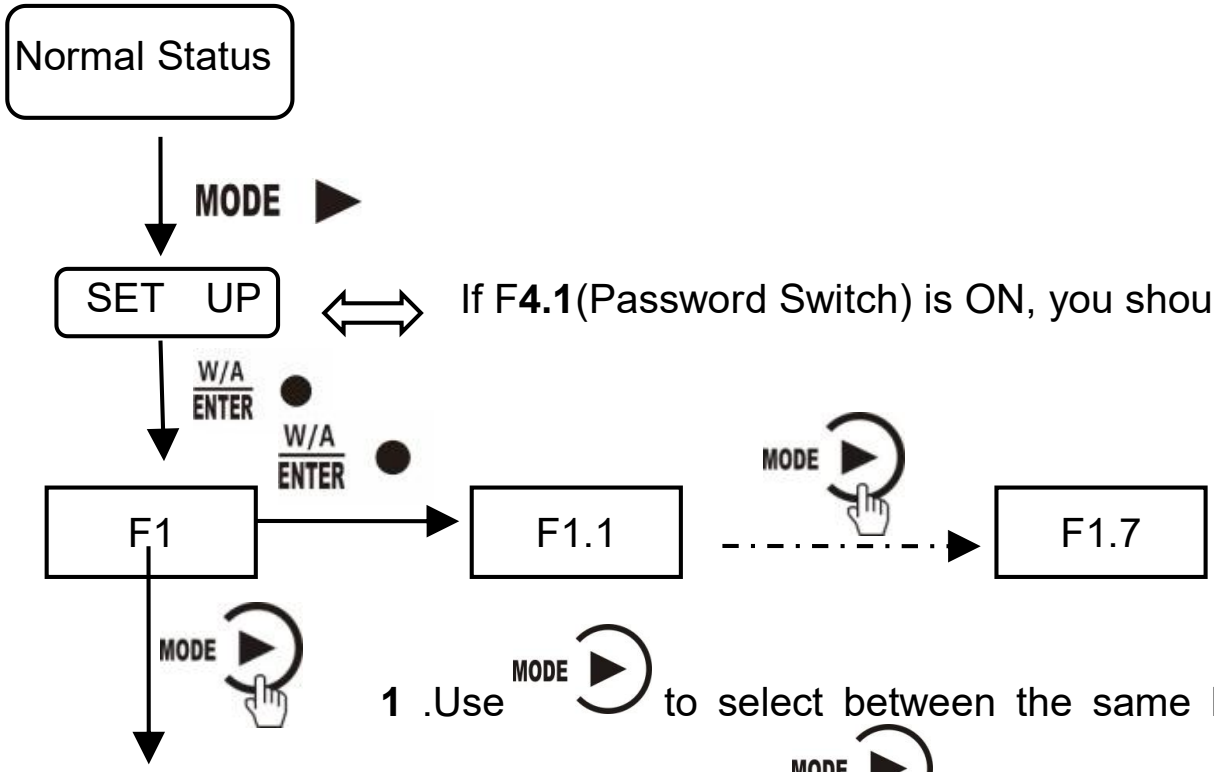
Symbol	Parameter	Types	Value of parameter	Default
Pt	Decimal Point	**5**	**0 0.0 0.00 0.000 0.0000**	**0**
1d	Min. Division	**6**	**1 2 5 10 20 50**	**1**
CP	Max. Capacity		≤Min. Division×**100000**	**10000**
t	Millivolt Value			
o	Zero			
C	Gain			
SIOCAL	Switch for Calibration via serial interface			**OFF**
PASS	Password Setting			**000000**

Log Table for Calibration Parameters

Parameter	Calibrated Value	Date	Remarks
Decimal Point			
Min. Division			
Max. Capacity			
Load cell sensitivity			
Password			

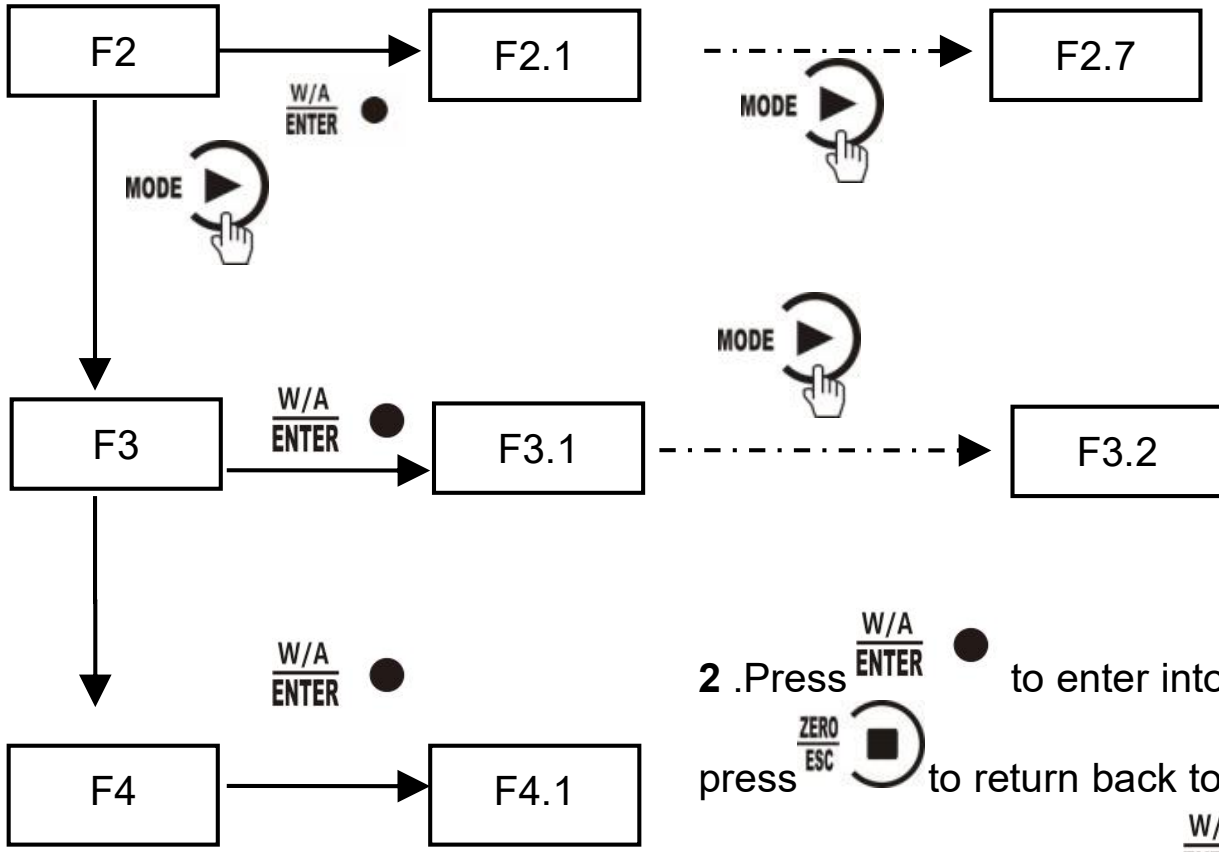
4 Working Parameters Setting

4.1 Flow Chart of Working Parameters Setting



If F**4.1**(Password Switch) is ON, you should input password first.

1 .Use MODE to select between the same level. Switch from display **F1** to **F2,** press MODE.

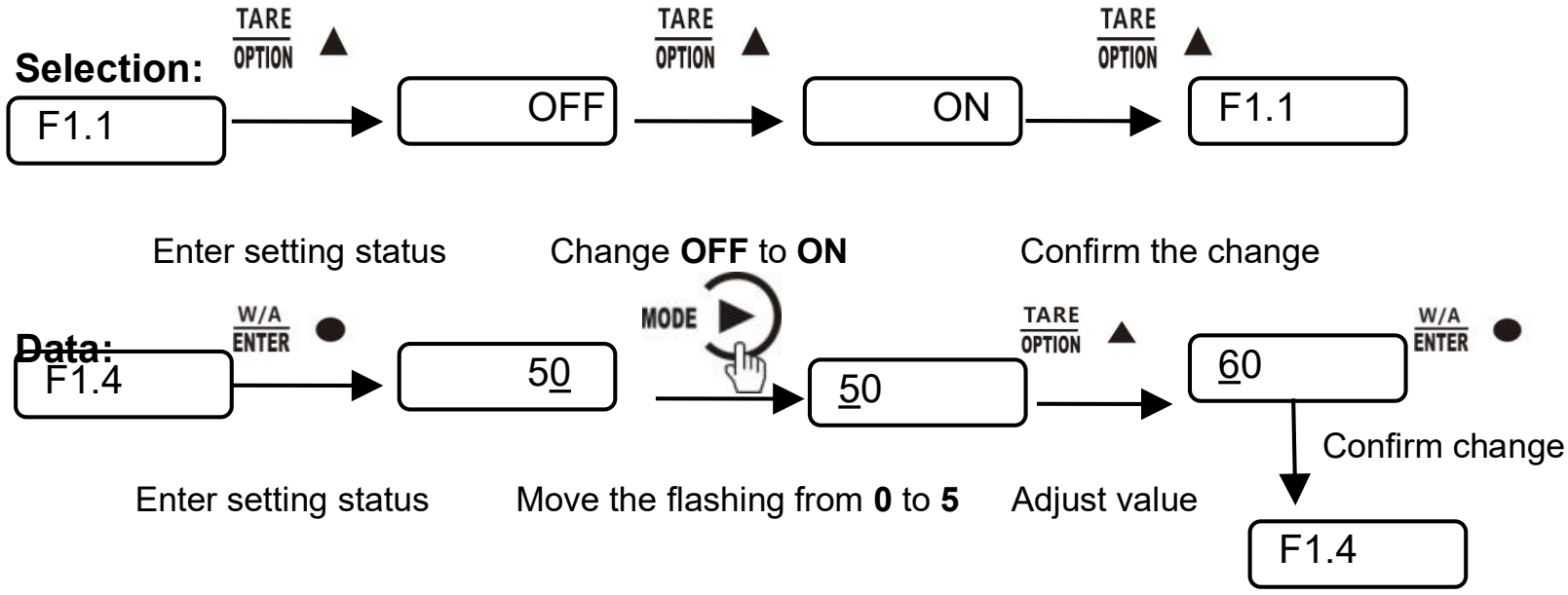


2 .Press W/A ENTER to enter into sub-selection, press ZERO ESC to return back to previous menu.

When it displays **F2**,press W/A ENTER to enter into **F2.1.**

4.2 Parameter Setting Method

GMT-P1 has 2 kinds of working parameters: Selection type and data type. For selection type parameters, press TARE/OPTION ▲ to choose. For data type parameter in parameter interface, press MODE ▶ to choose digit position, press TARE/OPTION ▲ to choose value.



4.3 Descriptions of Operation Parameters

Code	Default	Description
F1	**Null**	**The first major term of working parameter.**
F1.1	**OFF**	Switch for Auto-Zeroing when power-on, OFF: disabled ON: enabled
F1.2	**0**	Zero-tracking Range（0～9d optional）. This parameter is for automatic calibration, disabled when is set ”0”.
F1.3	**1**	Motion Detecting Range（1～9d optional)
F1.4	**50**	Zeroing Range（00%～99% of Maximum capacity）
F1.5	**5**	Digital filtering parameter: (1-9 as optional) 0: without filtering 9: strongest digital filtering
F1.6	**0**	VF-Filter: 0: without filtering 9: strongest digital filtering
F1.7	**0**	A/D conversion rate: 120,480,960,15,30,60 as optional
F1.8	**0**	NET Indicator function switch

		0：NET Indicator light is the function of gross/net weight. Net weight is on, gross weight is off. 1：NET Indicator light has communication indicator function. When there is communication, indicator light flashes
F2	**Null**	**The second major term of working parameter.**
F2.1	**01**	Scale no., indicator no.
F2.2	**38400**	Baud rate of serial port:1200 / 2400 / 4800 / 9600 / 19200 / 38400 / 57600
F2.3	**Modbus-RTU**	Serial ports communication mode: **Modbus-RTU：MODBUS RTU mode;** **r-Cont:SP1 continuous mode;** **r-SP1: SP1 command mode；** **tt:TOLEDOcontinuous mode；** **Cb920：Cb920 continuous mode。** **rE-Cont:rE continuous mode；** **rE- rEAd:rEcommand mode；**
F2.4	**8-E-1**	**Data format:** **7-E-1**：**7** data bits，even parity check，**1** stop bit； **7-O-1**：**7**data bits，odd parity check，**1** stop bit；

		8-E-1：**8** data bits，even parity check，**1** stop bit； **8-O-1**：**8** data bits，odd parity check，**1** stop bit； **8-n-1**：**8** data bits，no parity check，**1** stop bit； **8-n-2**：**8** data bits，no parity check，**2** stop bit；
F2.5	**HiLo**	**MODBUS dual-byte register storage turn**，**Hi Lo**：High byte in the front, low byte at the back；**Lo Hi**：Low byte in the front, high byte at the back
F2.6	**nonE**	Cont mode automatic sending time interval
F2.7	**0**	**tt**(**TOLEDOcontinuous mode**)If send the checksum。 **0**：not send, **1**：send. **yH: (Cont. mode)** **0:** send actual weight. **1:** send if stable, not send if unstable.
F3	**Null**	**The third major term of working parameter.** (For analog output only)
F3.1	**0-5**	**Analog output:** **4-20**：**4-20mA** **0-20**：**0-20mA** **0-24**：**0-24mA** **0-5**：**0-5V**

		0-10： 0-10V **I_out**：Current customized **V_out**：Voltage customized In customized mode,**F3.2-F3.5** parameters available
F3.2	**3920**	Minimum output
F3.3	**4000**	Zero point output
F3.4	**20000**	Maximum capacity output
F3.5	**20020**	Maximum output
F4	**Null**	**The fourth major term of working parameter.**
F4.1	**OFF**	Parameters password setting switch.
F4.2	**000000**	Parameters password setting:**Valid when F4.1 is ON**
F5	**Null**	Parameter setting refer the 5th term
F5.1	**1.00000**	Weight correction factor K, weight correction factor K = Expected weight/current weight range: 0-9.99999 When the calibration weight (gain) calibration parameters reset. The value reverts to the default value of 1.00000

4.4 Set point parameters

Code	Default	Description
P1-P4	**Null**	**The first term of working parameters**

PX.1	**OFF**	Change of state if need stable
PX.2	**0.0**	Change of state minimum duration
PX.3	**P1.3=1** **P2.3=5** **P3.3=0** **P4.3=0**	Comparing conditions： 0：forbid；No Comparing 1：< Less than; If the weight displayed by the indicator is less than PX.4, I/O Module is effective when it outputs the set point X, otherwise the output is invalid 2：<= Less than or equal to; The weight displayed by the indicator is less than or equal to PX.4, the output of I/O Module output set point X is valid, otherwise the output is invalid. 3：== Equal；The weight displayed by the indicator is equal to PX.4 items. The output of I/O Module output set point X is valid, otherwise the output is invalid. 4：>= Bigger than or equal to; If the weight displayed by the indicator is bigger than or equal to PX.4, the output of the I/O Module is effective and the output of the set point X is invalid 5：> Bigger than; If the weight displayed by the indicator is

		bigger than PX.4, the output of the I/O Module is effective, and the output of the set point X is invalid 6：!= not equal to; The weight displayed by the indicator is not equal to PX.4 items, the output of I/O Module output set point X is valid, otherwise the output is invalid 7：_<>_ Outside the interval, if the weight displayed by the indicator is less than or greater than PARx.4 or parx.5, the output of set point X of the I/O Module is effective, otherwise the output is invalid 8：=<__>= Within the interval, when the weight displayed by the indicator is bigger than or equal to PARx.4 and less than or equal to Parx.5, the output of the I/O Module at set point X is effective, otherwise, the output is invalid. 9：external trigger. If it's IO，do 1 state change for 1 trigger, if it's command, then decide according to valid or invalid command.
PX.4	**0**	Set value 1; 0 ~ 999999 can be set
PX.5	**0**	Set value 2; 0 ~ 999999 can be set

Set point has **4** major terms which are user defined.

5 I/O Definition

5.1 I/O Definition

Output/Input code table:

Output		
Code	**Definition**	**Description**
O0	None	No definition
O1	Stable	Effective output in stable status.
O2	Overflow	Effective output when overflow.
O3	Sp**1**	Effective output when set point **1** status output.
O4	Sp**2**	Effective output when set point **2** status output.
O5	Sp**3**	Effective output when set point **3** status output.
O6	Sp**4**	Effective output when set point **4** status output.

Input		
Code	**Definition**	**Description**
I0	None	No definition
I1	Zeroing	Effective input for zeroing, pulse input signals
I2	Sp**1**	If this signal is valid, Sp**1** status will be regarded as invalid. Output valid state when comparision condition turns to invalid, and be effective again.
I3	Sp**2**	If this signal is valid, Sp**2** status will be regarded as invalid. Output valid state when comparision condition turns to invalid, and be effective again.
I4	Sp**3**	If this signal is valid, Sp**3** status will be regarded as invalid. Output valid state when comparision condition turns to invalid, and be effective again.
I5	Sp**4**	If this signal is valid, Sp**4** status will be regarded as invalid. Output valid state when comparision condition turns to invalid, and be effective again.

I6	Reset all	Reset all parameter value when this signal is valid.
I7	Clear/Add tare	Clear tare when this signal is valid at first time, and add tare at the second time.
I8	Clear tare	Clear tare when this signal is valid.
I9	Add tare	Add tare when this signal is valid.
I10	Calibration lock	After the function is defined, the signal is valid (level signal), and then the password input state of the first item in the calibration step can be entered; otherwise, it cannot be entered, and an alarm Error7 is prompted. If this function is defined, MODBUS cannot perform serial port calibration.

5.2 I/O testing

Under weighing status,press MODE (**5 times**)，then display **TESTio**，press W/A ENTER enter into I/O testing interface.

Normal Status

⇔ Press TARE/OPTION ▲ **OUT1** status flash, press MODE ▶ **OUT2** status flash.

⇔ This interface shows:**IN1** input valid, **OUT1** output valid.

6 Serial Communication

GMT-P1 has RS232 or RS485 as optional to realize communication with upper computer。Support r-Cont、r-SP1、Modbus(bus)、tt TOLEDO、Cb920、rECont protocols and rErEAD protocol.

Serial communication terminal please refer to chapter **2.4.2**、**2.4.3.** Baud rate and communication format setting please refer to **F2.2**、**F2.3 and F2.4.**

※Under main display（display weight value), long press TARE/OPTION ▲ to enter into serial communication checking interface, it will display '------' if no communication, and '------' will flash if there's communication.

6.1 r-Cont

Indicator will send weighing data to host computer without command.

Data Format:

STX	Scale no.	Channel no.	Status	Value	CRC	CR	LF

Here:

STX —— 1byte，start character **02H**

Scale no. —— 2bytes，**00~99**

Status —— **2**bytes，high byte:**40H**；low byte definition as follows:

D6	D5	D4	D3	D2	D1	D0
Null	Null	G./N. weight	+/-	Zero point	OFL	Stable
1	**0**	**0: G** **1: N**	**0**：+ **1**：-	**0**：non/zero **1**：zero	**0**：normal **1**：OFL	**0**：not stable **1**：stable

Weight Value —— **6** bytes；when weight is+（-）overflow,return to“space space **OFL** space”

CRC —— **2** bytes,check sum

CR —— **1** byte，**0DH**

LF —— **1** byte，**0AH**

For example:

02 30 31 31 40 41 20 20 20 37 30 30 (present weight) 32 34 0D 0A

Means: stable,positive data,present weight **700**

6.2 r-SP1

Code : **ASCII**

Operation code supported: **W，write；R, read；C，calibrate；O, zero**

6.2.1 Parameters Code Chart

Operation code	Para code	Para. Name	number of character
R	**WT**	Read current status	**8**

		and weight	
C	**ZY**	Zero calibration with weight	
C	**ZN**	Zero calibration without weight	**6**
C	**GY**	Gain calibration with weight	**6**
C	**GN**	Gain calibration without weight	**12**
R	**AM**	Absolute millivolt	**7: D6D5D4D3D2D1D0;** **D6:+;D5-D0:** corresponding **ASCII** for **6** digits millivolt,Decimal point is fixed to **3 digits**
R	**RM**	Relative zero point on millivolt	**7：D6D5D4D3D2D1D0** **D6**：+/-;**D5-D0**:corresponding **ASCII** for **6** digits， Decimal point is fixed to **3**
O	**CZ**	Zero clearing command	

6.2.2 Error Code Explanation

1：CRC check error

2：Operation code error

3：Parameters code error
4：Write data error
5：Operation invalid
6：Channel no. error

Note：Default channel no. of this indicator：**1**（**31H**）

6.2.3 Command

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

6.2.3.1 Host computer read present status

Send command:

STX	Scale no.	Channel No.	**R**	**WT**	**CRC**	**CR**	**LF**

Correct response:

STX	Scale no.	Channel No.	**R**	**WT**	Status	Value	**CRC**	**CR**	**LF**

Wrong response:

STX	Scale no.	Channel No.	**R**	**WT**	**E**	Error code	**CRC**	**CR**	**LF**

Here：

STX —— **1**byte，start character，**02H**
R——**1** byte，**52H**
WT——**2** byte，**57H 54H**

E——1 byte，**45H**

Status —— **2**bytes，high byte: **40H**；low byte definition as follows:

D6	D5	D4	D3	D2	D1	D0
Null	Null	G./N. weight	+/-	Zero point	OFL	Stable
1	**0**	**0:** G **1:** N	**0**：+ **1**：-	**0**：non/zero **1**：zero	**0**：normal **1**：OFL	**0**：not stable **1**：stable

Weight Value —— **6** bytes；when weight is+（-）overflow,return to“space space **OFL** space”

For example:

02 30 31 31 52 57 54 30 31 0D 0A

Correct response：**02 30 31 31 52 57 54 40 4130 30 33 37 35 33 33 36 0D 0A**（**stable**present value **3753**）

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

6.2.3.2 Read other parameters

Send command:

STX	Scale no.	Channel No.	**R**	**Para. code**	**CRC**	**CR**	**LF**

Correct response:

STX	Scale no.	Channel No.	**R**	**Para. code**	Value	**CRC**	**CR**	**LF**

Wrong response:

STX	Scale no.	Channel No.	**R**	**Para. code**	**E**	Error code	**CRC**	**CR**	**LF**

Here:

Para. Value—— **1**byte

Para. code——**2** bytes，

For example:

02 30 31 31 524D52 3839 0D 0A

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

Wrong response:**02 30 31 31 53 4D 52 45 32 30 39 0D 0A**（Operation code error）

6.2.3.3 Write max. Capacity and min. Division

Send command:

STX	Scale no.	Channel No.	**W**	**DC**	Division value	Max. capacity	**CRC**	**CR**	**LF**

Correct response:

STX	Scale no.	Channel No.	**W**	**DC**	**O**	**K**	**CRC**	**CR**	**LF**

Wrong response:

STX	Scale no.	Channel No.	**W**	**DC**	**E**	Error code	**CRC**	**CR**	**LF**

Here:

DC——**2** bytes，**44H 43H**

O——1 byte，**4FH**

K——1 byte，**4BH**

Division value**——2 bytes**，**1/2/5/10/20/50**

Max. capacity**——6 bytes**

For example:

02 30 31 31<u>57 44 43 30 35 30 31 30 30 30 30</u> 36 30 0D 0A(division value **5**, Max capacity **10000)**

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

Wrong response: **02 30 31 31 57 44 43 <u>45 35</u> 39 32 0D 0A**（Operation can't execute）

6.2.3.4 Write other parameters

Send command:

STX	Scale no.	Channel No.	**W**	**Para. code**	Para. value	**CRC**	**CR**	**LF**

Correct response:

STX	Scale no.	Channel No.	**W**	**Para. code**	**O**	**K**	**CRC**	**CR**	**LF**

Wrong response:

STX	Scale no.	Channel No.	**W**	**Para. code**	**E**	Error code	**CRC**	**CR**	**LF**

For example:

02 30 31 31<u>57 5A 52 35 30</u> 30 38 0D 0A（Write zeroing range to 50）

Correct response: **02 30 31 31 57 5A 52 4F 4B 36 31 0D 0A**
Wrong response: **02 30 31 31 57 5A 53 45 33 32 38 0D 0A**（Para. Code error）

6.2.3.5 Calibration Zero

1）Calibrate zero as per current weight（with weight）

Send command:

STX	Scale no.	Channel No.	**C**	**ZY**	**CRC**	**CR**	**LF**

Correct response:

STX	Scale no.	Channel No.	**C**	**ZY**	**O**	**K**	**CRC**	**CR**	**LF**

Wrong response:

STX	Scale no.	Channel No.	**C**	**ZY**	**E**	Error code	CRC	**CR**	LF

Here:

Z——1 byte，5AH

Y——1 byte，59H

For example:

02 30 31 31 435A 59 39 34 0D 0A

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

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

2）Input millivolt calibration zero in the chart（without weight）

Send command:

STX	Scale no.	Channel No.	**C**	**ZN**	Zero millivolt value	**CRC**	**CR**	**LF**

Correct response:

STX	Scale no.	Channel No.	C	ZN	O	K	CRC	CR	LF

Wrong response:

STX	Scale no.	Channel No.	C	ZN	E	Error code	CRC	CR	LF

Here:

ZN——2 bytes，5AH4EH

Zero millivolt value——**6** bytes

For example:

02 30 31 31 43 5A 4E 30 31 32 36 31 30 38 31 0D 0A

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

Wrong response:**02 30 31 31 43 5A 4E 45 34 30 34 0D 0A**（Write data error）

6.2.3.6 Gain calibration

1）With weights

Send command:

STX	Scale no.	Channel No.	C	GY	Weight value	CRC	CR	LF

Correct response：

STX	Scale no.	Channel No.	C	GY	O	K	CRC	CR	LF

Wrong response:

STX	Scale no.	Channel No.	C	GY	E	Error code	CRC	CR	LF

Here:

GY——2 bytes，47H 59H

Weight value——**6 bytes**: Write in weight value

For example:

02 30 31 31<u>43 47 59 30 30 30 32 30 30</u> 36 35 0D 0A（Write in: weight value **200**）

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

Wrong response: **02 30 31 35 43 47 59 <u>45 36</u> 30 32 0D 0A**（Channel no. error）

2）Without weights

Send command:

STX	Scale no.	Channel No.	C	GN	Gain millivolt	Weight value	CRC	CR	LF

Correct response:

STX	Scale no.	Channel No.	**C**	**GN**	**O**	**K**	**CRC**	**CR**	**LF**

Wrong response:

STX	Scale no.	Channel No.	**C**	**GN**	**E**	Error code	**CRC**	**CR**	LF

Here:

Gain millivolt——**6 bytes**

Weight value——**6bytes**

For example:

02 30 31 31<u>43 47 4E 30 30 31 39 34 30 30 30 30 32 30 30</u> 35 36 0D 0A (Write in: weight value **200**，corresponding gain millivolt **0.194**）

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

Wrong response: **02 30 31 31 43 48 4E <u>45 33</u> 38 35 0D 0A**（Para. Code error）

6.2.3.7 Zeroing

Send command:

STX	Scale no.	Channel No.	O	CZ	CRC	CR	LF

Correct response:

STX	Scale no.	Channel No.	O	CZ	O	K	CRC	CR	LF

Wrong response:

STX	Scale no.	Channel No.	O	CZ	E	Error code	CRC	CR	LF

For example:

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

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

Wrong response: **02 30 31 31 4F 43 5A 45 35 30 36 0D 0A**（Operation can't execuate）

6.2.3.8 CRC computation

All the values in front of the parity byte add together and convert to decimal data, then convert the last 2 bytes to **ASCII** code (decade in front and the unit at the back).

For example

The following is a frame of data:

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

Add 02~5A: **180**(**Hex**),convert to decimal data: **384.** We can calculate from this that the check code is **38,34** for the data frame.

6.3 tt TOLEDO Protocol

When choose “tt” protocol in working parameter F2.3, indicator will send datas in continuous mode with TOLEDO protocol.

Continuous sending mode format as below:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
STX																**0D**	

﹀ **A B C** display weight(**6 bytes:** is synchronized with display) **6** 个 **30H**

Checksum

Here:start character is standard **ASII** start character **02(STX)**

status byte **A** definition as below:

D0	**0**	**1**	**0**	**1**	**0**
D1	**1**	**1**	**0**	**0**	**1**
D2	**0**	**0**	**1**	**1**	**0**
Decimal point	**x**	**.x**	**.xx**	**.xxx**	**.xxxx**

D3　　D4　D6 为 **0(not change)**　　**D5** is **1**(not change)

status byte **B** definition as below:

D6	**D5**	**D4**	**D3**	**D2**	**D1**	**D0**
Status			Stable	Overflow	symbol	G.W.
Is 0 (not change)	**Is 1** (not change)	**Is 1** (not change)	**1**-unstable **0**-stable	**1**-overflow **0**-normal	**1**-negative **0**-positive	**0**-G **1**-N

status byte **C is reserved, output 20H.**

6.4 Cb920

When **F2.3=Cb920** in working parameter**,** indicator will send weighing data continuously without command under **Cb920** protocol.

Data format：

Status	,	G.W.	**0/1**	Symbol	Display	Unit	CR	LF

Here：

Status —— 2 bytes，**OL**：（**4FH 4CH**) OFL；**ST**：（**53H 54H**)Stable；**US**：（**55H**

53H)unstable

，—— 1 byte，separator **2CH**

G.W. —— 2 bytes， GS: gross weight 47H 53H. NT: net weight 4EH 54H

0/1 —— 1 byte，(30H/31H) interleaved transmission

Symbol —— 1 byte, 2BH（+）, 2DH（-）

Display —— 7 bytes，including decimal point: display weight value.

Unit —— 2 bytes，**blank space（20H 20H）**

CR —— 1 byte，**0DH**

LF —— 1 byte，**0AH**

For example: When indicator send the following automatically:

53 54 2C 47 53 31 2B 20 20 31 39 30 2E 31 20 20 0D 0A

Means: Stable、G.W.、Data value is positive、current weight is **190.1**

6.5 rECont

Indicator will send weighing data to the upper computer continuously without any command.

Return data frame format specification：

Status	,	**GS/ NT**	,	+/-	Display	Unit	**CR**	**LF**
2bytes	**2C**	**47 53/4E 54**	**2C**	**2B/2D**	**7bytes**	**6B 67**	**0D**	**0A**

Here:

Status —— **2 bytes**，**OL**(OFL):**4FH 4CH; ST**(stable):**53H 54H; US**(unstable):**55H 53H**

Display value —— **7bytes**, including decimal point, high byte is blank if no decimal point.

For example: When indicator send the following automatically:

53 54 2C 47 53 2C 2B 30 31 31 2E 31 32 30 6B 67 0D 0A

Means：Stable，Data value is positive，display value is **11.120kg**

6.6 rEREAD

Indicator will send weighing data to the upper computer under command.

Data format：

Data	**R**	**E**	**A**	**D**	**CR**	**LF**
explain	**52H**	**45H**	**41H**	**44H**	**0DH**	**0AH**

The return data frame is the same with that of **rECont** protocol, please refer to **rECont.**

1) Zero clearing command: ZERO ON<CR><LF> : **5A 45 52 4F 20 4F 4E 0D 0A**

Return YES<CR><LF> or NO? <CR><LF>

2) Calibration zeroing command: TARE ON<CR><LF> : **54 41 52 45 20 4F 4E 0D 0A**

Return YES<CR><LF> or NO? <CR><LF>

3) Read ID no.: GET ID<CR><LF> : **47 45 54 20 49 44 0D 0A**

Return ASCII code with 6 digits ID no.

6.7 Modbus

Indicator uses **RTU mode** to communicate, every 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 the register	
06	preset single register	

16	preset several registers	Command only support preset double registers.
01	read coil	The length unit is bit.
05	**write coil**	

Exception code response

Code	Definition	Description
02	Illegal data address	Data address received from error code is not allowed
03	Illegal data value	Data wrote in is not in permissible range
04	machine fault	When indicator is trying to executate operation required, unrecoverable error is produced.
07	Unsuccessful programming request	Command received can't be executated under current condition.

6.7.1 Modbus communication address

PLC addr.	Display addr.	Description
The following items are only-read register(code 0x03)		
40001	**0000**	Present weight value(4bytes including sign characters, the high byte is in the front)
40002	**0001**	

40003	**0002**	**D15—D14..D5—D4 — D3—— D2 ——D1——D0** **All is 0** **0:+ 0:**non-zero **0:**normal **0:**unstable **1:-** **1:** zero **1:**OFL **1:**stable
40004 **……** **40006**	**0003** **……** **0005**	Reserve(permit to read, reading value is 0)
The following items are two bytes and are available to read and write (write code 0x06，read code 0x03）		
40007	**0006**	Zeroing(zeroing when write in non-zero value)
40008	**0007**	Automatically zeroing when power on（**0：OFF；1：ON**）
40009	**0008**	Zero tracking range（**0-9d**）
40010	**0009**	Stable range（**0-9d**）
40011	**0010**	Zeroing range（**0%-99%**）
40012	**0011**	Digit filter parameters**(0-9)**
40013	**0012**	Stability filter series**(0-9)**
40014	**0013**	**AD sample rate：0:15/s 1:30/s 2:60/s 3：120 /s 4:480/s 5:960/s**
40015	**0014**	**Reserved**
40016	**0015**	NET Indicator switch, 0：Used for gross and net weight

		,1：For communication indication
40017~ 40018	**0016~ 0017**	**Reserved**
40019	**0018**	Decimal point place（**0:0,1:0.0,2:0.00,3:0.000,4:0.0000**）
40020	**0019**	Minimum division（**1/ 2/ 5/ 10/ 20/ 50**）
The following items are available to read and write (writing code 0x10，read code 0x03）		
40021	**0020**	Maximum capacity（max.capacity≤mini.division×**1000000**）
40022	**0021**	
40023	**0022**	Zero calibration with weights: write in 1 and calibrate zero with the current weight. Read: Absolute millivolt of current load cell
40024	**0023**	
40025	**0024**	Zero calibration without weights: Write millivolt value at zero；Write in range（load cell **3mV/V**:millivolt value range within **0.02-12.000mV)** millivolt value at zero when read.
40026	**0025**	
40027	**0026**	Gain calibration with weights. Write weight value(≤max. capacity). Return millvolt at present weight value when read
40028	**0027**	
40029	**0028**	Gain calibration without weights；input gain millivolt(load cell **3mV/V:0.000** ＜ millivolt<**15.000mV** — zero
40030	**0029**	

		millivolt).Read: millivolt value for gain calibration.
40031	**0030**	Gain calibration weight without weights. input gain millivolt(≤max. capacity) Read: weight value for gain calibration.
40032	**0031**	
40033	**0032**	Gross weight, with symbol
40034	**0033**	
40035	**0034**	Net weight
40036	**0035**	
40037	**0036**	Tare weight
40038	**0037**	
40039~40040	**0038~0039**	Reserved
40041	**0040**	Set point **1 stable or not（0：no；1：yes）**
40042	**0041**	Set point **1** min. duration time（**0-999 : 0-99.9sec.**）
40043	**0042**	Set point **1 valid condition**
40044~40045	**0043~0044**	Set point **1** set value 1
40046~40047	**0045~0046**	Set point **1** set value2
40048	**0047**	Set point **2 stable or not（0：no；1：yes）**
40049	**0048**	Set point **2** min. duration time（**0-999 : 0-99.9sec.**）
40050	**0049**	Set point **2 valid condition**

40051~40052	**0050~0051**	Set point **2** set value1	
40053~40054	**0052~0053**	Set point **2** set value2	
40055	**0054**	Set point **3 stable or not（0：no；1：yes）**	
40056	**0055**	Set point **3** min. duration time（**0-999 : 0-99.9sec.**）	
40057	**0056**	Set point **3 valid condition**	
40058~40059	**0057~0058**	Set point **3** set value 1	
40060~40061	**0059~0060**	Set point **3** set value 2	
40062	**0061**	Set point **4 stable or not（0：no；1：yes）**	
40063	**0062**	Set point **4** min. duration time（**0-999 : 0-99.9sec.**）	
40064	**0063**	Set point **4 valid condition**	
40065~40066	**0064~0065**	Set point **4** set value 1	
40067~40068	**0066~0067**	Set point **4** set value 2	
40069	**0068**	Output 1 user-defined	
40070	**0069**	Output 2 user-defined	
40071	**0070**	Input 1 user-defined	
40072	**0071**	I/O output value	Note: available only when coil address 00016 is valid. Input write 1 valid，0 invalid. Read 1 valid，0 invalid
40073	**0072**	I/O input value	

Reserved			
40401	**0400**	**Current weight value(4 bytes with symbolic number, high digit in front)**	
40402	**0401**		
40403	**0402**	**D15—D14……D4 0** **D3 0:+ 1:-** **D2 0:non-zero 1:zero** **D1 0:normal 1:OFL** **D0 0:Stable 1:Unstable**	
40404	**0403**	**0**	
40405	**0404**	**6 digits without symbolic number, user ID no.**	
40406	**0405**		
The following items are byte read only. （read code: 0x03）			
49001	**9000**	Version no.	If display10024，formatXX XXXX,main version no., hardware no., software no..So main version no.01， hardware no. 00，software no. 24
49002	**9001**		
49003	**9002**	**Develop time**	If display 141024, means 24th Oct., 2014
49004	**9003**		
The following items are byte read only. （read code：0 x 0 1）			

00001	**0000**	**0**：unstable； **1**：stable	
00002	**0001**	**0**：normal；**1**：OFL	
00003	**0002**	**0**：non-zero；**1**：zero	
00004	**0003**	**0**：**+**；**1**：**-**	
00005	**0004**	**Reserved**	
00006	**0005**	**Reserved**	
The following item are available to read and write （read code：0x01，writing code： 0x05）			
00007	**0006**	Automatically zeroing when power on（**0**：**OFF**； **1**：**ON**）	
00008	**0007**	**Reserved**	
00009	**0008**	**Reserved**	
00010	**0009**	Reset all	
00011	**0010**	Reset calibration	
00012	**0011**	Reset paramaters	
00013	**0012**	Reset I/O	
00014	**0013**	**Reserved**	
00015	**0014**	**Reserved**	
00016	**0015**	I/O testing switch	
00017	**0016**	Set point 1 status	Only read：

00018	**0017**	Set point 2 status	0:invalid，1:valid
00019	**0018**	Set point 3 status	
00020	**0019**	Set point 4 status	
00021	**0020**	Zero calibration (Set on, and then write ON to start calibration.)	
00022	**0021**	Zero (Zeroing when write ON)	
00023	**0022**	Clear tare (Clearing tare when write ON)	
00024	**0023**	Add tare (Adding tare when write ON)	
00025	**0024**	Gross/Net change (Only read 0: gross weight; 1: net weight)	
00026~ 00032	**0025~ 0031**	**Reserved**	

7 Password Input and Setting, Reset

7.1 Password Input

（1）Indicator calibration and working paraters setting default password: **000000.**
（2）User can set password in parameters when **F4.1** is“**ON**”.
（3）When display is “PASS”, need to input correct password to enter parameters.

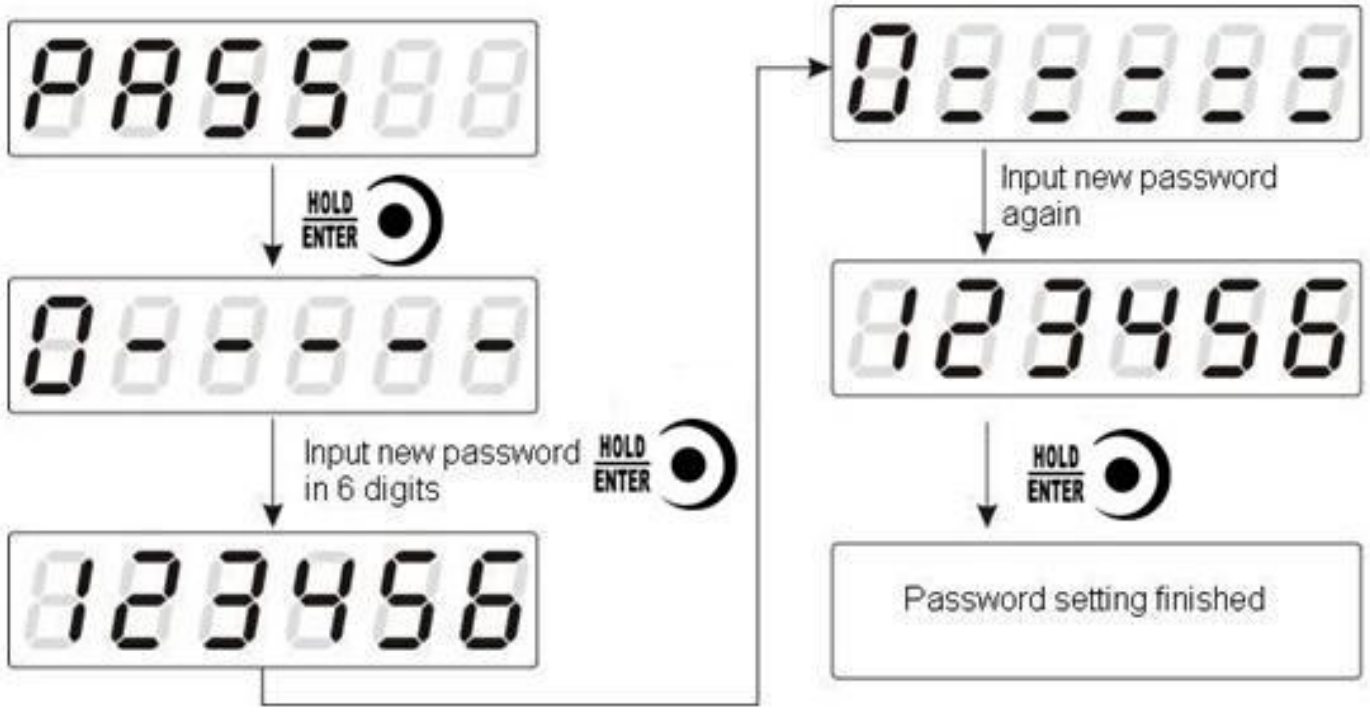
Note:

（1）When input password, if first time wrong, it will go to the second chance for password input(display from  turn to ).
（2）If second input wrong, it will enter into interface for inputting password the third time
(Display change from  to ).
（3）If Input wrong for three times, main display show “Error4” and self-lock, but user can operate when power on again.

7.2 Password Setting

（1）User can set password in parameters when **F4.1** is“**ON**”.

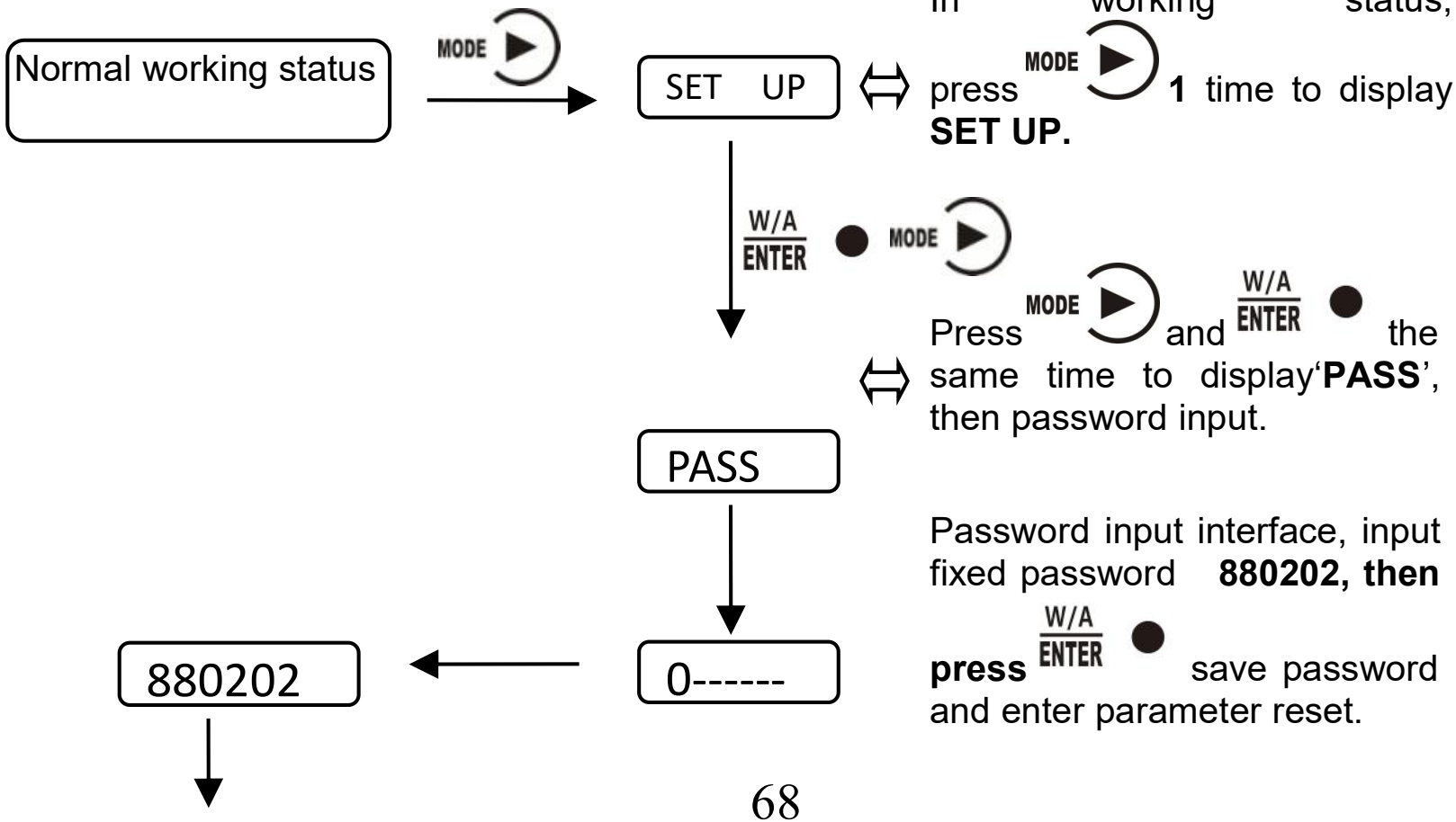
（2）User must input same new password twice in setting password, If not same, main display show“**Error**”one second and return to **PASS** again.

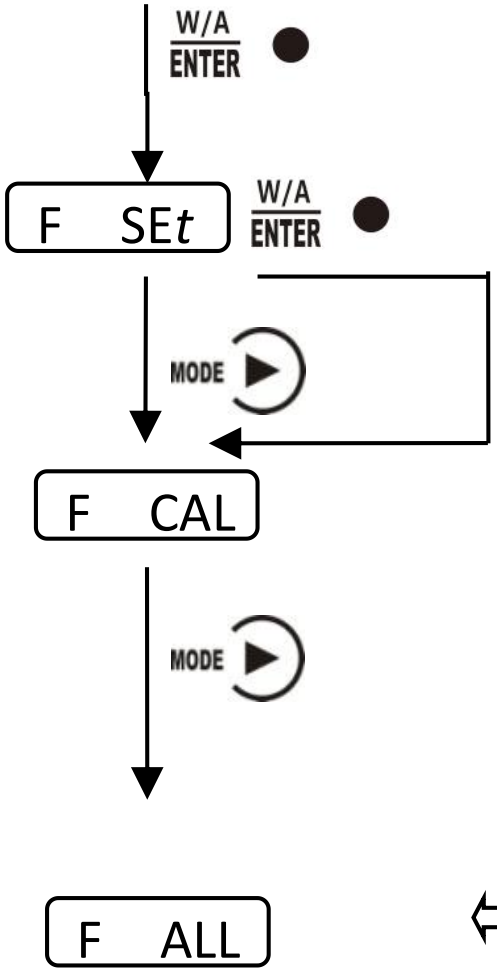


7.3 Factory Reset

Note: Factory reset is only for special technicists, which will reset all of parameters and will maybe cause not working.

Take reset all for example:





1）In **F SEt** interface, press HOLD/ENTER to reset working parameters, enter into reset calibration paramters interface.

2）In **F SEt** interface, press MODE，not to make working parameter reset, enter into calibration para. Reset interface.

1）In **F CAL** interface, press W/A/ENTER to reset calibration para., enter into reset all interface.

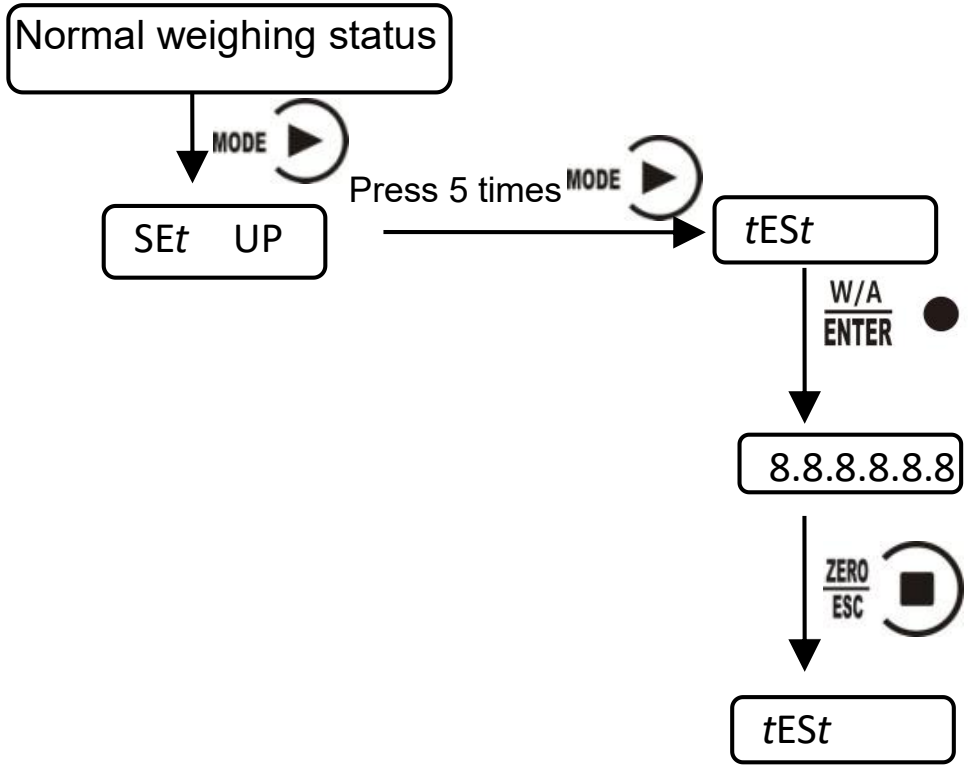
2）In **F CAL** interface, press MODE，not to make calibration para. reset, enter into reset all interface.

1）In **F ALL** interface, press W/A/ENTER to make reset all of the paramters（including working para., calibration para., I/O etc..

Note: In all reset interfaces, press ZERO/ESC to exit and return to weighing interface.

8 Display Testing

The following flow chart is to test lights on main-display and status lights.



Under parameter interface, press MODE to switch to"*t*ES*t*"interface.

Under"*t*ES*t*"interface,press W/A ENTER to make display testing, Nixie tube display and indicator lights all shine. Now if press W/A ENTER , display will sparkle.

After testing is finished, press ZERO ESC to return to"*t*ES*t*"interface.

9 Errors and Alarm Messages

Error ①Input error.

②wrong data beyond parameter range.

Error 2 The present weight value is out of zeroing range.

Error 3 Scale platform is not stable when zeroing.

Error 4 Input wrong password more than 3 times.

Error 5 The present weight value is overlimit when clearing tare.

Error 6 The present weight value showed is unstable when clearing tare.

OFL Weighing value is positive overflow.

-OFL Weighing value is negative overflow.

10 Indicator model user-defined function

The custom model of the indicator displayed after the indicator is powered on. Through the relevant operation of the indicator, you can customize the model content displayed on the indicator. Steps are as follows:

1. When power on,

Flash twice 8 after power on, and then display model, display model 3s turn to main display interface, long press MODE key under the menu interface display after the "LOGO" press Enter into custom Settings interface model, under the current interface, press MODE key to choose, the OPTION button to adjust a particular character values, save the change, indicator boot will show the changed model; If no changes are made to the indicator model, the indicator will default to GMT-P1.(note: reset out of position indicator model)

2. After entering the model user-defined interface, the 6-bit main display character can be defined. MODE key can be used to adjust and select a certain character. Characters can be adjusted by using the OPTION key. The sequence of character changes is space, -, 0~9, A~Z (according to the display character comparison table, as

shown in the appendix), and press Enter to save the current modified value.

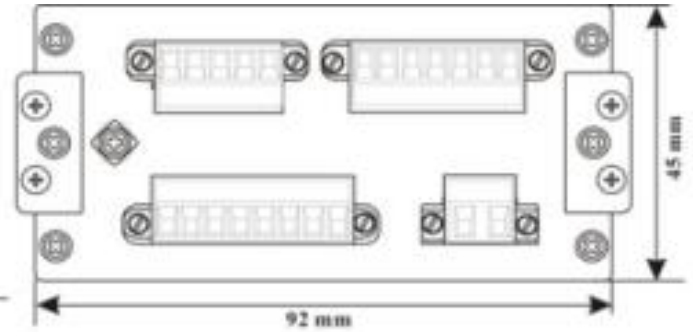
Displays character comparison table

a	b	c	d	e	f	g	h	i	j	k	l	m
												

n	o	p	q	r	s	t	u	v	w	x	y	z
												

11 Dimension of Indicator

Dimension of rear panel:**92×45(mm)**



Dimension of front panel:**105×57(mm)**

Panel cutout dimension:**93×46(mm)**