User's Manual

Tuxon-C

GENERAL MEASURE

Ver. 2 / 2022 / 01

Table

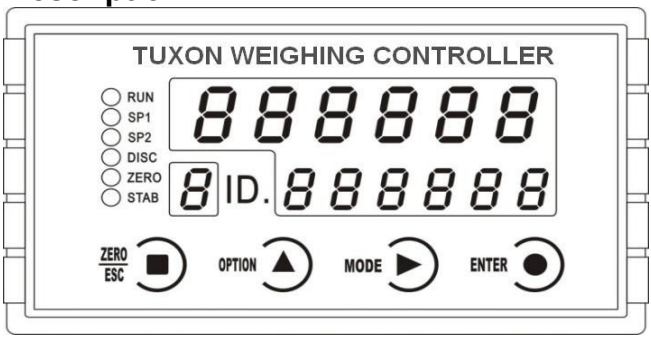
1 General information

Tuxon-C weighing indicator is a small-volume display specially for weighing and controlling in industrial field, which features are abundant communication, high precision, strong function and easy operation etc., thus to be widely used in weighing and controlling equipment, such as concrete mixer, asphalt batching, feeding stuff, metallurgy converter and so on.

1.1 Function:

- Small volume, unique design, easy operation;
- Suit to all of load cells at bridge-type resistance strain gauge;
- Multi digital filter;
- 5set points are used widely to meet more requirement;
- **RS232/RS485** (optional) to ensure stable communication;
- Abundant communication protocols(**RS/RE/MODBUS** optional) to communicate easier with host computer;
- High precision 16bit DA analog output;
- Digital calibration with or without weights;
- Password protection for calibration, operation parameters etc.;
- Automatic zeroing when power up;
- Automatic zero tracking.

1.2 Description



P **1-1**

Keypad:

ZERO ESC Display value when zeroing or exit present function.

OPTION: Parameters are optional.

MODE: Set parameter mode.

ENTER: Enter parameters or calibration or confirmation.

Status indication:

RUN : Not define

SP1/SP2 : Not define

DISC : Not define

ZERO: Zero indication light when weight is among **0±1/4d**.

STAB: Stability indication light when weight is in stable range.

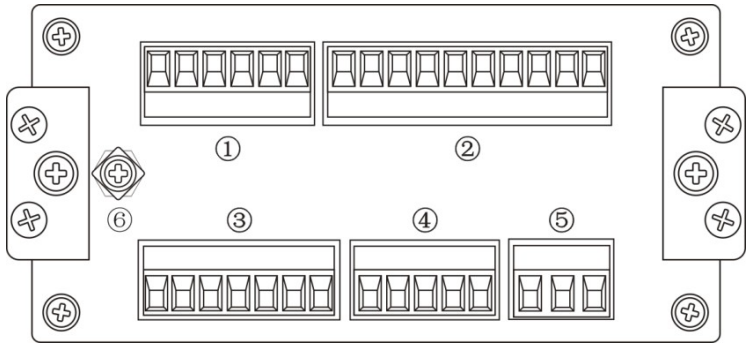
Display:

Main display：6digits, display weight and parameters.

Sub-display：6digits, display analog, set point and

Set point display：1 digit, display set point numbers.

1.3 Rear illustration



P 1-2

① I/O input terminals
② I/O output terminals
③ Load cell terminals
④ Serial port / analog terminals
⑤ Power connection
⑥ Fuse socket

1.4 Specification

Common:

Power supply：**AC90V～260V 50Hz (or 60Hz) ± 2%**

Filter：**Inside**

Working temperature：**-10～40**℃

Max humidity：**90%R.H without dew**

Power consumption：**About 10W**

Dimension：**105×151×57mm**

Analog:

Load cell power：**DC5V 300mA (Max)**

Input impedance：**10MΩ**

Zero steady range：**0.02～9mV**

Input sensitivity：**0.01uV/d**

Gain input range：**0.2～10mV**

Transfer mode：**Sigma - Delta**

A/D conversion speed：**120times**/sec

Non-linearity：**0.01%F.S**

Gain drift：**10PPM/**℃

Display Precision：**1/30000 Digital:**

Weight display：**6digits red high-brightness LED**

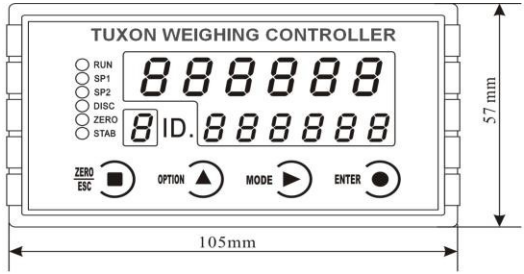
Minus display：“-”

Overload display：“**OFL**”

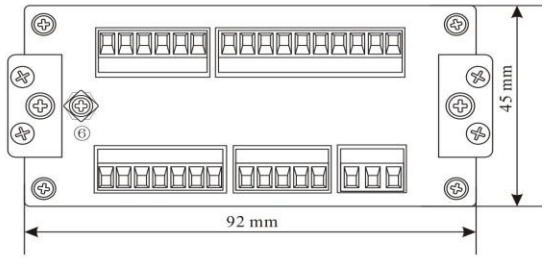
Decimal point：**5kinds (optional)**

1.5 Dimension

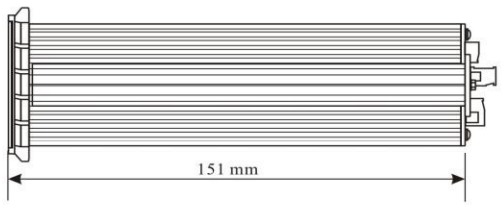
Front Panel



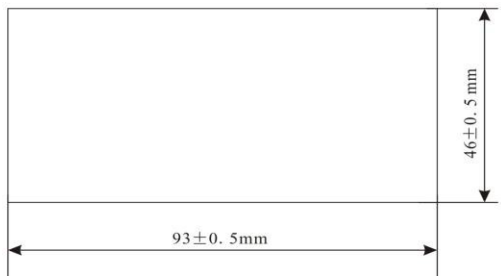
Rear Panel



Side View

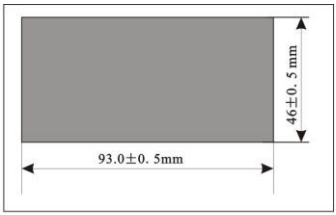


Rear Size

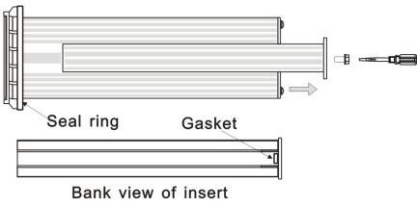


2 Wiring

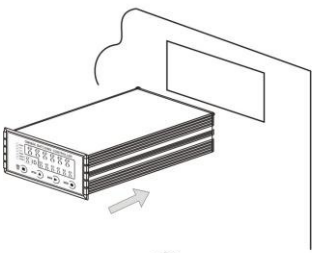
2.1 Installation



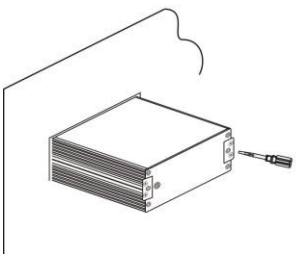
1. Cut hole as left size in the suitable place of control box.



2. Screw open in four corners, then dismantle mounting plates.



3. Install indicator in the front of control box.



4. Insert mounting plates on both sides and then screw tightly.

2.2 Power connection

Tuxon-C weighing indicator connects power as follows:

P 2-2

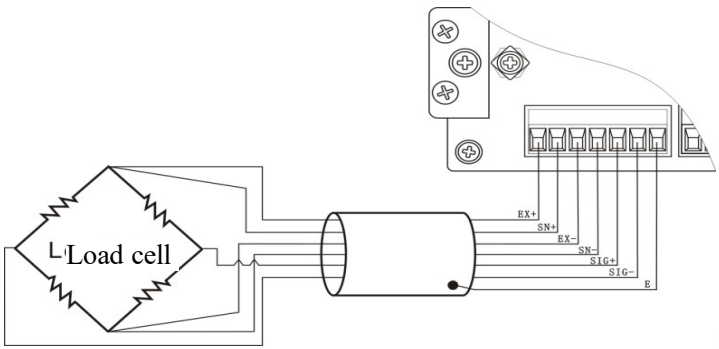
1. AC power must connect with ground;
2. Please do not connect indicator's earth line with other huge electronic equipment directly.

2.3 Load cell connection

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**

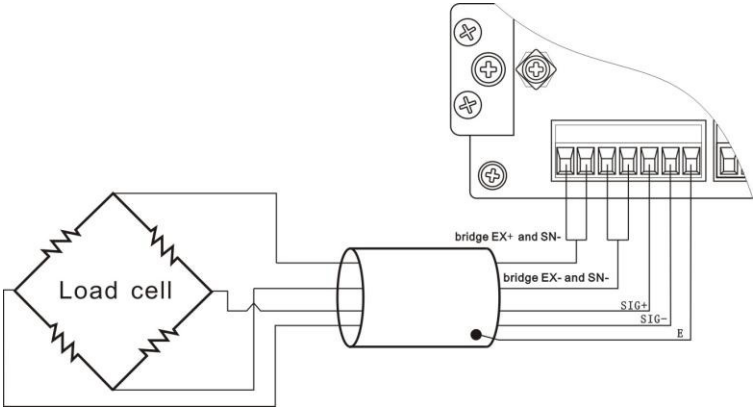
1) 6 wires connection:



P

2-3

2) 4 wires connection



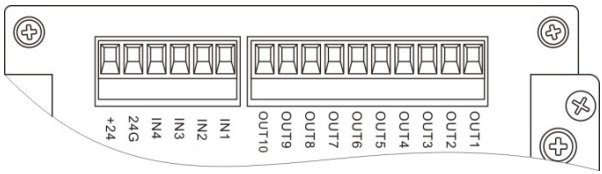
P 2-4

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.

2.4 I/O terminals

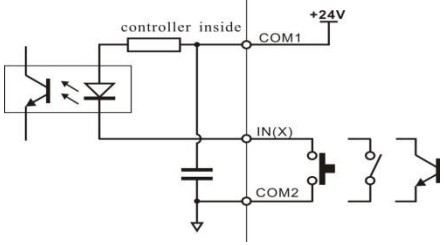
Tuxon-C Weighing indicator transfer data by optoelectronic isolation technology, thus need 24 V DC outside as power supply, which anode connect with indicator 24 V+, and cathode with 24V- through the COM1 (DC+) and the COM2 (DC-). The input signal is low level effective, and the output is transistor open-collector output, which driving current can reach 500mA.

I/O definition as follows：



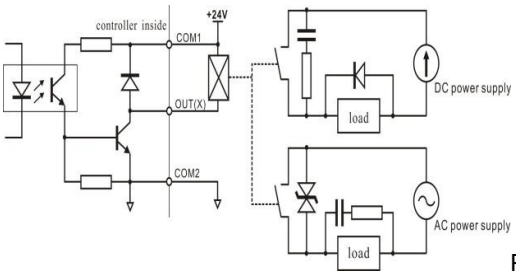
P 2-5

Indicator input terminal connection:



P 2-6

Indicator output terminal connection:



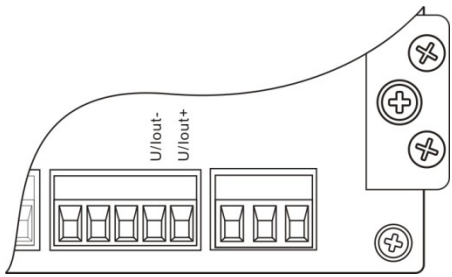
P 2-7

I/O tolerant definition as follows:

Output		Input	
OUT1	SP1	IN1	Zero
OUT2	SP2	IN2	NC
OUT3	SP3		
OUT4	SP4		
OUT5	SP5		
OUT6	SP6		

2.5 Analog output connection

Analog output two kinds: voltage and electric current. For voltage output, 0-5V/0-10V/-5-5V/-10-10V is optional for voltage output ； 4-20mA/0-20mA/0-24mA is optional for electric current output. Define terminals as follows：

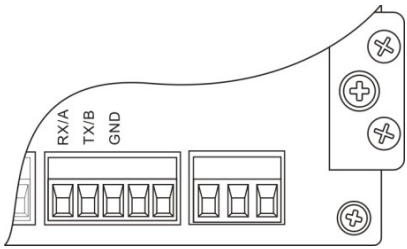


P 2-8

Note：Analog output is optional function, please

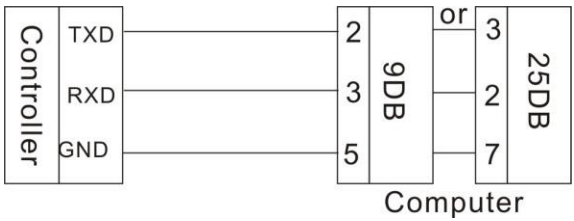
2.6 Serial port connection

Serial port(RS485 or RS232) connection as follows：



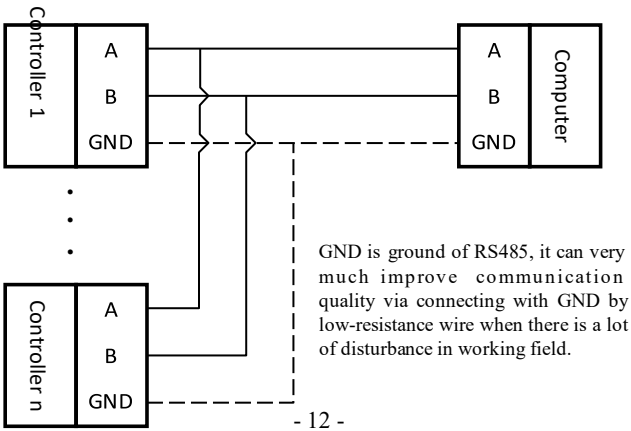
P 2-9

RS232 connection：



P 2-10

RS485 connection：



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.

P 2-11

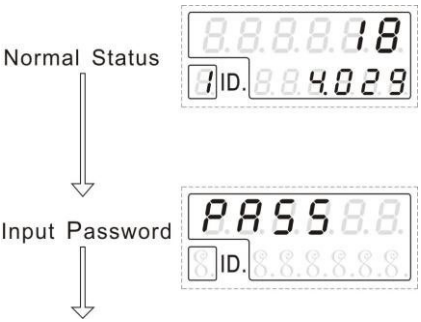
3 Calibration

3.1 Instruction

Tuxon-C Weighing indicator need calibrate atbeginning of operation or changing any parts on weighing system or non-suitable application for user. The calibration can define radix point, minimum scale division, maximum scale capacity, zero and gain, etc.

User can press MODE to enter next or press ENTER to save setting to only change one parameter, and then press MENU ESC to exit.

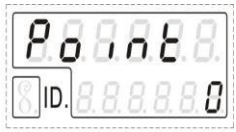
3.2 Flow chart



Press MODE to display **CAL**，and then press ENTER to enter password.

Input correct password，when display "**CAL ON**" one second, then enter to set radix point automatically.

The Position of Decimal Point



1) Press OPTION set radix point (0~0.0000 5 kinds optional), press ENTER to save and enter mini division.
2) If not change radix point, press ENTER directly to enter mini division.

Min. Division

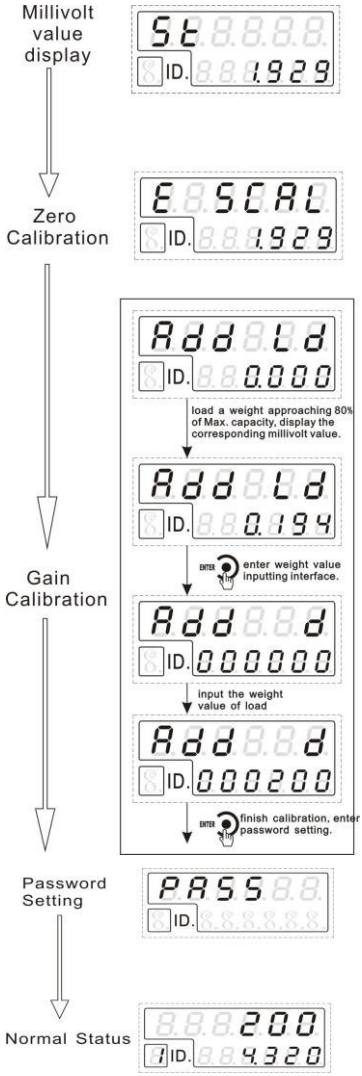
1) Press OPTION to set mini division(1~50 6kinds optional), press ENTER to save and enter max. capacity.
2) If not change mini division, press ENTER directly to enter max. capacity.

Max. Capacity

1) Input max. capacity(≤mini division × 30000), press ENTER to save and enter millivolt display.
2) If not change, press ENTER to enter millivolt display directly.

Sensitivity of load cell

1) Select suitable sensitivity based on load cell, press ENTER to save and enter millivolt display. Otherwise to press ENTER directly to enter millivolt display.



1) When load cell output millivolt value, press ENTER to enter zero calibration directly.
2) The display value is similar with millivolt from SIG+/SIG- terminals. See Character 3.3 for details.

1) When scale platform is stable, press ENTER to take present weight as zero，and enter gain calibration.

2 ） Press ZERO ESC to reserve original zero and enter gain calibration.

1) Gain calibration as the left chart.

▲When calibration with weights, please record zero millivolt, gain millivolt and weight value in list. If no weights, user will calibrate according to these data.

2) Press ZERO ESC to enter password directly, no gain

1) See Character 5.11 to set password, then press ZERO ESC to exit calibration and return.

2) If not set password, press ZERO ESC directly to return. Normal working status.

3.3 Millivolt display

This function is mainly used to test weighing system, four-corner position-error of force-transmitted equipment and load cell's linearity.

1. Test weighing system

(1) If the indicator display variational millivolt value according to add weight, thus indicate load cells are connected correctly and force-transmitted equipment is operated normally.

(2) If the indicator display OFL (or –OFL), thus indicate the weight is too heavy (or too light), then need unload (or add) the weight. But if always display OFL (or –OFL) after changing weight, maybe the following reason cause:

a. Please check force-transmitted equipment.

b. Please check the load cell's connection.

c. Please check Load cells.

2. Test four-corner position-error of force-transmitted equipment

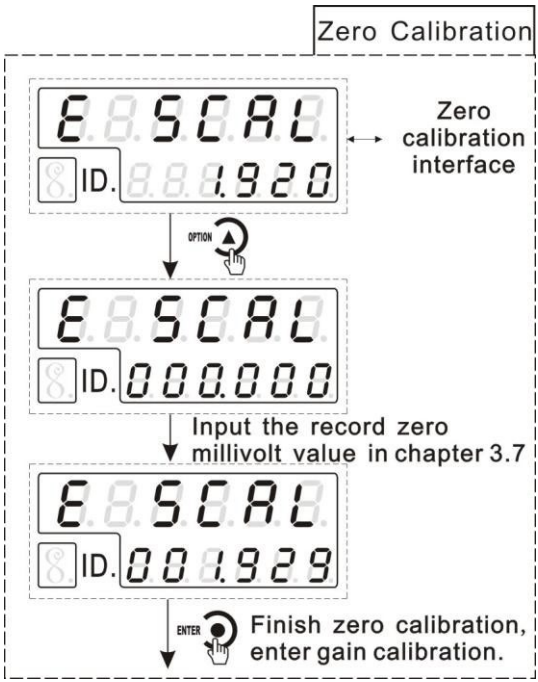
Please load same weight on scale's every corner and record individual millivolt value. If the values are obviously different, please adjust force-transmitted equipment.

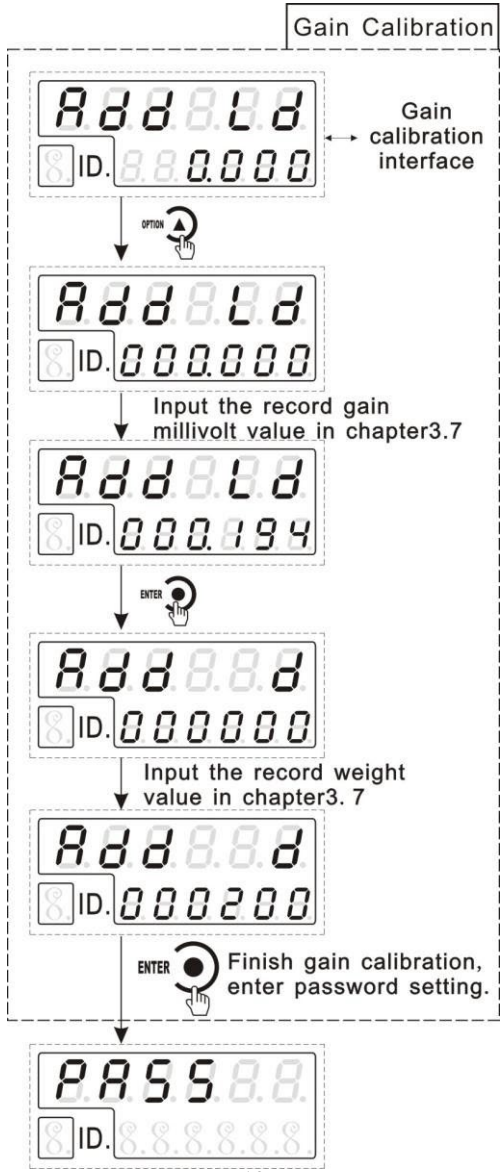
3. Test load cell's linearity

Please load several same weight values within the weighing capacity and record relevant millivolt value after zeroing every time; if the discrepancy is bigger among millivolt values, thus indicate that the load cell's linearity is not good, need change new load cell or adjust force-transmitted equipment.

3.4 Calibration without weights

Calibration without weights is only for urgency. If change new load cells or indicator, or adjust weighing system, calibration without weights is not correct.




Gain Calibration
AddLd
ID.
0.000
Gain calibration interface
OPTION
AddLd
ID.
000.000
Input the record gain millivolt value in chapter3.7
AddLd
ID.
000.194
ENTER
Add d
ID.
000000
Input the record weight value in chapter3. 7
Add d
ID.
000200
ENTER
Finish gain calibration, enter password setting.
PASS
ID.

3.5 Fast zero / gain calibration

In weighing status, press OPTION ▲ for long time, when display password input, then input password correctly and enter zero calibration. See Character 5.10 for details.

3.6 Calibration parameter table

Sign	Parameter	Type	Division	Initial value
Point	Decimal point	5	0,0.0,0.00,0.000, 0.0000	0
1d=	Mini division	6	1,2,5,10,20,50	1
CP	Max capacity		≤mini division×30000	10000
St	System millivolt			
SE	Sensitivity	2	2，3	2(mV/V)
E SCAL	Zero			
AddLd(d)	Gain			
PASS	Set password			000000

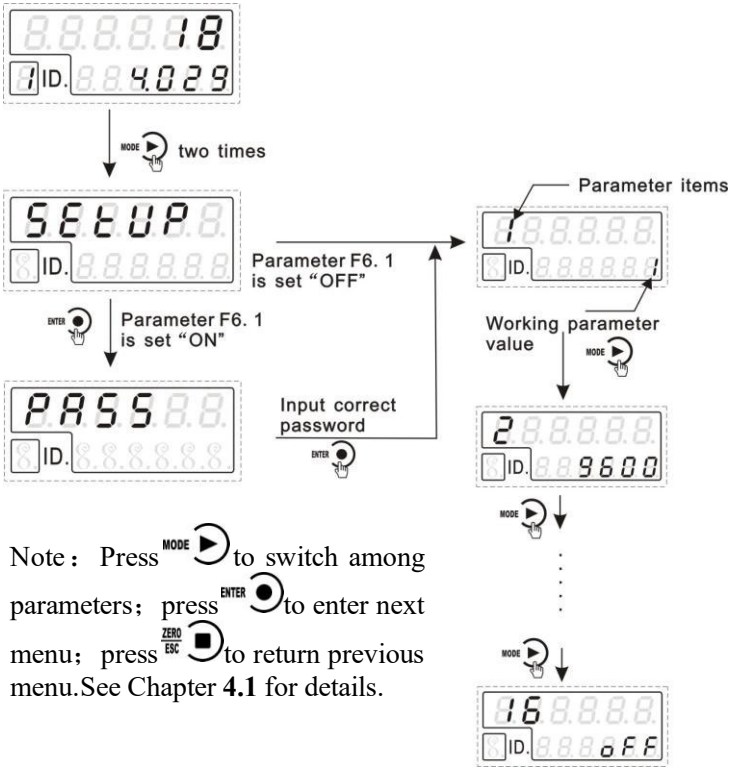
3.7 Calibration parameter record

Parameter	Valued	Date	Remark
Decimal point position			
Mini division			
Max capacity			
Load cell sensitivity			
Password setting			

List(calibration with weights)：

Times	Zero millivolt （**mV**）	Gain millivolt （**mV**）	Weights （**Kg**）	Date	Remark
1					
2					
3					

4 Parameter setting



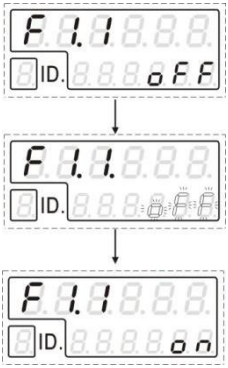
Note： Press MODE to switch among parameters； press ENTER to enter next menu； press ZERO/ESC to return previous menu.See Chapter **4.1** for details.

4.1 Defination

Press ENTER to select parameters, then press MODE and OPTION to set parameters, after that, press ENTER to save setting.

1） Optional parameter setting

Set“parameter**F1.1**”（**ON**）for example:



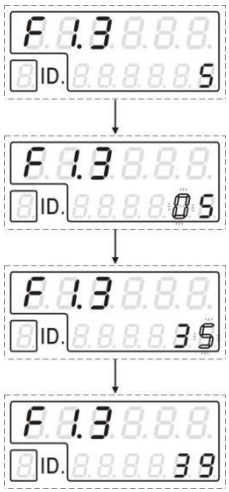
1. Press ENTER , then sub-display sparkle “**OFF**”.

2. Press OPTION , then sub-display show“**ON**”.

3. Press ENTER to save setting. If not need set other parameters, press ZERO/ESC to return.

2） Numerical parameter setting

Set “parameter **F1.3**”（as **39**）for example:



1. Press ENTER , sub-display sparkle “**0**” in the right.

2. Press OPTION till sub-display show “**3**”，then press MODE ，sparkle move to the right one.

3. Press OPTION till sub-display show“**9**”，then press ENTER to save and finish.

4.2 Operation parameter table

No.	Para.	Initial	Description	
F1	**None**	**None**	No.1 parameter	
F1.1	**ON/OFF**	**OFF**	Automatic zeroing when power on	
F1.2	**00～99**	**01**	Zero tacking range(00～99d optional). If setting 0, not zero tracking.	
F1.3	**00～99**	**05**	Zeroing range(01%～99% of full capacity).	
F1.4	**00～99**	**01**	Stability criterion range(01～99d optional). If 0, always stability and the light are on.	
F1.5	**0~9**	**4**	Digital filter parameter **0**：no filter；**9**：strongest filter	
F1.6	**0～9**	**7**	Stability filter **0**：no filter；**9**：strongest filter	
F2	**None**	**None**	No.2 parameter	
F2.1	**××××××**	**0**	Set point **1** (maximum. weight data)	Set point 1 to 5 according to weight value from max. to mini. Set weight value as need, if no use, keep 0. Note：Do not set 0 as weight value between set points.
F2.2	**××××××**	**0**	Set point **2**	
F2.3	**××××××**	**0**	Set point **3**	
F2.4	**××××××**	**0**	Set point **4**	
F2.5	**××××××**	**0**	Set point **5** (minimum weight data)	

F3	**None**	**None**	No.3 parameter
F3.1	**4-20 / 0-20 / 0-24 / 0-5 / 0-10 / -5-5 / -10-10**	**4-20**	Analog output: **4-20: 4-20mA** **0-20: 0-20mA** **0-24: 0-24mA** **0-5 : 0-5V** **0-10: 0-10V** **-5-5 : -5-5V** **-10-10 : -10-10V**
F3.2	**ON / OFF**	**OFF**	Analog output mode: **OFF :** Weight and analog output are direct proportion; **ON:** Weight and analog output are inverse proportion.
F4	**None**	**None**	No.4 parameter
F4.1	**00～99**	**01**	Scale no.
F4.2	**1200～ 57600**	**9600**	Baud rate
F4.3	**RS/RE/ Bus**	**RS**	**RS : GM ; RE : CHIMEI ; Bus: MODBUS.**
F4.4	**READ/ CONT**	**CONT**	Communication mode: (Available when F4.3 is **RS/RE**) **READ**: command; **CONT**: continue
F4.4.1	**0~5**	**1**	Serial port data-sent speed(Available when F4.4 is **CONT**): 1-5 means 10-50ms; 0 means one character time.

F4.4	**Rtu/Asc**	**Rtu**	MODBUS communication mode (Available when F4.3 is Bus)
F4.4.1	**Hi Lo/Lo Hi**	**Hi Lo**	**MODBUS** dual-byte register storage turn(Available when F4.4 is **Rtu)**: **Hi Lo**: High byte in the front, low byte at back ; **Lo Hi**: Low byte in the front, high byte at back.
F4.5	**7-E-1/ 7-O-1/ 7-N-2/ 8-E-1/ 8-O-1/ 8-N-1/ 8-N-2**	**8-E-1**	Data format(data bit + parity bit + stop bit)， only the last 4 format is for MODBUS.
F5	**None**	**None**	No.5 parameter
F5.1	**ON/OF F**	**OFF**	**OFF** ： Not need stability to adjudge whether output or not from set point; **ON**: Need stability to adjudge whether output or not from set point.

F5.2	**DA/SP**	**DA**	DA：Sub-display show analog value； SP：Sub-display show present weight among different set points. If present weight<mini set point, sub-display show weight value at mini set point; if present weight>set point 1, sub-display show weight value at set point 1; others sub-display show nearest set point-present weight.
F6	**None**	**None**	No.6 parameter
F6.1	**ON / OFF**	**OFF**	Password switch
F6.2			Password setting. See Character 5.11 for details.

5 Operation

5.1 Operation status

1. When power on, buzzer hoot, main and sub-display flash “8”，and instruction lights also sparkle.

2. After finished, main display show “8806-A” ， and sub-display show “software no. ”.

3. After 3 seconds, main display show present weight value, andsub-display show related setting in Character **F5.2.** See Character F5.2 for details.

5.2 Working instrument

For examples: **F2.1=SP1** 、 **F2.2=SP2** 、 **F2.3=SP3** 、 **F2.4=SP4**、**F2.5=SP5**，present weight **W** compare with **SPx** to control I/O output.

Weight	Set point display	I/O output
W>= SP1	**1**	**SP1** output effectively
SP2<=W<SP1	**2**	**SP2** output effectively
SP3<=W<SP2	**3**	**SP3** output effectively
SP4<=W<SP3	**4**	**SP4** output effectively
SP5<=W<SP4	**5**	**SP5** output effectively
W<SP5	**6**	**SP6** output effectively

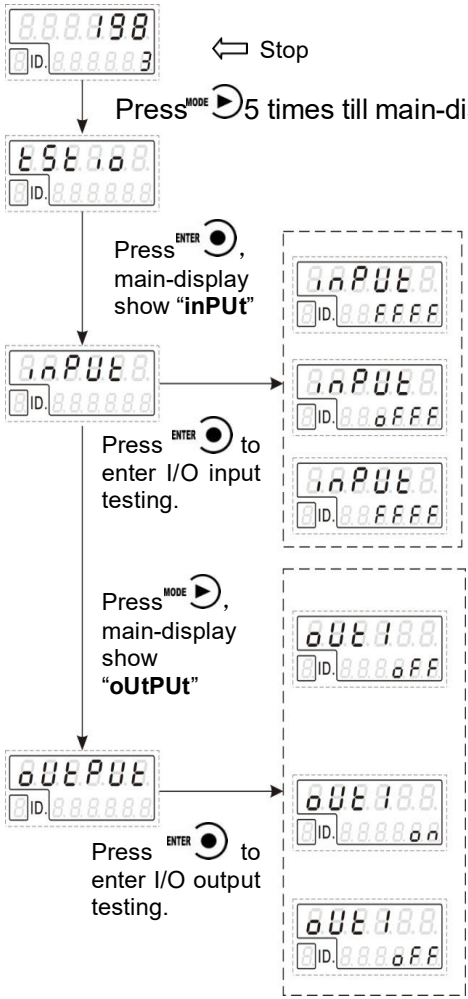
5.3 Manual zeroing

When stop, press 

or input “zeroing” signal to clear gross weight value. Note: Operation must be in stable status or gross weight is in the zeroing range. Otherwise the indicator will display ERROR3 or ERROR2.

5.4 I/O testing

Press MODE to switch among **OUT1~OUT10** and press ZERO/ESC to return. Please refer following flow chart:



Sub-display indicate **F** means **IN1~IN4** from left to right，when input effectively, **F** change to **O.**

For example, **F** changeto **O** indicates **IN1** input effectively and connect correctly.

OUTPUT means testing. Main-display show output number ， sub-display show status.

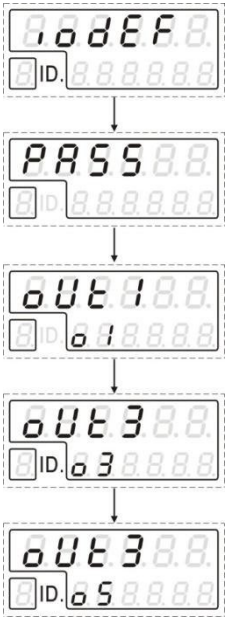
Press OPTION, sub-display **OFF** change to **ON** indicates **OUT1** output effectively and connect correctly.

Press MODE to switch output numbers, such as from **OUT1** to **OUT2.**

5.5 I/O definition

When stop, user can define I/O ports by MODE and ZERO/ESC to return.

The flow chart is to define **OUT3** as **O5**(SP5) for example：



When stop, press MODE 4 times，main display show "**iodEF**".

Press ENTER to input correct calibration password, then press ENTER to define.

Main display show output and sub-display show code. Press MODE till main display show **OUT3.**

Press OPTION till sub-display show **05**, then press ENTER to finish, and press ZERO/ESC to return.

Output code table：

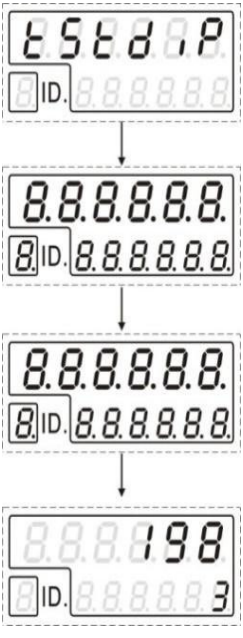
Output		
Code	**Definition**	**Description**
O0	None	No definition
O1	**Sp1**	Effective output when present weight>=set point**1**.

O2	**Sp2**	Effective output when set point **1** >present weight>=set point**2.**
O3	**Sp3**	Effective output when set point **2** >present weight>=set point**3.**
O4	**Sp4**	Effective output when set point **3** >present weight>=set point**4.**
O5	**Sp5**	Effective output when set point **4** >present weight>=set point**5.**
O6	**Sp6**	Effective output when present weight<set point **5.**
O7	**Stable**	Effective output in stable status.
O8	**Zero**	Effective output at zero.
O9	**Overflow**	Effective output when overflow.
Input		
Code	**Definition**	**Description**
I1	**Zeroing**	Effective input for zeroing when weight value is stable in the zeroing range.

Note: Same input or output code can be defined by several inputs or output terminals, such as both of **IN1** and **IN2** can be defined I1 (zeroing).

5.6 Display testing

The following flow chart is to test lights on main-display and sub-display, status and instruction:



Press MODE 9 times in stop status till main display show “tStdip”.

Press ENTER till all of lights shine and sparkle at 2seconds/time.

Press ZERO/ESC 2 times to exit testing and return.

5.7 Reset

Reset present parameters to initial setting.

Reset “I/O definition (**io**)” for example:

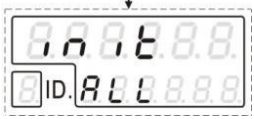
1. When stop， press MODE till main display show “init”.

2. Press ENTER to input correct calibration password.

3. Press MODE till sub-display show “**io**(I/O definition)”.

Note: “**SETUP**” to backup operation parameters; “**CAL**” to backup calibration parameters; “**rECiPE**” to backup recipe parameters; “**ALL**” to reset all of parameters.

4. Press ENTER， sub-display show “**YES?**”.



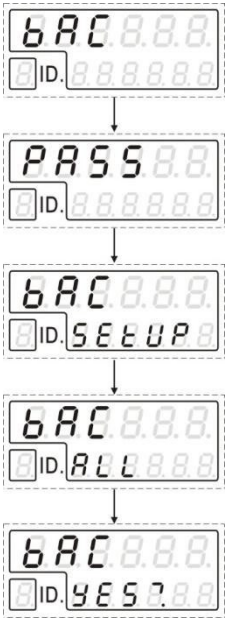
5. Press ENTER， sub-display show “**SUCCES**” to enter next parameters. Press ZERO ESC to return.

1. Suggestion: When reset, please backup first to be used in the future.

5.8 Backup

User can make all of parameters backup.

Make“all of parameters(**ALL**)”backup for example:



1. When stop，press MODE till main display show “**bAC”.** And then press ENTER input calibration password, sub-display show **“SET UP”.**

2. Press MODE till sub-display show “**ALL** (all of parameters)”
Note: “**SETUP**” operation parameters backup; “**CAL**” calibration parameters backup; “**io**” I/O definition backup.

3. Press ENTER， sub-display show “**YES?**”, press ENTER to confirm and enter next parameters. Otherwise press ZERO ESC to exit.

5.9 Restore backup

User can restore all of parameters to backup status.

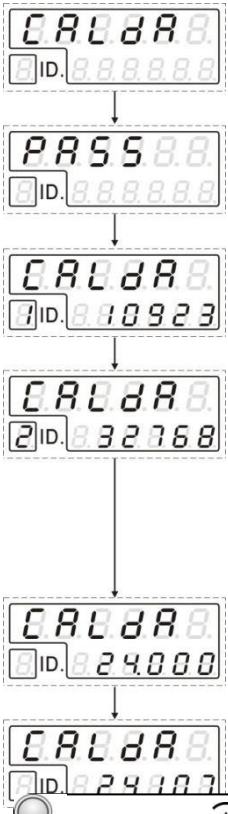
Please refer backup instruction to operate, when main display show “**rbAC**”, confirm and restore.

5.10 Analog calibration

Calibrate at 4 values：**4mA**、**12mA**、**20mA** and maximum current.

1) **4mA**：Main display shows **CAL DA,** sub-display **10923** , ID indicates **1**；

2) **12mA**：Main display shows **CAL DA,** sub-display **32768,** ID indicates **2**；
3) **20mA**：Main display shows **CAL DA,** sub-display **54613,** ID indicates **3**；
maximum current：Main display shows **CAL DA,** sub-display **24.000**.
For example: calibrate "**12mA** output" and "Max. current" :



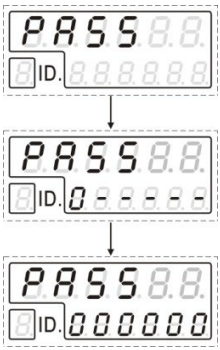
1. When stop, press MODE till main display show **CALdA.**
2. Press ENTER to input calibration password.
3. Press MODE, ID indicate from **1** to **2**, which means from **4mA** to **12mA.**
4. Calibrate when analog output is not **12mA** by multi-meter.
Press ENTER, sub-display sparkle, thenpress or MODE to change **DA** digits to adjust analog output **12mA**, press ENTER tofinish.
User also can change **DA** digits according to the highest digit: Press OPTION when calibrate，then present highest digit sparkle, so press MODE to select and press OPTION and MODE in turn to change digits.
5. If ID doesn't display, which indicate the present value is maximum analog output, user can input present analog value now.
6. Press ZERO ESC to exit.

1. Press OPTION long time in calibration, sub-display value for all of analog output restore to initial value.

5.11 Password

All initial passwords are ：**000000**。Note：Calibration password is same password as reset, backup, restore, I/O definition and analog calibration. Whencalibration password changed, others also changed.

Password operation as follows：



1. Press ENTER to enter password.

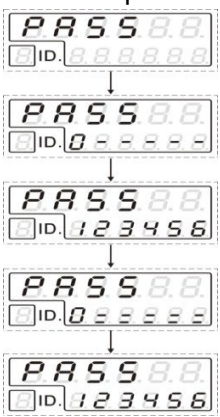
2. Press OPTION to input password.

Note: If input wrong, sub-display show "**Error**", then press ENTER to input again. If Input wrong for three times, main display show "**Error4**" and self-lock, but user can operate again when power on again.

3. Input correct password, then press ENTER to set parameters.

5.12 Password setting

User can set password in parameters when **F6.1** is"**ON**". Set operation parameters password for example:



1. Press ENTER, main display show **F6.2**, then press ENTER to enter password.

Note：If **F6.1 is OFF**，user can't enter password when press ENTER.

2. Press OPTION and MODE in turn to input password.

Note：User must input same new password twice in setting password. If not same, main display show"**Error**"one second and return to **PASS** again.

3. When input same new password twice, press ENTER to save and return **F6.2.**

6 Serial port communication

Note：Not permit to change parameters related with serial port by serial ports.

Communication protocols: **RS/ RE/MODBUS,** which can be set in operation parameter **F4.**

6.1 RS protocol

Two modes：Continue（**Cont**）/Command（**Read**）at **ASCII** code.

6.1.1 Continue (Cont)

When operation parameter **F4.3** for **RS**、**F4.4** for **Cont**，indicator send weighing data to host computer without command.

Data Format：

STX	Scale no.	R	S	000	Status	+/-	Value	CRC	CR	LF

Here：

STX —— 1bit，start character **02H**

Scale no. —— 2bits，range at **01-99**，For example: **01** is **30H 31H**

R —— 1bit，**52H**

S —— 1bit，**53H**

000 —— 3bit， **30H 30H 30H**

Status —— 1bit, **4DH:M**(stable)；**53H:S**(motion) ； **4FH: O** (overflow)

+/- —— 1bit，**+**：**2B**，-：**2D**

Value —— **7**bits, including radix point, if no, the highest bit is **0**.

CRC —— 2bits，check sum，means to add all of front digits and transform to algorism, and then transform the last two digits to **ASCII** code.

CR —— 1bit，**0DH**

LF —— 1bit，**0AH**

For example: **02 30 31 52 53 30 30 30 4D 2B 30 30 30 30 39 31 36 38 30 0D 0A**

Means：**1#** scale stable、positive data、present weight **916.**

6.1.2 Command (Read)

When operation parameter **F4.3** for **RS**、**F4.4** for **Read**，indicator send weighing data to host computer after received command.

1) Host computer read present status

Read command：

STX	Scale no.	R	S	CRC	CR	LF

Correct response：

STX	Scale no.	R	S	000	Status	+/-	Value	CRC	CR	LF

Wrong response：

STX	Scale no.	R	S	N	O	CRC	CR	LF

Here：

N —— 1bit，**4EH**

O —— 1bit，**4FH**

For example：**02 30 31 52 53 36 34 0D 0A**

Correct response：**02 30 31 52 53 30 30 30 4D 2D 30 30 30 32 30 2E 30 36 36 0D 0A**

Means：**1**# Scale、stable，Present main display **-20.0**。

2)Host computer read“Set point”

Read command：

STX	Scale no.	R	Spx	CRC	CR	LF

Correct response：

STX	Scale no.	R	Spx	DDDDDD	CR	CRC	LF

Wrong response：

STX	Scale no.	R	Spx	N	O	CRC	CR	LF

Here：

Spx —— 1bit，**1- 5** means **31H**、**32H**、**33H**、**34H**、**35H**

DDDDDD —— 6bits，set point value.

Read command on set point **1** for example:

02 30 31 52 31 33 30 0D 0A

Correct response：

02 30 31 52 31 30 30 30 37 30 30 32 35 0D 0A

Means set point 1 value is 700.

3) Host computer read radix point

Read command：

STX	Scale no.	R	P	CRC	CR	LF

Correct response：

STX	Scale no	R	P	DDDDDD	CRC	CR	LF

Wrong response:

STX	Scale no.	R	P	N	O	CRC	CR	LF

Here：

P —— 1bit，**50H**

DDDDDD —— 6bits，range at **0- 4**，means radix point，for example， **30H 30H 30H 30H 30H 34H** for 4bits radix point

Read radix point for example：**02 30 31 52 50 36 31 0D 0A**

Correct response：

02 30 31 52 50 30 30 30 30 30 31 35 30 0D 0A

Means: **1#** scale radix point 1bit.

4) Host computer read operation parameters

Read command：

STX	Scale no.	R	F	Parameters	0	CRC	CR	LF

Correct response：

STX	Scale no.	R	F	Parameters	0	DDDDDD	CRC	CR	LF

Wrong response：

STX	Scale no.	R	F	N	O	CRC	CR	LF

Here：

F —— 1bit，**46H**

Parameters —— 3bits**,** for example: digit filter **F1.5** for **31H**

35H 30H

0 —— 1bit，**30H**

DDDDDD —— 6bits，operation parameter data

Read command operation parameter **F1.5** for example:

02 30 31 52 46 31 35 30 30 34 39 0D 0A

Correct response：

02 30 31 52 46 31 35 30 30 30 30 30 30 30 34 34 31 0D 0A

Means: **1#** scale F**1.5** is 4.

5) Host computer write set point value

Write command：

STX	Scale no.	W	Spx	DDDDDD	CRC	CR	LF

Correct response：

STX	Scale no.	W	Spx	O	K	CRC	CR	LF

Wrong response：

STX	Scale no.	W	Spx	N	O	CRC	CR	LF

Here：

W —— 1bit，**57H**

Spx —— 1bit，**1- 5** means **31H**、**32H**、**33H**、**34H**、**35H**

DDDDDD —— 6bits，set point value

K —— 1bit，**4BH**

Write command set point **1** at **1500 on** #1 scale for example:

02 30 31 57 31 30 30 31 35 30 30 32 39 0D 0A

Correct response ：

02 30 31 57 31 4F 4B 38 39 0D 0A

Means: #1 scale have saved written data.

6）) Host computer write operation

parameters Write command：

STX	Scale no.	W	F	Parameters	0	DDDDDD	CRC	CR	LF

Correct response：

STX	Scale no.	W	F	O	K	CRC	CR	LF

Wrong response：

STX	Scale no.	W	F	N	O	CRC	CR	LF

Here：

W —— 1bit，**46H**

Parameters —— 3bits，for example, digit filter **F1.5 31H**

35H 30H

O —— 1bit，**30H**

DDDDDD —— 6bits，operation parameter value

Write command **F1.5** at **7** on #1 scale for example:

02 30 31 57 46 31 35 30 30 30 30 30 30 37 34 39 0D 0A

Correct response：**02 30 31 57 46 4F 4B 31 30 0D 0A**

Means: #1 scale has saved **F1.5** at **7**.

7）Host computer zero calibration with weights

Write command：

STX	Scale no.	C	Z	CRC	CR	LF

Correct response：

STX	Scale no.	C	Z	O	K	CRC	CR	LF

Wrong response：

STX	Scale no.	C	Z	N	O	CRC	CR	LF

Here：

C —— 1bit，**43H**

Z —— 1bit，**5AH**

Write command zero calibration with weights on #1 scale for example: **02 30 31 43 5A 35 36 0D 0A**

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

Means command has been performed correctly. 8

）Host computer zero calibration without weights

Write command：

STX	Scale no.	C	Y	DDDDDD	CRC	CR	LF

Correct response：

STX	Scale no.	C	Y	O	K	CRC	CR	LF

Wrong response：

STX	Scale no.	C	Y	N	O	CRC	CR	LF

Here：

Y —— 1bit，**59H**

DDDDDD —— 6bits，related zero millivolt，fixed 3bit radix point.

For example：Send **1.500mA** as zero calibration to #1 scale

02 30 31 43 59 30 30 31 35 30 30 34 39 0D 0A

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

Means data has been saved in #1 scale.

9）Host computer calibrate radix point

Write command：

STX	Scale no.	C	P	Radix point	CRC	CR	LF

Correct response：

STX	Scale no.	C	P	O	K	CRC	CR	LF

Wrong response：

STX	Scale no.	C	P	N	O	CRC	CR	LF

Here：

P —— 1bit，**59H**

Radix point —— 1bit，range at **0~4**

For example: calibrate radix point 3 on #1 scale

02 30 31 43 50 33 39 37 0D 0A

Correct response: **02 30 31 43 50 4F 4B 30 30 0D 0A**

Means: Data has been saved in #1 scale.

10 Host computer calibrate minimum division and maximum capacity

Write command：

STX	Scale no.	C	M	DD	DDDDDD	CRC	CR	LF

Correct response：

STX	Scale no.	C	M	O	K	CRC	CR	LF

Wrong response：

STX	Scale no.	C	M	N	O	CRC	CR	LF

Here：

M —— 1bit，**4DH**

DD —— 2bits，division **1**、**2**、**5**、**10**、**20**、**50**

DDDDDD —— 6bits，maximum capacity

For example: Send division 1 and maximum capacity 10000 to #1 scale.

02 30 31 43 4D 30 31 30 31 30 30 30 30 32 39 0D 0A

Correct response：**02 30 31 43 4D 4F 4B 39 37 0D 0A**

Means: Data has been saved in #1 scale.

11) Host computer gain calibration with weights

Write command：

STX	Scale no.	C	G	DDDDDD	CRC	CR	LF

Correct response：

STX	Scale no.	C	G	O	K	CRC	CR	LF

Wrong response：

STX	Scale no.	C	G	N	O	CRC	CR	LF

Here：

G —— 1bit，**47H**

DDDDDD —— 6bits，weights value

Send command gain calibration to #1 scale for example:

02 30 31 43 47 30 31 30 30 30 30 32 36 0D 0A

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

Means: Written **10000** have been saved in #1 scale.

12）Host computer gain calibration without weights

Write command：

STX	Scale no.	C	L	$D_1D_1D_1D_1D_1D_1$	$D_2D_2D_2D_2D_2D_2$	CRC	CR	LF

Correct response：

STX	Scale no.	C	L	O	K	CRC	CR	LF

Wrong response：

STX	Scale no.	C	L	N	O	CRC	CR	LF

Here：

L —— 1bit，**4CH**

$D_1D_1D_1D_1D_1D_1$ —— 6bits，gain millivolt

$D_2D_2D_2D_2D_2D_2$ —— 6bits，weight value

For example：Calibrate **4.110mA** as **10000**

02 30 31 43 4C 30 30 34 31 31 30 30 31 30 30 30 30 32 35 0D 0A

Correct response：**02 30 31 43 4C 4F 4B 39 36 0D 0A**

Means：Written data has been saved in #1 scale.

13）Host computer zeroing operation

Write command：

STX	Scale no.	C	C	CRC	CR	LF

Correct response：

STX	Scale no.	C	C	O	K	CRC	CR	LF

Wrong response：

STX	Scale no.	C	C	N	O	CRC	CR	LF

Zeroing operation on #1 for example：

02 30 31 43 43 33 33 0D 0A

Correct response：**02 30 31 43 43 4F 4B 38 37 0D 0A**

Means zeroing operation has been performed correctly.

6.2 RE protocols

Two modes：Continue (**Cont**)/ command (**Read**).

Support all of data format in parameters **F4.5; ASCII** code.

6.2.1 Continue mode (**Cont**)

When operation parameters **F4.3** for **RE**、**F4.4** for **Cont,** indicator send data to host computer without any command.

Data format as follows:

Status	,	GS	,	Sign	Value	Unit	CR	LF

Here：

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

, —— 1bit，list separator **2CH**

GS —— 2bits，**47H 53H**

Sign —— 1bit，**2BH**（+）、**2DH**（-）

Value—— 7bits，including decimal point，if no, the highest bit is **0**

Unit —— 2bits，**Kg 4BH 67H**

CR —— 1bit，**0DH**

LF —— 1bit，**0AH**

For example：Indicator sends following data format:

53 54 2C 47 53 2C 2B 30 31 31 2E 31 32 30 4B 67 0D 0A

Means ：stable、positive data、present weight value is **11.120kg**

6.2.2 Command mode (Read)

When operation parameters **F4.3** for **RE**、**F4.4** for **Read**，indicator send present data to host computer only after received command **.**

Data format as follows:

R	E	A	D	CR	LF

Here：

R —— 52H

E —— 45H

A —— 41H

D —— 44H

CR —— 0DH

LF —— 0AH

Response data format is same as data format in continue mode.

For example

Command： **52 45 41 44 0D 0A**

Response： **53 54 2C 47 53 2C 2B 30 31 31 2E 31 32 30 4B 67 0D 0A**

Means：stable、positive data、present weight value is **11.120kg.**

6.3 MODBUS protocol

6.3.1 Communication mode

MODBUS communication by two mode：**RTU** and **Asc**。

When parameter **F4.4** is **RTU**，every 8-bit byte of the message are divided into 2pcs of 4-bit hexadecimal characters to transmit at binary code. Data format：**8- E-1**，**8- O-1**，**8- n-1**，**8- n-2**。

When parameter **F4.4** is **ASCII**，every 8-bit byte of the message is transmitted as 2pcs **ASCII** characters at **ASCII** code, which can support all of data format in parameter **F4.5.**

6.3.2 MODBUS communication address

PLC address	Display address	Description
The following items are only-read register(code **0x03**)		
40001	**0000**	Present weight value(4bits including sign characters, the high bit is in the front)
40002	**0001**	
40003	**0002**	**D0**（**0** stable、**1** unstable）；**D1**（**0** normal 、 **1** overflow ）； **D2** （ **0** none-zero、**1** zero） **D4**（**0** positive sign、**1** negative sign）；**D5** （ **0 sp1** ineffective 、 **1 sp1** effective）；**D6**（**0 sp2** ineffective、**1 sp2** effective）；**D7**（**0 sp3** ineffective、**1 sp3** effective ）； **D8** （ **0 sp4** ineffective、**1 sp4** effective）； **D9** （ **0 sp5** ineffective 、 **1 sp5** effective）；**D10**（**0 sp6** ineffective、**1 sp6** effective）；

40004 …... 4007	**0003 …… 0006**	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**）		
40008	**0007**	Automatically zeroing when power on.（**F1.1**）
40009	**0008**	Zero tracking range（**F1.2**）
40010	**0009**	Zeroing range（F**1.3**）
40011	**0010**	Stable range（F**1.4**）
40012	**0011**	Digit filter parameters(**0-9**)（**F1.5**）
40013	**0012**	Stability filter series(**0-9**)（**F1.6**）
40014	**0013**	Analog output mode（**F3.1**）
40015	**0014**	Analog inverting input（**F3.2**）
40016	**0015**	I/O output stability（**F5.1**）
40017	**0016**	Sub-display items（F**5.2**）
40018 …… 40021	**0017 …… 0020**	Reserve （read value **0**， no any operation when write. Suggest had better not write in order to update in the future. ）
40022	**0021**	Radix point（**0- 4**）
40023	**0022**	Minimum division（ **0- 5** means **1/ 2/ 5/ 10/ 20/ 50**）
40024	**0023**	Load cell sensitivity（ **0- 1** means **2mV/V、3mV/V**）
40025 …… 40034	**0024 …… 0033**	Reserve （read value **0**， no any operation when write. Suggest had better not write in order to update in the future. ）

The following items are four bytes and available to read and write(writing code **0x10**，read code **0x03**）		
0031-0032	**0030-0031**	Maximum capacity(max.capacity≤mini. division×**30000**)
0033-0034	**0032-0033**	Zero calibration with weights Write **0001H** to take present weight as zero when weight value is stable； Return present millivolt at zero when read.
40035-40036	**0034-0035**	Gain calibration with weights Write present weight value according to present millivolt； Return present millvolt at present weight value when read.
40037-40038	**0036-0037**	Zero calibration without weights Write millivolt value at zero； Return present millivolt value at zero when read.
40039-40040	**0038-0039**	Gain calibration without weights, input gain millivolt. Write gain millivolt value related gain weight, indicator save first； Return millivolt value related present weight when read.
40041-40042	**0040-0041**	Gain calibration without weights，input gain weight value（≤maximum capacity）. Write weight value related gain millivolt after writing gain millivolt first, gain calibration in this register by both of weight and millivolt； Return **0000H** when read.

40043-40044	**0042-0043**	Set point numbers
40045-40046	**0044-0045**	Set point **1**（**F2.1**）
40047-40048	**0046-0047**	Set point **2**（**F2.2**）
40049-40050	**0048-0049**	Set point **3**（**F2.3**）
40051-40052	**0050-0051**	Set point **4**（**F2.4**）
40053-40054	**0052-0053**	Set point **5**（**F2.5**）
40055-40056	**0054-0055**	Upper limit（**F2.2**）only for 3 set points.
40057-40058	**0056-0057**	Moderate limit （**F2.3**） only for 3 set points.
40059-40060	**0058-0059**	Lower limit （**F2.4**）only for 3 set points.

The following items are bit read only.（read code：**0 x 0 1**）

00057	**0056**	**0**：Stable； **1**：Unstable
00058	**0057**	**0**：Normal； **1**：Overflow
00059	**0058**	**0**：None-zero； **1**：Zero
00060	**0059**	**0**：Positive sign；**1**：negative sign
00061	**0060**	**SP1** output effective（**0** ineffective；**1** effective）
00062	**0061**	**SP2** output effective（**0** ineffective；**1** effective）
00063	**0062**	**SP3** output effective（**0** ineffective；**1** effective）
00064	**0063**	**SP4** output effective（**0** ineffective；**1** effective）
00065	**0064**	**SP5** output effective（**0** ineffective；**1** effective）

00066	**0065**	**SP6** output effective（**0** ineffective；**1** effective）
00067 **…..** **00075**	**0066** **…..** **0074**	Reserve （ read value **0** ， no any operation when write. Suggest had better not write in order to update in the future. ）
The following item are available to read and write （read code：**0x01**，writing code： **0x05**）		
00076	**0075**	Zeroing (write **FF00**)；read to return fixed **0**

6.3.3 Function code

Above **Modbus** communication protocols have five function codes：**01** read coil、**03** read register、**05** force single coil、**06** preset single register、**16**(**10 Hex**) preset several registers.

◆ **01 read coil**

Inquiry：Regulate coil start and quantities.

Response：

a) Every coil state in response message is corresponding to every data in data area；**1=ON**；**0=OFF**。The **LSB** in first byte is start address in inquiry. Other coils are in seriation from lowest to highest in the byte till full of 8pcs, next byte same seriation.

b) If they are not 8 multiples, the last byte is full of zero from the remain to the highest，which byte sections indicate all of byte quantities.

For example：Inquiry weighing indicator **01** to read **40- 43** coil

1） RTU communication mode：

Inquiry command：

Address	Function code	Start address	Coil quantity	CRC parity
1byte	1byte	2byte	2byte	2byte

Correct response：

Address	**Function code**	**Account byte**	**Data area**	**CRC parity**
1byte	**1byte**	**1byte**	**1byte**	**2byte**

Inquiry command：**01 01 00 28 00 04 BD C1**

Correct response：**01 01 01 02 D0 49**（Coil **43- 40** related state：**0- 0- 1- 0**）

2） ASCII communication mode：

Inquiry command：

Start	Address	Function code	Start address	Coil quantities	LRC parity	Stop
1byte	2byte	2byte	4byte	4byte	2byte	2byte

Correct response：

Start	Address	Function code	Account byte	Data area	LRC parity	Stop
1byte	2byte	2byte	2byte	2byte	2byte	2byte

Inquirycommand:**3A 30 31 30 31 30 30 32 38 30 30 30 34 44 32 0D 0A**

Correct response：**3A 30 31 30 31 30 31 30 32 46 42 0D 0A**

（**Coil 43- 40** related status：**0- 0- 1- 0**）

◆ **03 read register**

Inquiry：Regulate to read register start address and register quantities.

Response：Regulate read register byte quantities, every register relate 2bytes respectively；Message also has data from every read register.

For example：read register **0007**、**0008**。

1） RTU communication mode：

Inquiry command：

Address	Function code	Start address	Inquiry register quantity	CRC parity
1byte	1byte	2byte	2byte	2byte

Correct response：

Address	Function code	Account byte	Register (0007) data	Register (0008) data	CRC parity
1byte	1byte	1byte	2byte	2byte	2byte

Inquiry command：**01 03 00 07 00 02 75 CA**

Correct response：**01 03 04 00 00 00 05 3A 30**（Register **0007**、**0008** respective data：**0**（**Hex：0000H**）、**5**（**Hex：0005H**）

2） ASCII communication mode：

Inquiry command：

Start	Address	Function code	Start address	Inquiry register quantity	LRC parity	Stop
1byte	2byte	2byte	4byte	4byte	2byte	2byte

Correct response：

Start	Address	Function code	Account byte	Register (0007) data	Register (0008) data	LRC parity	Stop
1byte	2byte	2byte	2byte	2byte	2byte	2byte	2byte

Inquirycommand:**3A 30 31 30 33 30 30 30 37 30 30 30 32 46 33 0D 0A**

Correct response：**3A 30 31 30 33 30 34 30 30 30 30 30 30 30 35 46 33 0D 0A**（**register 0007、0008** respective data ：**0**（**Hex：0000H**）、**5**（**Hex：0005H**）

◆ **05 force single coil**

Force：Regulate force coil address；and one normal item in force data area，regulate requested coil **ON/ OFF** state: **FF00** for **ON**，**0000H** for **OFF**，other data is ineffective to coil.

Response：Return normal response for force coil.

For example：Force weighing indicator **01, 0056** coil is **ON**

1）RTU communication mode：

Force command：

Address	Function code	Coil address	Force data	CRC parity
1byte	1byte	2byte	2byte	2byte

Correct response：

Address	Function code	Coil address	Force data	CRC parity
1byte	1byte	2byte	2byte	2byte

Force command：**01 05 00 38 FF 00 0D F7**

Correct response：**01 05 00 38 FF 00 0D F7**（Coil **0056** is **ON**）

2）ASCII communication mode：

Force command：

Start	Address	Function code	Coil address	Force data	LRC parity	Stop
1byte	2byte	2byte	4byte	4byte	2byte	2byte

Correct response：

Start	Address	Function code	Coil address	Force data	LRC parity	Stop
1byte	2byte	2byte	4byte	4byte	2byte	2byte

Force command：**3A 30 31 30 35 30 30 33 38 46 46 30 30 43 33 0D 0A**

Correct response：**3A 30 31 30 35 30 30 33 38 46 46 30 30 43 33 0D 0A（Coil0056 is ON）**

◆ **06 preset single register**

Preset：Regulate to preset single register address and data.

Response：Return normal response after register is preset.

For example：Request **0009** register in weighing indicator **01** is preset **0005H**

1）RTU communication mode：

Preset command：

Address	Function code	Preset register address	Preset data	CRC parity
1byte	1byte	2byte	2byte	2byte

Correct response：

Address	Function code	Preset register address	Preset data	CRC parity
1byte	1byte	2byte	2byte	2byte

Preset command：**01 06 00 09 00 05 99 CB**

Correct response：**01 06 00 09 00 05 99 CB**（**register 0009data**：**5**（**Hex**：**0005H**））

2）**ASCII communication mode**：

Preset command：

Start	Address	Function code	Preset register address	Preset data	LRC parity	Stop
1byte	2byte	2byte	4byte	4byte	2byte	2byte

Correct response：

Start	Address	Function code	Preset register address	Preset data	LRC parity	Stop
1byte	2byte	2byte	4byte	4byte	2byte	2byte

Preset command: **3A 30 31 30 36 30 30 30 39 30 30 30 35 45 42 0D 0A**

Correct response：**3A 30 31 30 36 30 30 30 39 30 30 30 35 45 42 0D 0A**（register **0009** data： **5**（**Hex**：**0005H**））

◆ **16**（**10 hex**）**Preset several registers**

Preset：Regulate to preset register start address and preset value.

Response：Return address, function code, start address and preset register quantity.

For example：Preset 2 registers in weighing indicator **01:** start register is **0030.** Preset value is **0001H** and **7318H 1**

）**RTU communication mode：**

Preset command：

Address	Function code	Start address	Register quantity	Account byte	Preset data	CRC parity
1byte	1byte	2byte	2byte	1byte	4byte	2byte

Correct response：

Address	Function code	Start address	Register quantity	CRC parity
1byte	1byte	2byte	2byte	2byte

Preset command：**01 10 00 1E 00 02 04 00 01 73 18 07 D5**

Correct response：**01 10 00 1E 00 02 21 CE**

2）**ASCII communication mode：**

Preset command：

Start	Address	Function code	Start address	Register quantity	Account byte	Preset data	LRC parity	Stop
1byte	2byte	2byte	4byte	4byte	2byte	8byte	2byte	2byte

Correct response：

Start	Address	Function code	Start address	Register quantity	LRC parity	Stop
1byte	2byte	2byte	4byte	4byte	2byte	2byte

Preset command：**3A 30 31 31 30 30 30 31 45 30 30 30 32**

30 34 30 30 30 31 31 43 39 36 31 38 0D 0A

Correctresponse:

3A 30 31 31 30 30 30 31 45 30 30 30 32 43 46 0D 0A

6.3.4 MODBUS communication error message

When weighing indicator check other error message except parity code(**CRC** or **LRC)**，indicator will send message to host computer, the highest in function code is **1**，which means function code from weighing indicator to host computer is added **128** based on function code from host computer(For example: read register command **03H** will be changed to **83H**).

Error code:

02: error data address；Received data address is not permitted by weighing indicator.

03: error data；Inquiry data is not permitted by weighing indicator.

For example：Host computer read coil (**0040**) by function code **03.**

Error message format：

1）RTU communication mode：

Address	Function code	Error code	CRC parity
1byte	1byte	1byte	2byte

2）ASCII communication mode：

Start	Address	Function code	Error code	LRC parity	Stop
1byte	2byte	2byte	2byte	2byte	2byte

1）RTU communication mode：

Inquiry command：**01 03 00 28 00 01 04 02**

Error response：**01 83 02 C0 F1 2**

）ASCII communication mode：

Inquiry command：**3A 30 31 30 33 30 30 32 38 30 30 30 31 44 33 0D 0A**

Error response：**3A 30 31 38 33 30 32 37 41 0D 0A**

From response message, the present error code is **02,** which means the present received data address is error, not permit by weighing indicator.

7 Error and alarm message

ERROR：Input wrong data beyond parameter range.

ERROR2：The present weight value is out of zeroing range.

ERROR3：Scale platform is not stable in zeroing.

ERROR4：Input wrong password more than 3 times.

OVER ：The load cell sign is too big in zero calibration.

UNDER：The load cell sign is too small in zero calibration.

OFL ：Overflow