GENERAL MEASURE

GM8802S-T

User's Manual

110602230002

CONTENTS

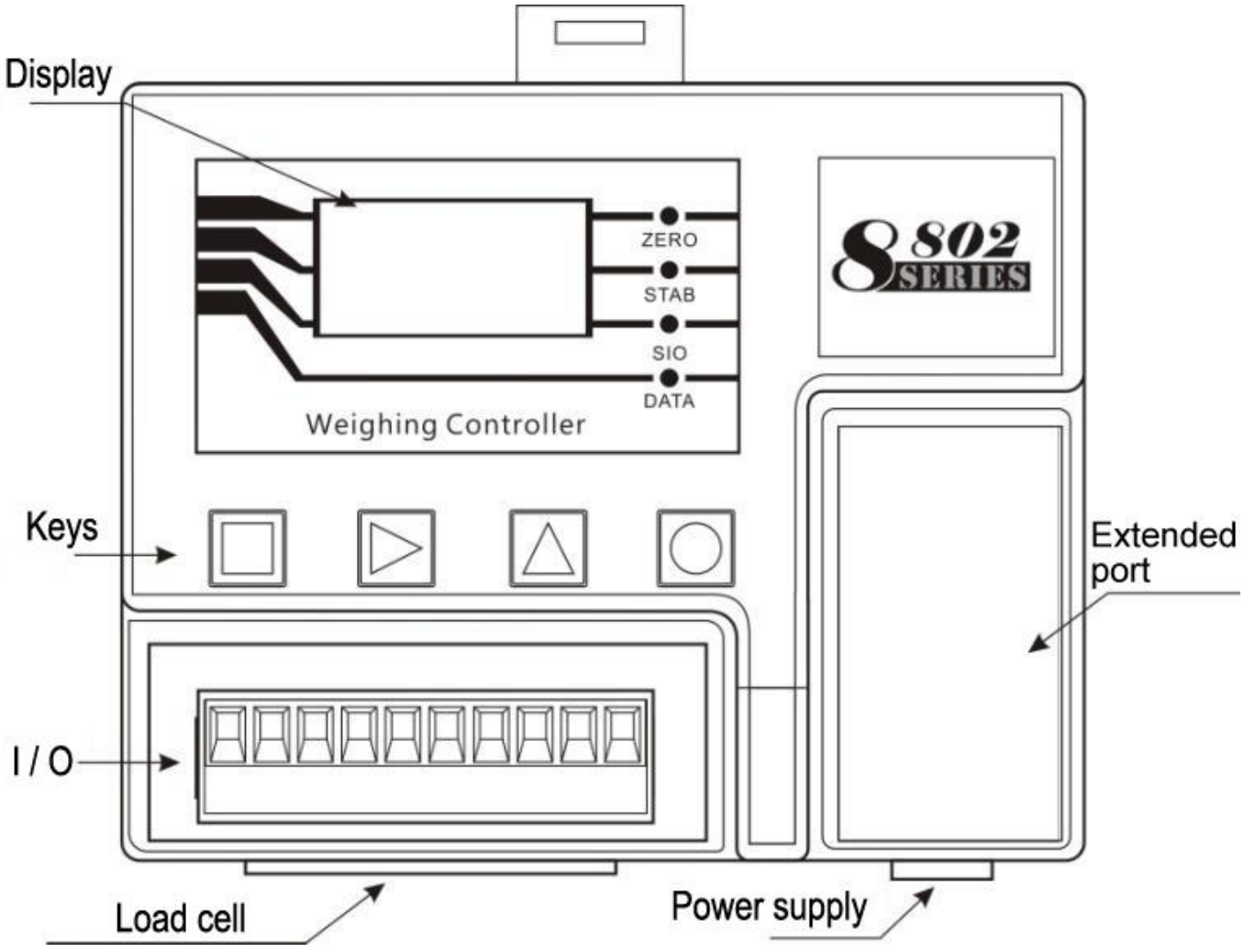
1 General description

GM8802S-F weighing indicators are specially designed for weight transmitting in industrial fields, which have features of small volume, plenty communicating commands, stable performance, easy operation and practicability, so they are widely applied to concrete and bitumen mixing equipment, commodity industry, chemical industry and feed, etc.

1.1 Features

- Small volume, economic design and easy operation
- Suitable for resistance strain gauge bridge load cell
- Front panel digital calibration
- Multilevel of digital filter
- Automatic zero -tracking
- Automatically zero when powered on
- **PROFIBUS-DP** function(optional)

1.2 Front panel



Keypad：

 : **Zero/Esc:** Clear weight value/exit from current operation.

 : **Option:** Select parameters.

 : **Function:** Set parameters or sparkle when data input.

 : **Confirm:** Set parameters or enter calibration and confirm.

Instruction lights：

- **ZERO**：Zero point，the light bright at weight range **0±1/4d.**
- **STAB**：Stable，the light bright in stable weight range.
- **SIO**：Communication，the light bright in communication by extended serial port.
- **DATA**：Communication，the light bright in communication by PRI RS port.

1.3 Technical Specifications

1.3.1 General Specification

Power supply: **DC24V ±5%**
Working temperature: **-10~40**℃
MAX humidity: **90%R.H. Without dew**
Power consumption: about **10W**
Dimension: **110×89×60**(**mm**)

1.3.2 Analog part

Power supply for load cell: **DC5V 200mA**(**MAX**)
Input resistance: **10MΩ**
Zero adjustment range: **0.02~8mV**(load cell **2mV/V**)
Input sensitivity: **0.1uV/d**
Input range: **0.02~10mV**(load cell **2mV/V**)
A/D conversion: **Sigma - Delta**
A/D rate: **120/240/480/s**
Non-linearity: **0.01% F.S**

Gain drifting: **10PPM/**℃

Maximum display precision: **1/100000**

1.3.3 Digital part

Display: **1.3inch OLED screen**

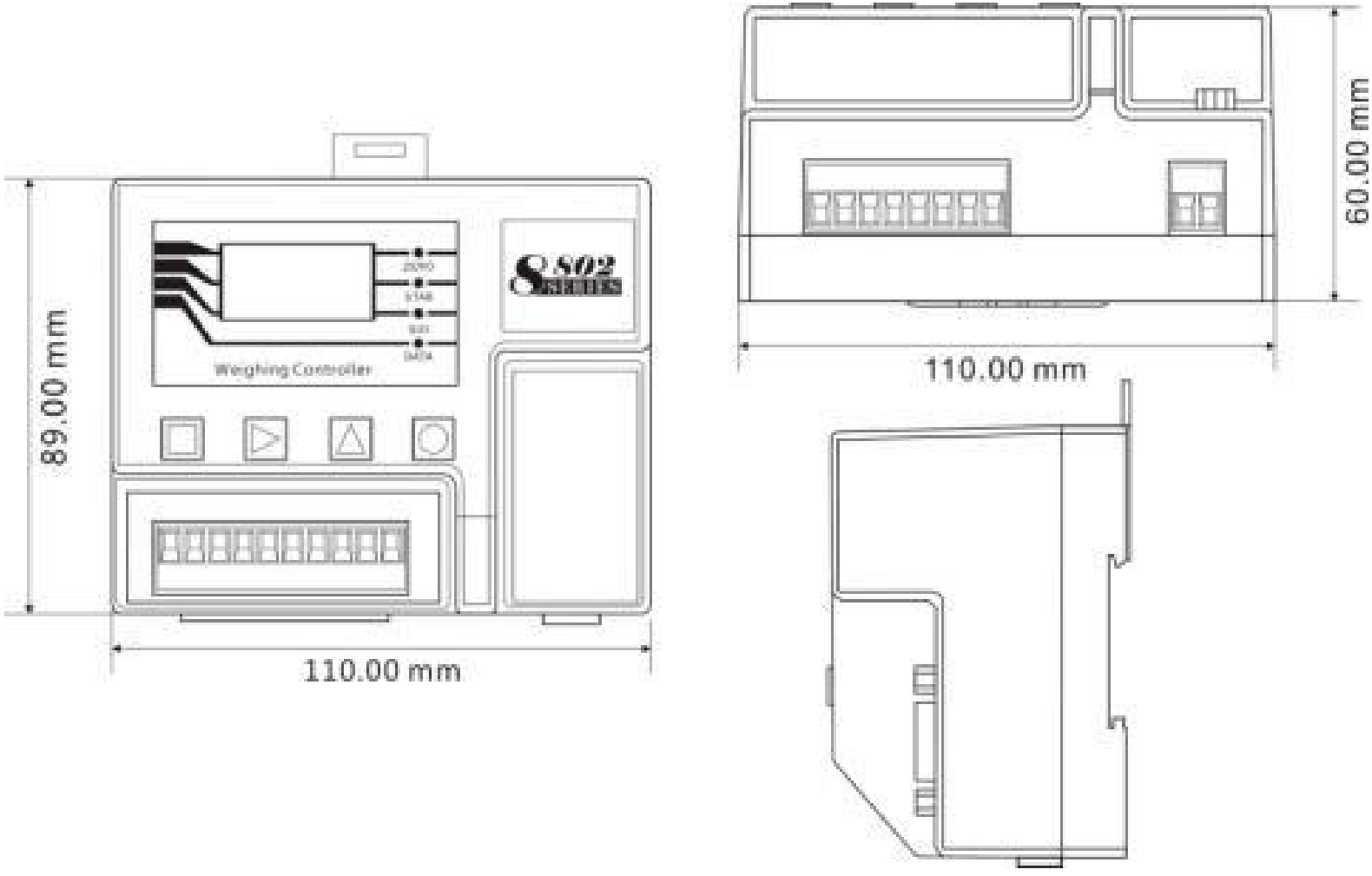
Negative data display: “**-**”

Overflow display: “**OFL**”

Position of decimal point: **5 kinds (optional)**

Keypad: **4 beep keys**

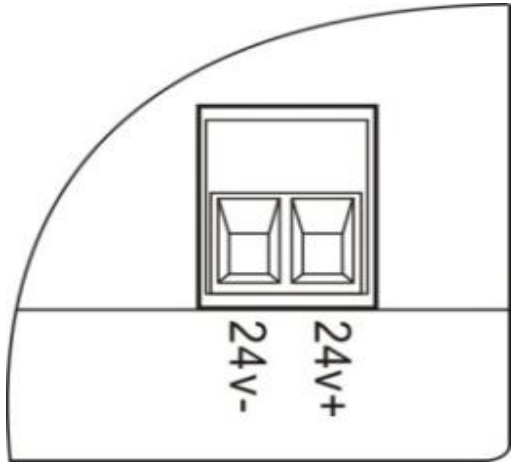
1.4 Dimensions



2 Installation and Wiring

2.1 Connection of Power Supply

GM8802S-T weighing controller power supply:DC24V:



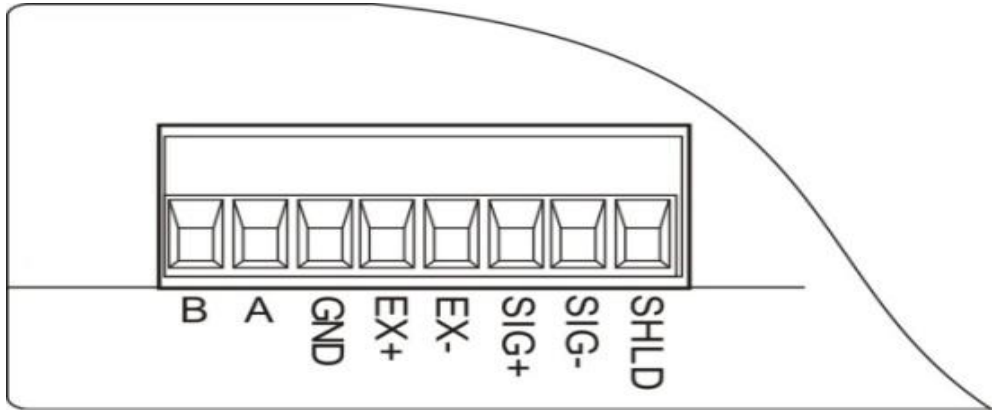
NOTE： DC 24V POWER SUPPLY !

2.2 Connection of Load Cell

GM8802S-F weighing indicator need connect with resistance strain gauge bridge load cell as follows:

Port	**EX+**	**EX-**	**SIG+**	**SIG-**	**AG1**
Definition	Excitation+	Excitation-	Signal+	Signal-	Shield

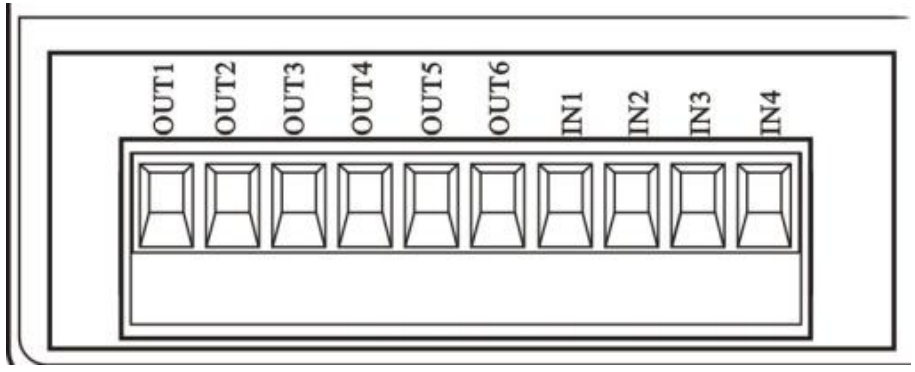
For 6-wired load cells, you must bridge the SN+ with EX+ of the load cell, then connect to EX+ port on the indicator, and bridge the SN- with EX- of the load cell, then connect to EX- port on the indicator.



1. The signals from the load cells are low voltage analog signals, which are easily affected by electro-noise, so the cables connecting load cells to indicator should use shielded cables, and not bind with other cables, especially power supply cables.
2. For the application of multi-load cell in parallel connection, the sensitivity of each load cell (mV/V) must be same.

2.3 I/O terminals

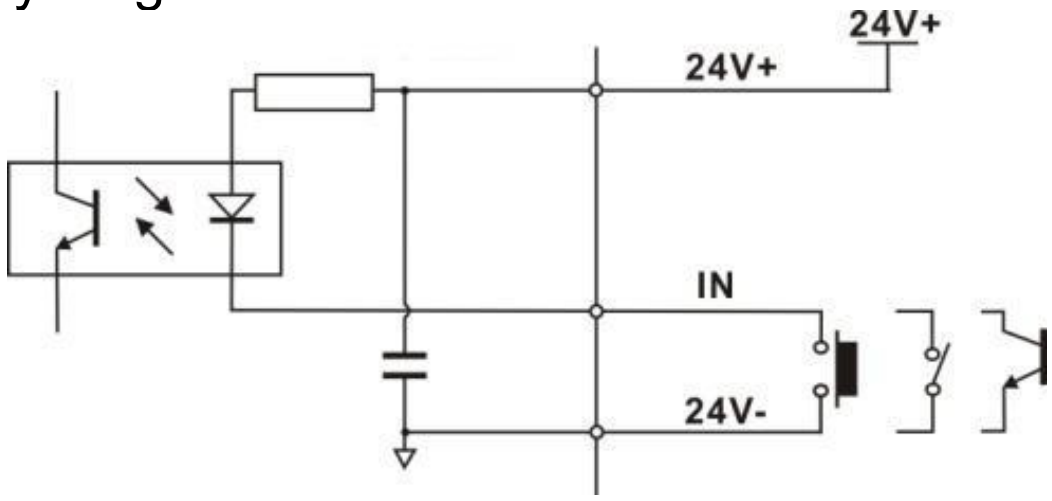
I/O terminals can be self-defined be users for easy wiring and some special application. Please refer to **4.7** for details.



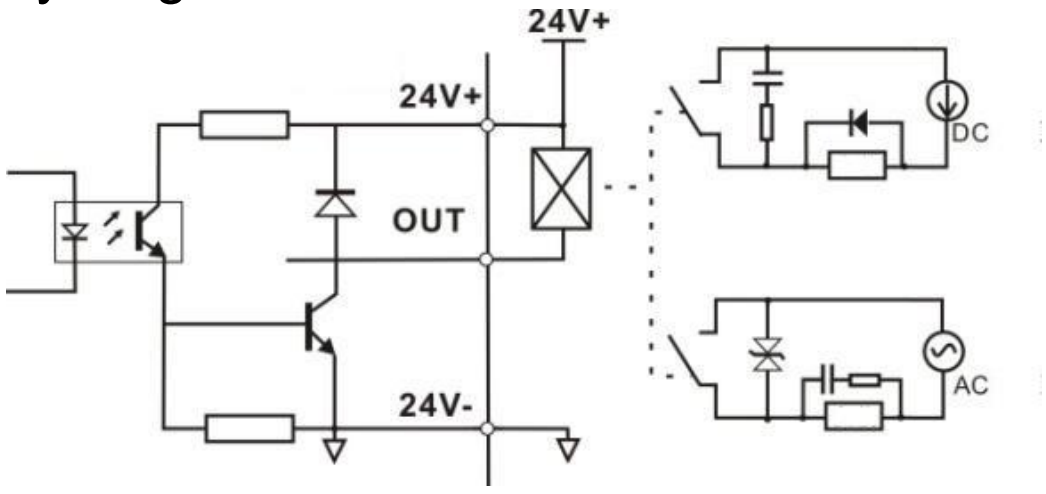
I/O default defination as follows:

Output		Input	
OUT1	Zero	IN1	Zeroing
OUT2	Stable	IN2	None
OUT3	SP1	IN3	None
OUT4	SP2	IN4	None
OUT5	SP3		
OUT6	SP4		

Input theory diagram：

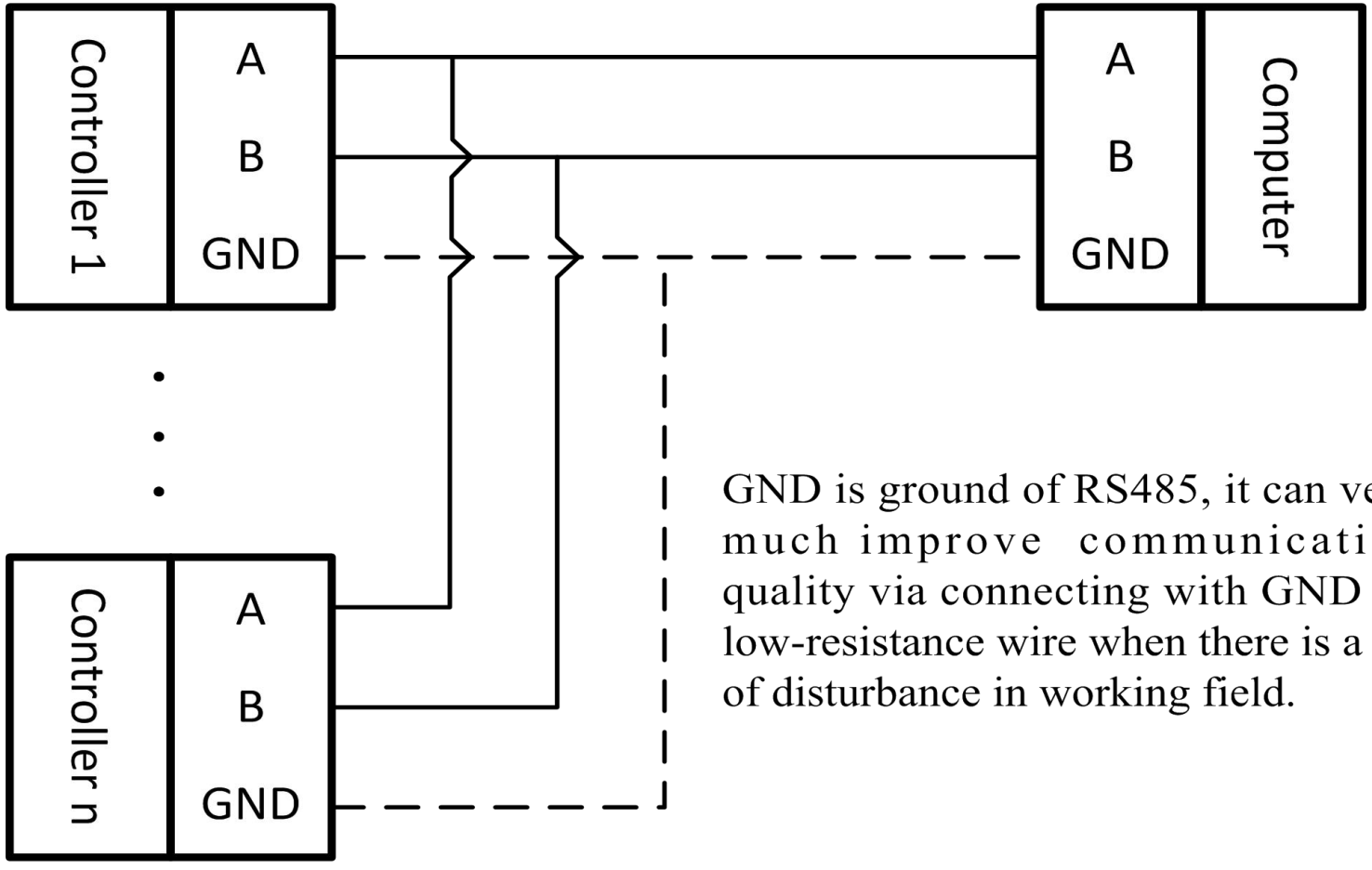


Output theory diagram：



2.4 Connection of Main Serial Port

GM8802S-T communicate by RS485 as follows:



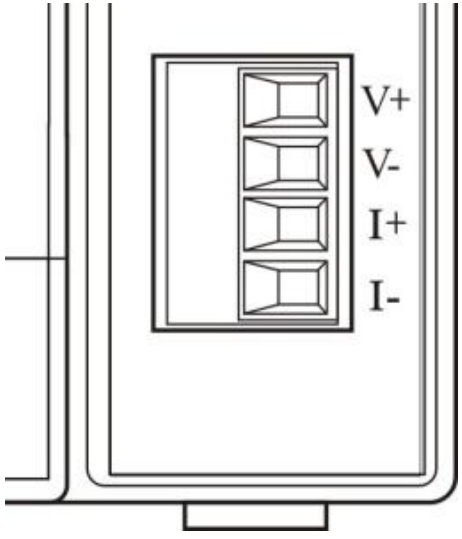
GND is ground of RS485, it can very much improve communication quality via connecting with GND by low-resistance wire when there is a lot of disturbance in working field.

2.5 Extended port

GM8802S-T Weighing controller have optional Extended port: analogue output、RS232/485 serial port、Ethernet port and PROFIBUS.

2.5.1 Analogue

Please press □ in main menue to see analogue output. Analogue output define as follows：



V +：Voltage +　　**V -**：Voltage -
I +：Current +　　**I -**：Current -

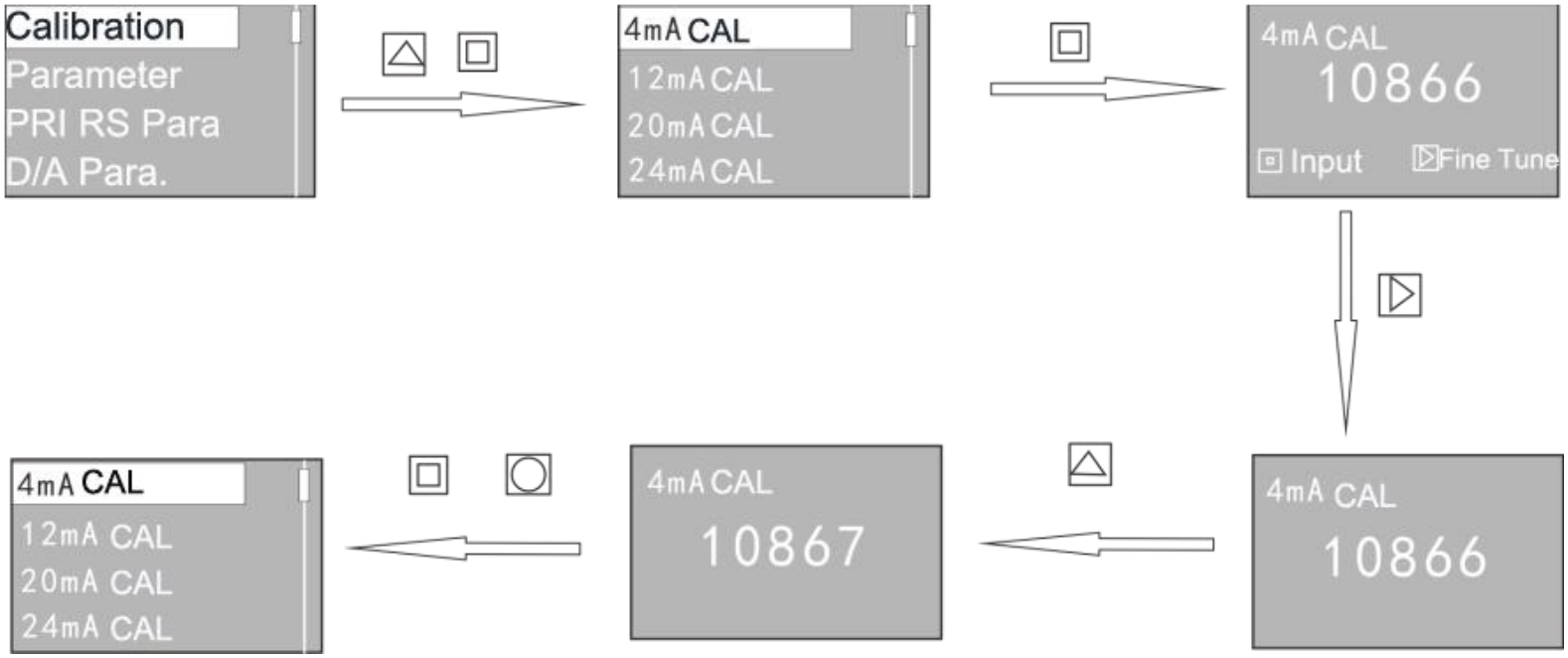
Users can select voltage output and current output as following parameters:

⑴ Voltage output: 0~5V、0~10V

⑵ Current output: 4~20mA、0~20mA、0~24mA

⑶ Self defination by users

Memo: **GM8802S-T** Weighing controller have been calibrated for analogue output in our manufactory, so users don't need calibrate again. If error happened, users can calibrate as follows：



Explanation：

①Press △ and □ at same time in working parameter interface to enter analogue calibration interface after 3 seconds；

②Press □ to enter **4mA** calibration， then the weighing

controller will display present **DA** code；

③Measure present analogue output by a multimeter， if the value is **4mA**， then press  to exit； If not， press  to adjust **DA** code to make the multimeter get **4mA**， then press  to finish **4mA** calibration； （For more deviation value output，press  to input **DA** code）

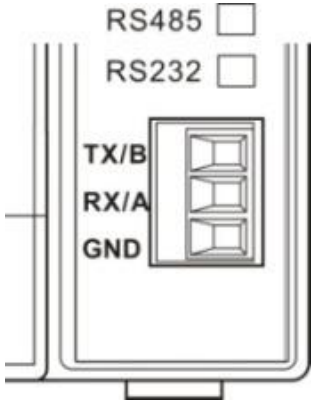
④Press  to exit after finished；then calibrate **12mA**、**20mA** in same way as **4mA** calibration；

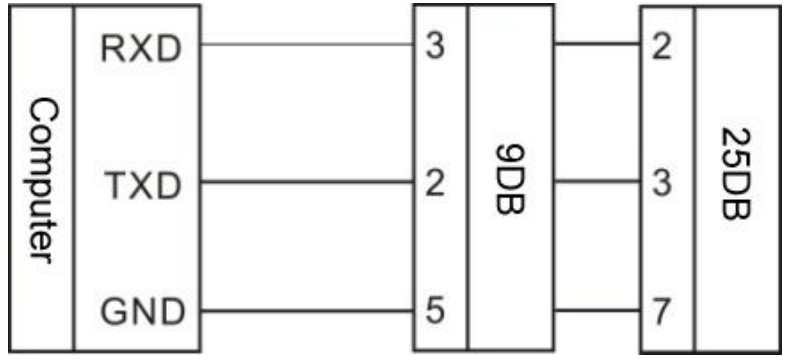
⑤**24mV** calibration， measure present analogue output by a multimeter, then input value. Press  to finish calibration.

Memo: For any analogue output, calibrate as above 4 point.

2.5.2 Serial output

GM8802S-T Weighing controller can have **RS232/485 serial output**：





RS232 connection

2.5.3 Ethernet

GM8802S-T Weighing controller can have Ethernet to communicate with host computer.

Users can set **IP** address in promoters to communicate by Modbus **TCP.**

If users need change the address, users need press  to select and press  to enter, then press  to move and press  to change address.

The yellow light will bright with Ethernet line inserted and the green light will sparkle for communication； **SIO** light will bright to display the state.

2.5.4 PROFIBUS

GM8802S-T Weighing controller can have **PROFIBUS-DP** to connect with host lines.

2.5.4.1 I/O defination

GM8802S-T Weighing controller state can be read and controlled by these **I/O: 8DI**、**8DO** 和 **2AI**

Read state:

DI0：Stable state，0 unstable，1 stable

DI1：Overflow state，0 normal，1 overflow

DI2：Zero state，0 non-zero，1 zero

DI3-DI6：reserved

DI7：value sign，0 positive，1 negative

Set state:

DO0：Zeroing（1 effective）

DO1-DO2：reserved

DO3-DO7：reserved

Read weight:

AI0：Present weight value high two bytes

AI1：Present weight value low two bytes

2.5.4.2 **GSD** file

Please download directly from www.szgmt.com

3. Data input

Input parameters, set parameters or enter to confirm by keys:

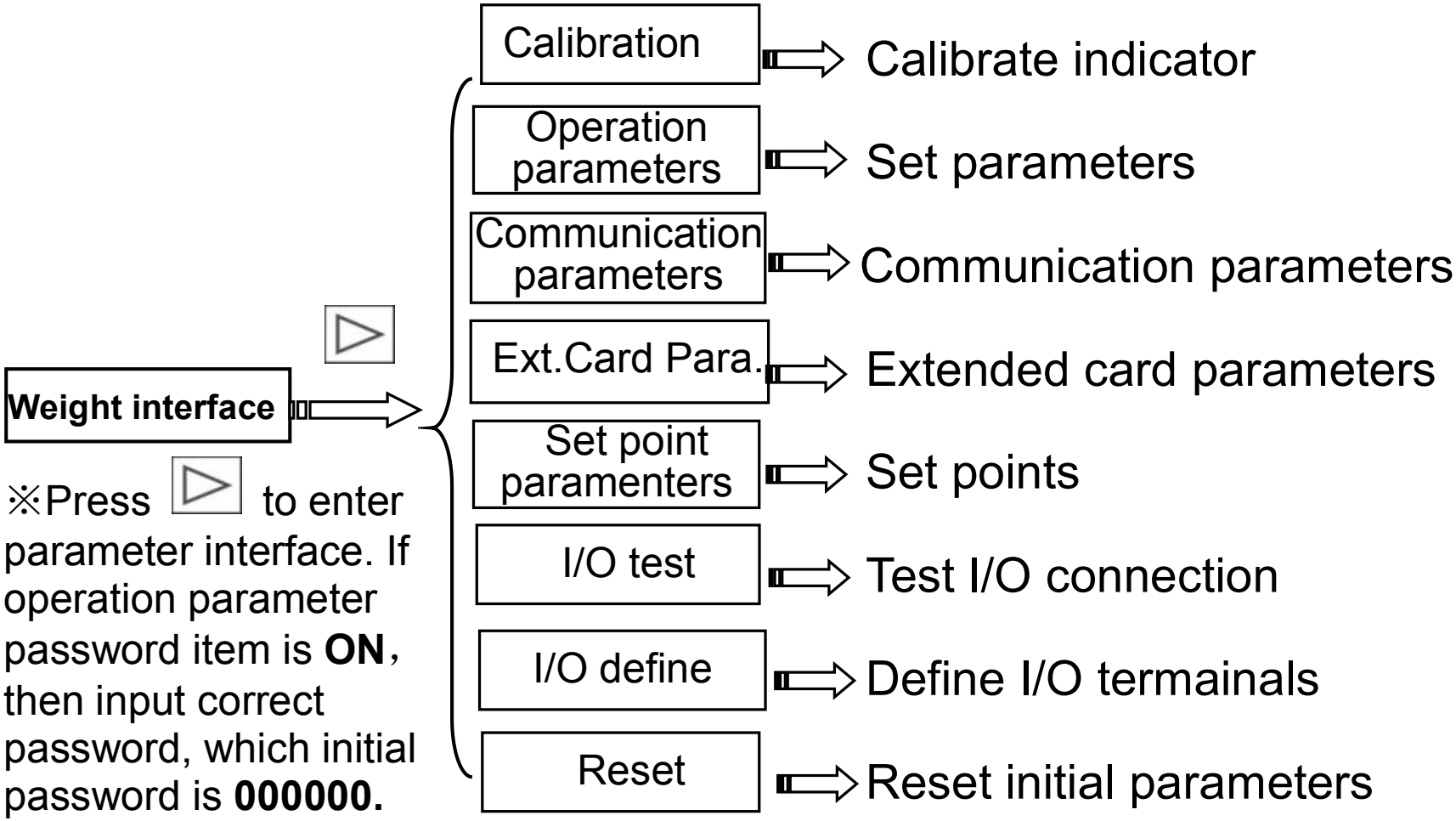
 ：Exit present parameter setting status.

 : Up to move cursor to select parameters or change sparkle digits to set parameters.

 ： Down to move cursor to select parameters or change sparkle digits to set parameters.

 ： Save and exit parameter setting interface after selected parameters.

4. Set parameters



※Press ▷ to enter parameter interface. If operation parameter password item is **ON**, then input correct password, which initial password is **000000.**

4.1 Calibration

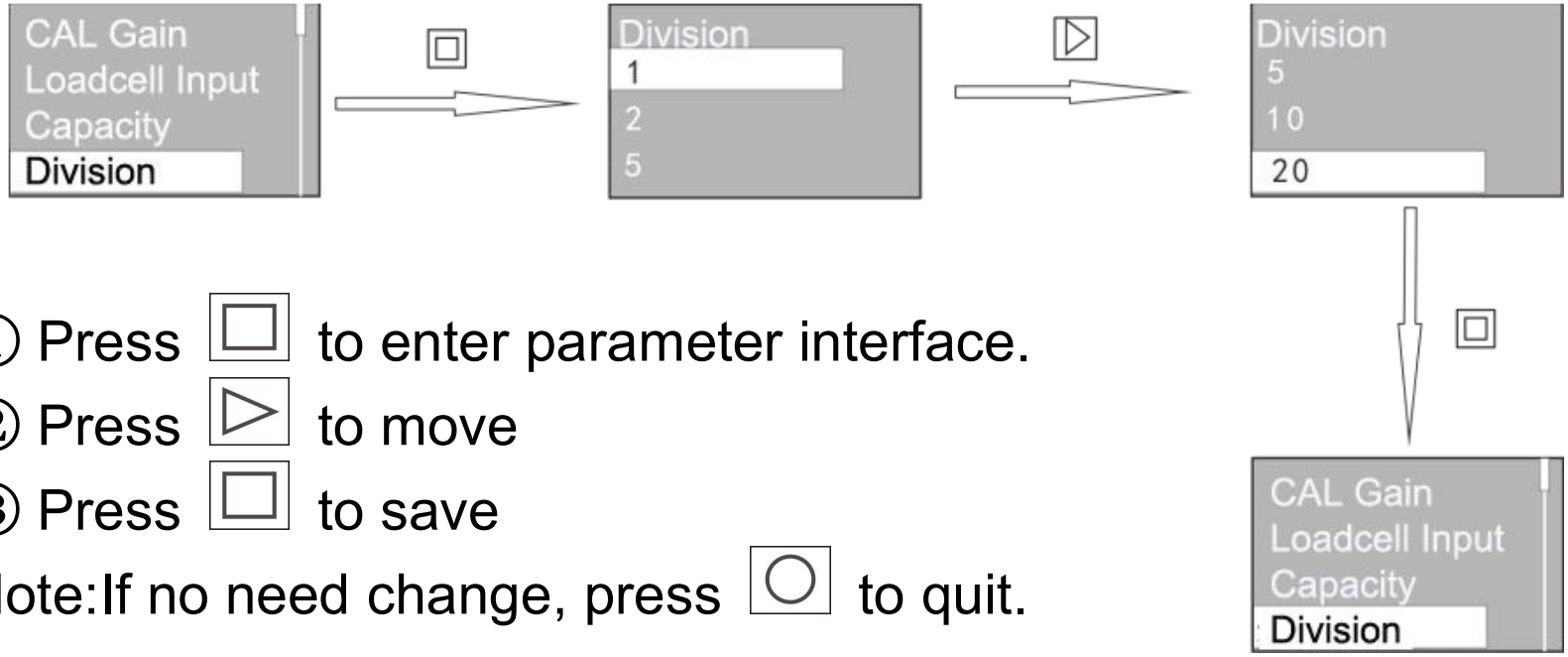
GM8802S-T weighing controller must be calibrated for first time, or the preset parameters may no longer meet user needs, or any part of the weighing system has been changed.

4.1.1 Parameter table

Parameter	Initial	Description
CAL Zero		Zero calibration
CAL Gain		Gain calibration
Loadcell Input		Review Loadcell VOLT and Gain VOLT
Max. Capacity	10000	Input weight ≤ Min. Division×100000
Min. Division	1	1、2、5、 10、20、50(optional)
Decimal point	0	0、0.0、0.00、0.000、0.0000(optional)
Unit	kg	g, kg, t
A/D speed	120	120/s、240/s、480/s
Online CAL ON?	OFF	ON；OFF：
CAL Password	000000	Calibrate password

4.1.2 Set parameters

Press“calibration”parameter to input password by ▷ and △（initial password is **000000**）.



① Press □ to enter parameter interface.

② Press ▷ to move

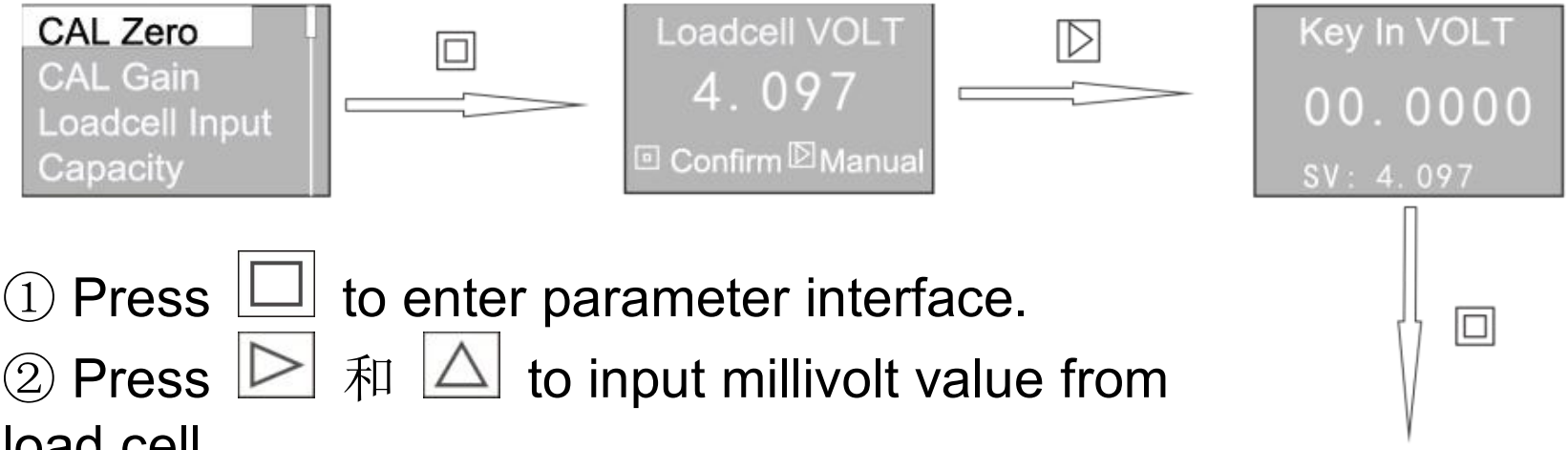
③ Press □ to save

Note:If no need change, press ○ to quit.

Memo: Press ▷ and △ to input digits.

4.1.3 Zero calibration

There are two ways to calibrate: standard or millivolt calibration, but users must calibrate by standard calibration for first time and record millivolt output in zero point for future use in millivolt calibration.



① Press □ to enter parameter interface.

② Press ▷ 和 △ to input millivolt value from load cell.

③ Press □ to enter and exit.

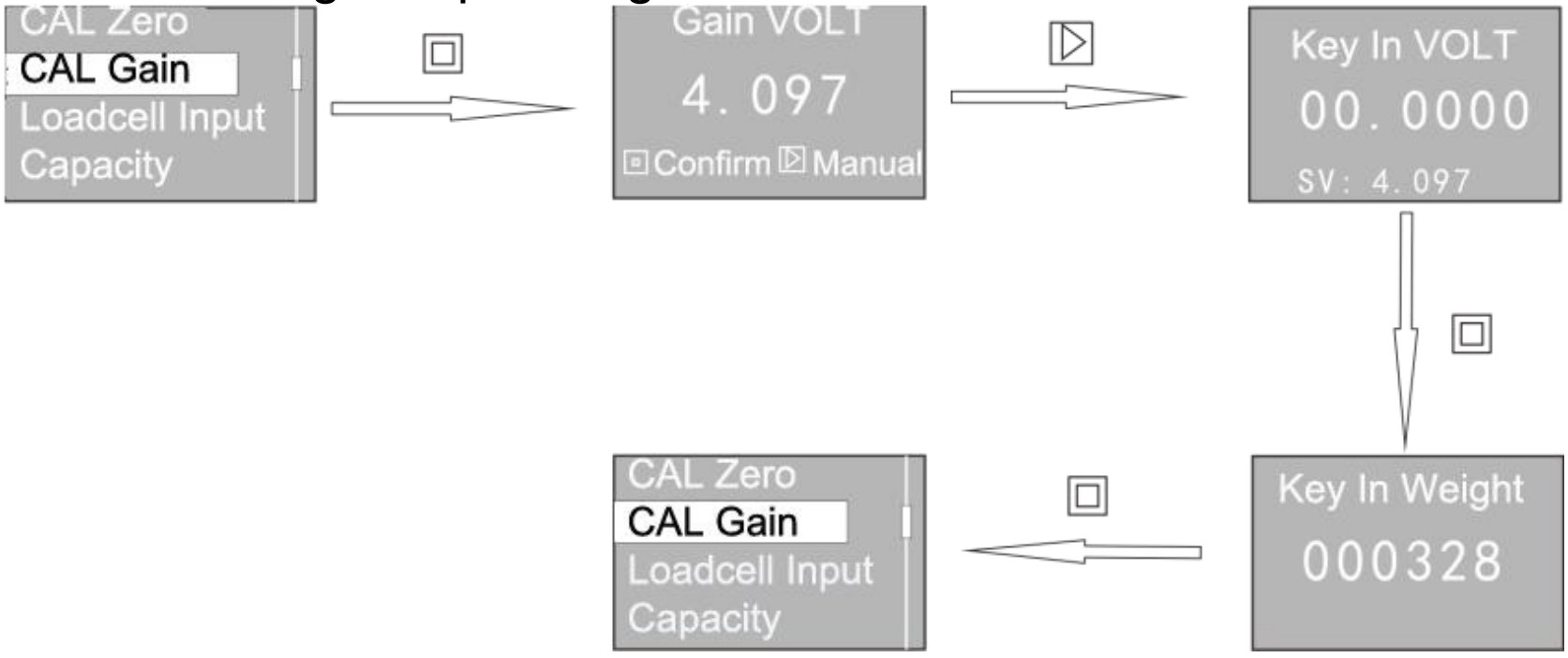
Note: Users must calibrate again for any changes in load cells, indicators or weighing equipment.

4.1.4 Gain calibration

There are two ways：gain calibration and gain weight.

Gain calibration : Input gain millivolt from weights

Gain weight: input weight value



Record：

times	Zero millivolt (**mV**)	Gain millivolt (**mV**）	Weights	Date	Memo
1					
2					
3					

4.2 Parameters

4.2.1 parameter table

Item	Para.	Initial	Illustration
Working parameters			
Int Zero ON/OFF	ON / OFF	**OFF**	Automatic zeroing when power on；If the weight ＞ max.capacity × zeroing range， the controller will display"**Err 2**"alarm； If the scale is unstable， the controller will display "**Err 3**" alarm.
Zero TRC Range	**0-9**	**0**	Zero tracking range（**0**～**9d** optional）

Stable Range	**0-9**	**0**	Stable range（**1~9d** optional）
Zero Limits	**0-99**	**50**	Zeroing range（**0~99%** of max.capacity）。If weight >max.capacity×zeroing range，the controller will display“**Err2**”alarm.
Filter STRG	**0-9**	**5**	Filter strength（**0~9** optional） **0**：none；**9**：strongest
VC Filter STRG	**0-9**	**0**	Stable filter strength（**0~9** optional） **0**：none；**9**：strongest
OLED Lock Time	**0、1、2、5、10**	**0**	**0** to bright all the time； Others to shut off screen after some time
PASSWD ON/OFF	ON/OFF	OFF	Password for parameters：
Password		**000000**	Initial password **000000**
PRI RS Parameters			

ID	**01~99**	**01**	Scale no.
Baud rate	**1200~ 115200**	**9600**	Serial port baud rate: **1200,2400,4800,9600,19200,38400,57600,115200**
Comm. Mode	**Modbus-RTU/ Modbus-ASCII/RS read/ continue /Ext. Display**	**Modbus-rtu**	**Modbus-RTU：MODBUS by RTU（B）** **Modbus-ASCII：MODBUS by ASCII（B）** **RS read/continue** **Ext.Display： Baud rate 38400**，data form **8-n-1 to** communite with **GM8891D**
Modbus Mode	Hi-Lo / Lo-Hi	Hi-Lo	Data display

Data form	**7-E-1/ 7-O-1/ 7-n-2/ 8-E-1/ 8-O-1/ 8-n-1/ 8-n-2**	**8-E-1**	**7-E-1**：**7 digits**，Even，**1** Stop； **7-O-1**：**7 digits**，Odd，**1** Stop； **7-n-2**：**7 digits**，None，**2** Stop； **8-E-1**：**8 digits**，Even，**1** Stop； **8-O-1**：**8 digits**，Odd，**1** Stop； **8-n-1**：**8 digits**，None，**1** Stop； **8-n-2**：**8 digits**，None，**2** Stop；
Frame Interval	**None/10 /20/30/ 40/50**	None	**10~50**：Frame interval among **10~50 ms.**
Set point parameters			
O/P Req Stable	ON/OFF	OFF	If ON, set point request stable.
Min Last Time	**0~99**	**5**	**0~9.9** second，keep same time if I/O output changed.
SP0	**××××××**	**0**	Set point **1**（mini weight value）
SP**1**	**××××××**	**0**	Set point **2**

SP**2**	**××××××**	**0**	Set point **3**
SP**3**	**××××××**	**0**	Set point **4**
SP**4**	**××××××**	**0**	Set point **5**（max. weight value）
Profibus parameters			
Write Enable	ON/OFF	ON	**Profibus** write enable function
ID	**01-99**	**01**	Scale no.
Serial port parameters			
ID	**01-99**	**01**	Scale no.
Baud rate	**4800~ 115200**	**9600**	Serial port baud rate: **4800,9600,19200,38400,57600,115200**
Comm. Mode	**Modbus-RTU/ Modbus-ASCII/RS read/ continue**	**Modbus - RTU**	**Modbus-RTU：MODBUS by RTU（B）** **Modbus-ASCII：MODBUS by ASCII（B）** **RS read/continue**

Modbus Mode	Hi-Lo / Lo-Hi	Hi-Lo	Data display only for **Modbus-RTU / Modbus-ASCII**
Data form	**7-E-1/ 7-O-1/ 7-n-2/ 8-E-1/ 8-O-1/ 8-n-1/ 8-n-2**	**8-E-1**	E: Even O: Odd N: None
Frame Interval	**None/10/ 20/30**	None	Frame interval time
Analogue parameters			
Working mode	**4-20/0-20 /0-24/0-5/ 0-10 / User Define**	**4-20**	**4-20: 4-20mA**; **0-20: 0-20mA**; **0-24: 0-24mA**; **0-5: 0-5V**; **0-10: 0-10V;** User Define

User Define	Current / Voltage	Current	Change in weight display interface
CFG Min Value	**0-24/0-10**	**0**	Current: **0-24**； Voltage: **0-10**
CFG Zero Value	**0-24/0-10**	**0**	Current: **0-24**； Voltage: **0-10**
CFG Span	**0-24/0-10**	**0**	Current: **0-24**； Voltage: **0-10**
CFG Max Value	**0-24/0-10**	**0**	Current: **0-24**； Voltage: **0-10**

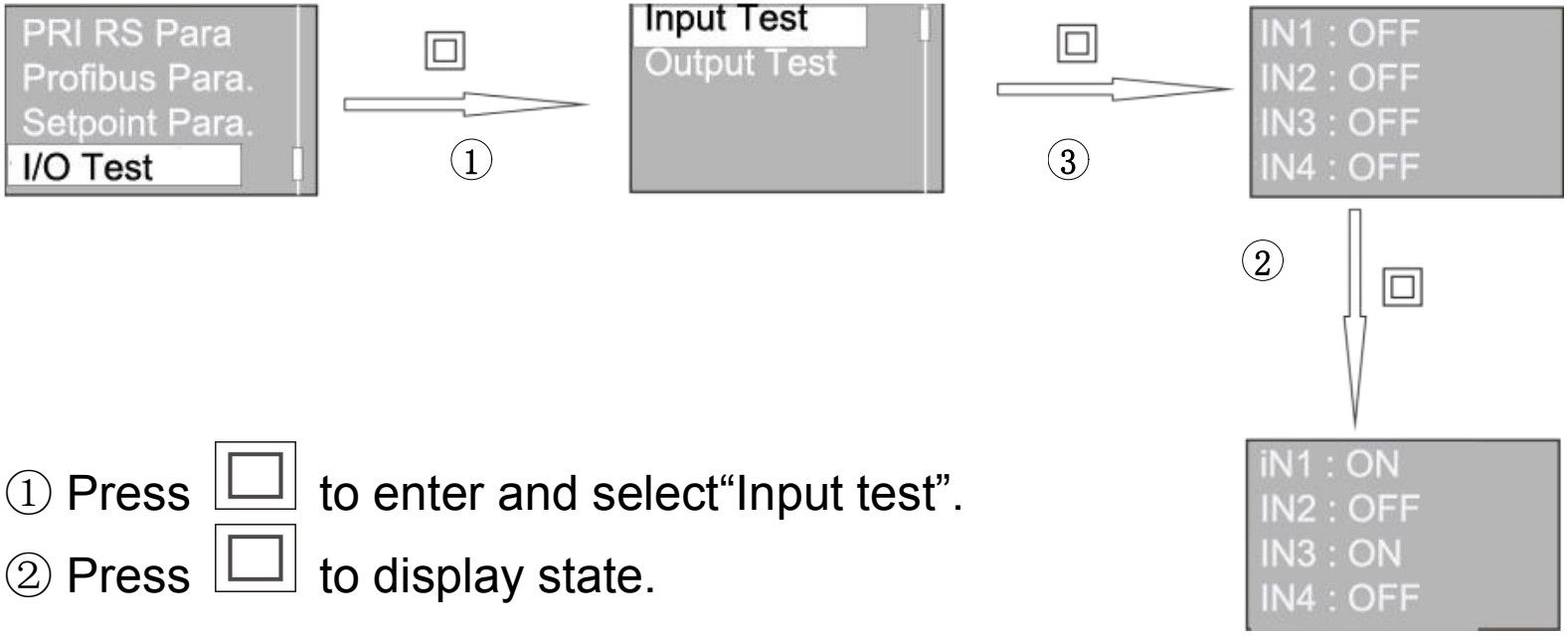
Ethernet(Modbus TCP)			
Port No.	××××××	**502**	Port for communication
IP Address	×××.×××. ×××.×××	**192.168.101.208**	**IP** address for communication
MAC	**BC：66：41 9×：××：××**	**BC：66：41 90:00: 00**	Address

Note: Users can select parameters in white background and press  to move, the press  to save.

Users also can input parameter value by  to move and  to adjust, then press  to save.

4.3 I/O Test

Input test:



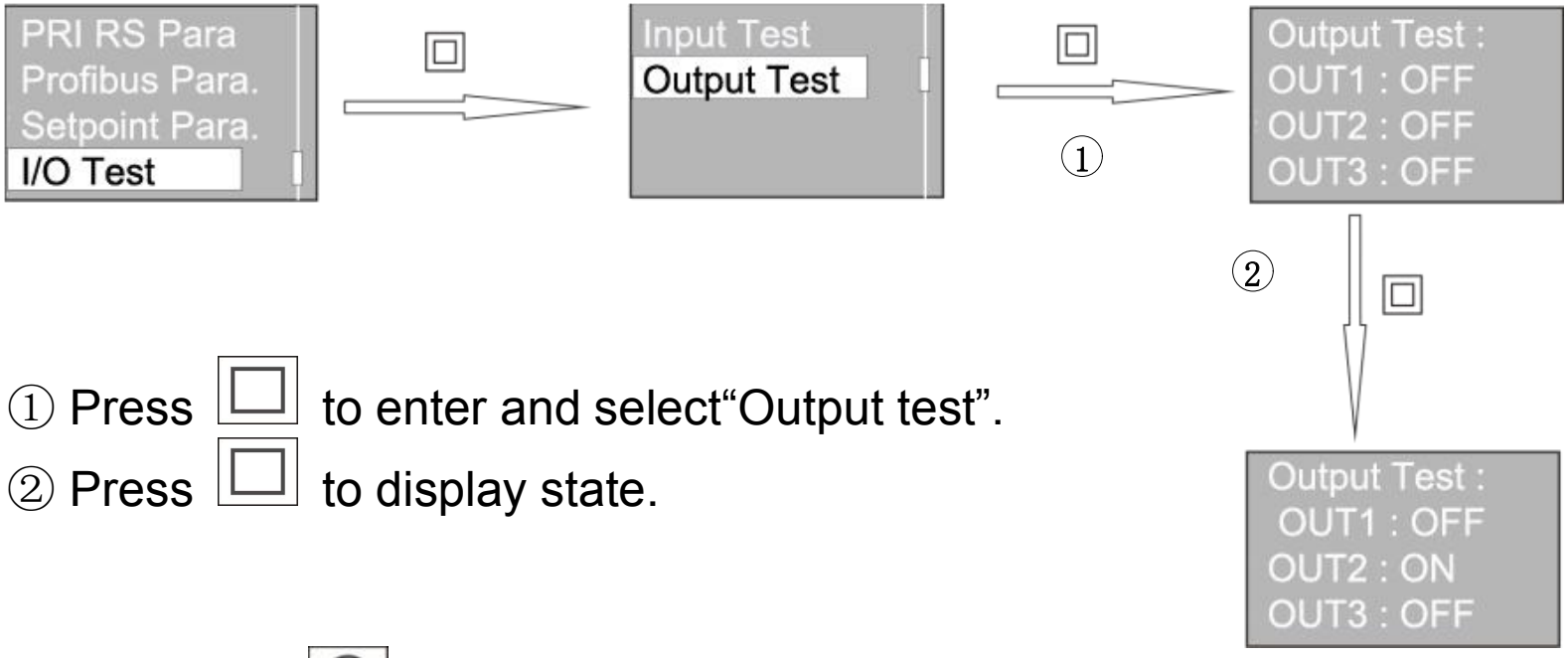
① Press □ to enter and select“Input test”.

② Press □ to display state.

③ If there are input signals, then it will show “ON” .

Please press ○ to exit after testing

Output test:



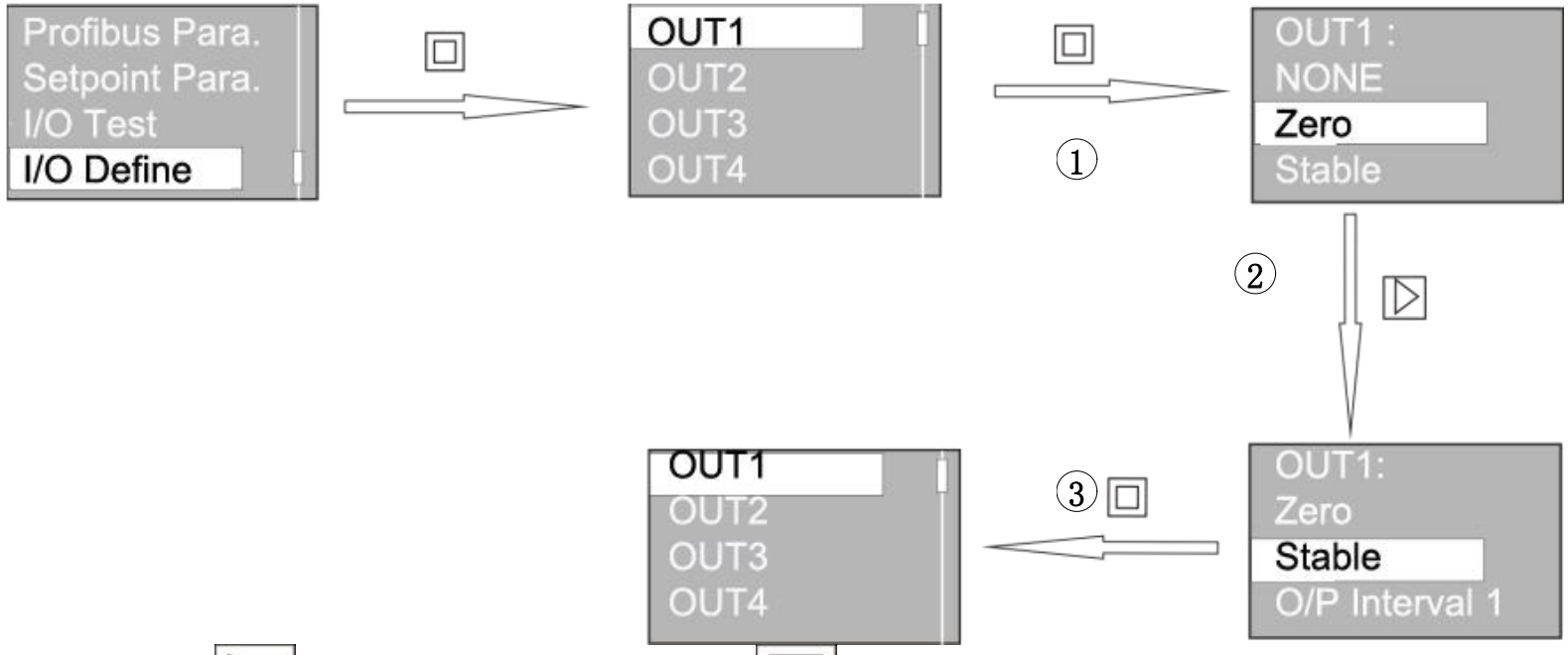
① Press □ to enter and select“Output test”.

② Press □ to display state.

Please press ○ to exit after testing

4.4 I/O Define

Users can define **IO** in need as follows:



① Press ▷ to define and press □ to enter.

② Press ▷ to change I/O

③ Press □ to save

I/O define：

Define	Content	Explanation
O0	NONE	No output
O1	Zero	Output is effective in zero
O2	Stable	Output is effective in stable
O3	OP **1**	Output is effective when weight ≤ set point 1
O4	OP **2**	Output is effective when set point **2** ≥ weight > set point **1**
O5	OP **3**	Output is effective when set point **3** ≥ weight > set point **2**
O6	OP **4**	Output is effective when set point **4** ≥ weight > set point **3**
O7	OP **5**	Output is effective when set point **5** ≥ weight > set point **4**
O8	OP **6**	Output is effective when weight > set point **5**

Define	Content	Explanation
I1	Zeroing	Zeroing in stable state within range

4.5 Reset

Only special technologist can reset parameters, otherwise error will happen.

Reset All：Reset all of parameters

Reset CAL：Reset calibration parameters

Reset I/O：Reset I/O define

Reset parameters ： Reset operation parameters, serial port parameters and controlling parameters

5. Communication protocols

GM8802S-F have **RS485** port to communicate with host computer by following seven protocols: **rS** / **Modbus**(**bus**)

5.1 RS protocols

Two working mode: **Cont** / **Read.**

Data format：operation parameters

Baud Rate：**1200** / **2400** / **4800 / 9600 / 19200 / 38400 / 57600 / 115200** (optional)

Code: **ASCII**

Operation code: W: write; R: read; C: calibration; O: zeroing

5.1.1 Parameter table

Operation code	Parameter code	Parameter name	Characters
R	WT	Reading current status and weight value	8

W	DC	Writing Max. capacity and Min. division	8
R/W	PT	Decimal point digits	1
R	SE	Load cell sensitivity	1
R	DD	Min. division	2
R	CP	Max. capacity	6
R/W	AC	Automatically zeroing switch	1
R/W	TR	Range of Zero-Tracking	1
R/W	MR	Stable Range	1
R/W	ZR	Range of zeroing	2
R/W	FL	Digital filter parameter	1
R/W	VC	Steady state filter	1

R/W	AD	Read/write AD speed	1
R/W	OT	Screen-locked time	1(0-4 digits mean to CLOSE 、1、2、5、10min)
R/W	CT	Output interval	2
R/W	CS	Output stable	1
R/W	C1	Set point 1	6
R/W	C2	Set point 2	6
R/W	C3	Set point 3	6
R/W	C4	Set point 4	6
R/W	C5	Set point 5	6
R	AM	Absolute Millivolt value	7bits:D6D5D4D3D2D1D0 D6:+; D5-D0:ASCII code of 6bits corresponding Millivolt value Decimal point:4bits

R	RM	Millivolt value of relative zero	7bits:D6D5D4D3D2D1D0; D6:+/ - ; D5-D0: ASCII code of 6bits corresponding Millivolt value; Decimal point:4bits
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
O	CZ	Zeroing	

5.1.2 Explanation form for wrong code

Under communication mode, if the transmitter received wrong data frame, there will be a wrong code as below:

1. CRC check error
2. Operation code error
3. Parameter code error
4. Writing data error
5. Operation can’t be performed
6. Channel number error

Remark: the default channel number is: **1(31H)**

5.1.3. **Cont** mode

The indicator will transmit collected data to upper computer automatically.

Data format:

STX	Scale ID	Channel NO	Status	Weight value	CRC	CR	LF

Here:

STX —— **1bit**，start，**02H**

Scale ID —— **2bit**，range **00~99**

Status —— **2bits**，High Byte:40H; Low Byte is as below:

D6	**D5**	**D4**	**D3**	**D2**	**D1**	**D0**
none	none	G.W. / N.W.	+/-	Zero	Overflow	Stable
1	**0**	**0:**G.W. **1:**N.W.	**0:**+ **1:**-	**0:**Non-zero **1:**Zero	**0**：normal **1**：overflow	**0**：Stable **1**：unstable

Weight value —— 6unsigned numbers; return to “blank space blank space OFL blank space” when the weight is positive or negative overflow.

CRC —— **2bit**，checksum

CR —— **1bit**，**0DH**

LF —— **1bit**，**0AH**

For example: 02 30 31 31 40 40 30 30 32 31 36 35 37 38 0D 0A

Means:Stable; positive number; weight value is 2.165

5.1.4 **Read** mode

The indicator will transmit collected data to upper computer only when receive command.

Data format:

STX	Scale ID	Channel NO	R	WT	CRC	CR	LF

Response：

STX	Scale ID	Channel NO	R	WT	Status	Display value	CRC	CR	LF

Here：

STX —— **1bit**，start，**02H**

R —— **1bit**，**52H**

WT —— **2bit**，**57H 54H**

E —— **1bit**，**45H**

Status —— 2bits;High Byte:40H; Low Byte as below:

D6	**D5**	**D4**	**D3**	**D2**	**D1**	**D0**
none	none	G.W. / N.W.	+/-	Zero	Overflow	Stable
1	**0**	**0:**G.W. **1:**N.W.	**0:**+ **1:**-	**0:**Non-zero **1:**Zero	**0**：normal **1**：overflow	**0**：Stable **1**：unstable

Display value —— 6unsigned numbers; return to “blank space blank space OFL blank space” when the weight is positive or negative overflow.

Wrong code —— Please refer Character **5.1.2** for details.

For example: 02 30 31 31 52 57 54 30 31 0D 0A

Correct response：02 30 31 31 52 57 54 40 40 30 30 30 31 33 32 32 33 0D 0A

Wrong response：02 30 31 31 52 57 54 45 31 31 39 0D 0A

5.1.4.2 Read other parameters

Data format:

STX	Scale ID	Channel NO	R	Parameter code	CRC	CR	LF

Correct response：

STX	Scale ID	Channel NO	R	Parameter code	Parameter value	CRC	CR	LF

Here：

Parameter value —— **1bit**

Parameter code —— **2bits**

For example: 02 30 31 31 52 4D 52 38 39 0D 0A

Correct response：02 30 31 31 52 4D 52 35 34 32 0D 0A

Wrong response：02 30 31 31 52 4D 52 45 31 30 37 0D 0A

5.1.4.3 Write Max.capacity and mini division

Data format:

STX	Scale ID	Channel NO	W	DC	Division value	Max. Capacity	CRC	CR	LF

Correct response：

STX	Scale ID	Channel NO	W	DC	O	K	CRC	CR	LF

Here：

DC —— **2bits，44H 43H**

O —— **1bit，4FH**

K —— **1bit，4BH**

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

Max. Capacity —— **6bits**

For example:

Command: 02 30 31 31 57 44 43 30 35 30 31 30 30 30 30 36 30 0D 0A

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

Wrong response：02 30 31 31 57 44 43 45 35 39 32 0D 0A

5.1.4.4 Write other parameters

Data format:

STX	Scale ID	Channel NO	W	Parameter code	Parameter value	CRC	CR	LF

Response：

STX	Scale ID	Channel NO	W	Parameter code	O	K	CRC	CR	LF

For example：
Command：02 30 31 31 57 5A 52 35 30 30 38 0D 0A
Correct response：02 30 31 31 57 5A 52 4F 4B 36 31 0D 0A
Wrong response：02 30 31 31 57 5A 52 45 31 32 35 0D 0A

5.1.4.5 Calibration

1) Zero calibration with weights

Data format:

STX	Scale ID	Channel NO	C	ZY	CRC	CR	LF

Response：

STX	Scale ID	Channel NO	C	ZY	O	K	CRC	CR	LF

Here：
Z —— **1bit，5AH**
Y —— **1bit，59H**
For examples：02 30 31 31 43 5A 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 31 43 5A 59 45 35 31 36 0D 0A

2) Zero calibration without weights

Data format:

STX	Scale ID	Channel NO	C	ZN	Zero Millivolt value	CRC	CR	LF

Response：

STX	Scale ID	Channel NO	C	ZN	O	K	CRC	CR	LF

Here：

ZN —— **2bits，5AH 4EH**

Zero Millivolt value —— 6bits;input zero millivolt value (decimal point:4bits)

For example:

Command：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 4D 5A 4E 45 32 31 32 0D 0A

5.1.4.6 Gain calibration

1) Gain calibration with weights

Add a standard weight which is near to 80% of the Max. capacity, then write in the current value of the standard weight to achieve the gain calibration.

Data format:

STX	Scale ID	Channel NO	C	GY	Weight value	CRC	CR	LF

Response:

STX	Scale ID	Channel NO	C	GY	O	K	CRC	CR	LF

Here：

GY —— **2bits，47H 59H**

Weight value —— 6bits; standard weight value

For example: 02 30 31 31 43 47 59 30 30 30 32 30 30 36 35 0D 0A

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

Wrong response：02 30 31 32 43 47 59 45 36 39 39 0D 0A

2) Gain calibration without weights

Input the standard weight value in Appendix and the corresponding gain Millivolt value to achieve gain calibration.

Data format:

STX	Scale ID	Channel NO	C	GN	Gain millivolt value	Weight value	CRC	CR	LF

Response：

STX	Scale ID	Channel NO	C	GN	O	K	CRC	CR	LF

Here：

Gain millivolt value —— 6bits;corresponding gain millivolt value (decimal point:4bits)

Weight value—— 6bits;standard weight value

For example：02 30 31 31 43 47 4E 30 30 31 39 34 30 30 30 30 32 30 30 35 36 0D 0A

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

Wrong response：02 30 31 31 43 5A 52 45 33 30 37 0D 0A

5.1.4.7 Zeroing

Data format:

STX	Scale ID	Channel NO	O	CZ	CRC	CR	LF

Response：

STX	Scale ID	Channel NO	O	CZ	O	K	CRC	CR	LF

For example：

Command：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

5.1.4.8 CRC count

Count the sum of all the left bytes and convert the sum to be decimal data, and then convert the 2 low-order digits of the decimal date to ASCII code.

For example:

Data format:

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

The sum from **02** to **5A** is **180(Hex)**， then change to **384(decimal data),** thus to work out the check code of the above data frame is **38**、**34.**

5.2 Modbus protocols

5.2.1 **Modbus** mode

RTU mode:

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

Data format：8data bits, 1 stop bit, Even parity (8-E-1)

8data bits, 1 stop bit, Odd Parity (8-O-1)

8data bits, 1 stop bit, No Parity (8-n-1)

8data bits, 2 stop bit, No Parity (8-n-2)

Baud Rate：**1200** / **2400** / **4800** / **9600** / **19200** / **38400** / **57600** / **115200** (optional)

Code: binary

ASCII mode:

For **ASCII** mode， every 8-bit byte of the message are transmited as 2 ASCII characters.

5.2.2 Modbus communication address

PLC add.	Display address	Instruction
Only read register (function code 0x03)		
40001	0000	Present weight value (4 byte with sign，highest in the front)
40002	0001	
40003	0002	**Bit**:**0**//weight positive overflow； **Bit**:**1**//voltage positive overflow; **Bit**:**2**//weight negative overflow； **Bit**:**3**//voltage negative overflow; **Bit**:**4**//weight character； **Bit**:**5**//zero sign; **Bit**:**6**//stable sign;
40004	0003	Load cell output millivoltage value (**3** decimal point)

40005	0004	Relative millivoltage(present millivoltage value - zero-calibrated millivoltage value) (**3** decimal points)
Two bytes read and write（Write function code 0x06, Read function code 0x03）		
40008	0007	Automatic zeroing switch (0:OFF; 1:ON)
40009	0008	Zero tracking range（0-9）
40010	0009	Stable range（1-9）
40011	0010	Zeroing range（0%-99%）
40012	0011	Digital filter parameter(0-9)
40013	0012	Steady state filter grade(0-9)
40014	0013	Screen-protected time：**0**:close；**1:1min**；**2:2min**；**3:5min**；**4:10min**
40015	0014	Weight unit：**0**：**g**；**1**：**kg**；**2**：**t**

40016	0015	**AD** speed (**0:120**/s；**1**:**240**/s；**2**:**480**/s)
40017	0016	Decimal point (**0~4**：**0~0.0000**)
40018	0017	Mini devision(0-5 means 1/2/5/10/20/50)
40019	0018	Calibrate voltage at zero Read：Zero voltage calibrated last time Write：Write **0** to calibrate zero with weights
40020	0019	Calibrate gain millivoltage Read：Gain millivoltage calibrated last time Write：Write **0** to calibrate with weights，record relative millivoltage as gain voltage value； Write non-zero value to record as gain millivoltage

Four bytes read and write(Write function code 0x10, Read function code 0x03)			
40021	0020	Read：Weight value calibrated last time Write：Calibrated weight value	
40022	0021		
40023	0022	Max.weighing capacity，Write range (Max.capacity≤Mini devision×**100000**)(≤**999999)**	
40024	0023		
…	…	Reserved	
40065	0064	Output stable	Function address
40066	0065	Output interval	
40067	0066	Set point 1	
40068	0067	Set point 2	
40069	0068	Set point 3	
40070	0069	Set point 4	
40071	0070	Set point 5	

…	…	Reserved	
40097	0096	Out put 1	I/O self-defined address
40098	0097	Out put 2	
40099	0098	Out put 3	
40100	0099	Out put 4	
40101	0100	Out put 5	
40102	0101	Out put 6	
40103	0102	Input 1	
40104	0103	Input 2	
40105	0104	Input 3	
40106	0105	Input 4	
Only read(function code：0 x 0 1)			
00033	0032	Set point 1　1：effective；0：ineffective	
00034	0033	Set point 2　1：effective；0：ineffective	

00035	0034	Set point 3 1：effective；0：ineffective
00036	0035	Set point 4 1：effective；0：ineffective
00037	0036	Set point 5 1：effective；0：ineffective
00038	0037	Set point 6 1：effective；0：ineffective
…	…	Reserved
00041	0040	**0**：normal； **1**：weight positive overflow
00042	0041	**0**：normal； **1**：millivoltage positive overflow
00043	0042	**0**：normal； **1**：weight negative overflow
00044	0043	**0**：normal； **1**：millivoltage negative overflow
00045	0044	**0**：+； **1**：-
00046	0045	**0**：Non-zero； **1**：Zero
00047	0046	**0**：Motion； **1**：Stable

Write and read (Read function code: 0x01;Write function code: 0x05)			
00057	0056	Zeroing	Write **FF00** : Zeroing; Return **0** when read the coil.
00058	0057	Reset	
00059	0058	Reset calibration	
00060	0059	Reset I/O	
00061	0060	Reset parameters(including operation parameters、controlling parameters、serial port parameters and **PROFIBUS** parameters)	
…	…	Reserved	
00065	0064	I/O testing function，Write：**1** (enter I/O testing)；Write：**0**(exit)	

00066	0065	OUT 1	I/O testing Write：**1**，output effectively； Write：**0**，output ineffectively； Read：present output status
00067	0066	OUT 2	
00068	0067	OUT 3	
00069	0068	OUT 4	
00070	0069	OUT 5	
00071	0070	OUT 6	
00072	0071	IN 1	Only read present input status.
00073	0072	IN 2	
00074	0073	IN 3	
00075	0074	IN 4	

5.2.3 Function code

Modbus communication protocols have 5 function codes:01 Reading the status of the coil;03 Reading holding register; 05 Force single coil;； 06 Preset single holding register; 16 (10 Hex) Preset multiple holding registers.

01 Read the status of the coil

Query

Query information assigns the starting coil and quantity of coil.

Response

(1) Each status of the coil corresponds to each data: 1=ON;0=OFF. The LSB（Least Significant Bit）of the first byte is the start address during query, the other coils are arranged from low bit to high bit till the eighth coil, the next byte is also arranged from low bit to high bit.

(2) If the return coil is not the multiple of 8,then set “0”for the

bits from the rest bits of the last bits to the highest bit ,the byte district represents all the byte number.

For example: Request to read 40 43 coil from Transmitter 01

1) Under RTU Mode for communication:

Query command:

Transmitter Address	Function Code	Start Address	The Number of Coils	CRC Check
1 byte	1 byte	2 byte	2 byte	2 byte

Received data sequence is correct:

Transmitter Address	Function Code	Counting Byte	Data Field	CRC Check
1 byte	1 byte	1 byte	1 byte	2 byte

Query command: 01 01 00 28 00 04 BD C1

Received data sequence is correct: 01 01 01 02 D0 49

The corresponding status of coil 43 40: 0 0 1 0

2) Under ASCII Mode for communication:

Query command:

Start	Transmitter Address	Function Code	Start Address	Number of Coils	LRC Check	End
1 character	2 character	2 character	4 character	4 character	2 character	2 character

Received data sequence is correct:

Start	Transmitter Address	Function Code	Counting Byte	Data Field	LRC Check	End
1 character	2 character	2 character	2 character	2 character	2 character	2 character

Query command: 3A 30 31 30 31 30 30 32 38 30 30 30 34 44 32 0D 0A

Received data sequence is correct: 3A 30 31 30 31 30 31 30 32 46 42 0D 0A

The corresponding status of coil 43 40: 0 0 1 0

03 Reading Holding Register

Query information assigns the start address and number of the registers.

Response

Response information assigns the byte number of the reading register, each register corresponds to 2 bytes; there is also the data value of each reading register in the response information.

For example: Reading register 0007、0008

1) Under RTU Mode:

Query command:

Transmitter Address	Function Code	Start Address	Query number of Registers	CRC Check
1 byte	1 byte	2 byte	2 byte	2 byte

Received data sequence is correct:

Transmitter Address	Function Code	Counting Byte	Register (0007) Data	Register (0008) Data	CRC Check
1byte	1byte	1byte	2byte	2byte	2byte

Query command：01 03 00 07 00 02 75 CA

Received data sequence is correct：01 03 04 00 00 00 05 3A 30

The data for Register (0007)and Register (0008): ： 0(Hex：0000H)、5(Hex：0005H)

2) Under ASCII Mode:

Query command:

Start Address	Transmitter Address	Function Code	Start Address	Query number of Registers	LRC Check	End
1 character	2 character	2 character	4 character	4 character	2 character	2 character

Received data sequence is correct:

Start	Transmitter Address	Function Code	Counting Byte	Register (0007) Data	Register (0008) Data	LRC Check	End
1 character	2 character	2 character	2 character	4 character	4 character	2 character	2 character

Query command：3A 30 31 30 33 30 30 30 37 30 30 30 32 46 33 0D 0A

Received data sequence is correct：3A 30 31 30 33 30 34 30 30 30 30 30 30 30 35 46 33 0D 0A

The data for Register (0007)and Register (0008): ： 0(Hex：0000H)、5(Hex：0005H)

05 Force single coil

Query

Query information assigns the address of the coil that need to be forced；A constant in query data field decides the ON/OFF status for the requested coil: FF00 value for ON status,0000H value for OFF status. Other value is ineffective to the coils.

Response

The coil being force status returns to normal response.

For example: Force the 0056 coil of Transmitter01 is ON status

1) Under RTU Mode:

Query command:

Transmitter Address	Function Code	Coil Address	Forced Data	CRC Check
1 byte	1 byte	2 byte	2 byte	2 byte

Received data sequence is correct:

Transmitter Address	Function Code	Coil Address	Forced Data	CRC Check
1 byte	1 byte	2 byte	2 byte	2 byte

Query command：01 05 00 38 FF 00 0D F7

Correct response：01 05 00 38 FF 00 0D F7

The coil0056 is set to be “ON” status.

2) Under ASCII Mode:

Query command:

Start Address	Transmitter Address	Function Code	Coil Address	Forced Data	LRC Check	End
1 character	2 character	2 character	4 character	4 character	2 character	2 character

Received data sequence is correct:

Start Address	Transmitter Address	Function Code	Coil Address	Forced Data	LRC Check	End
1 character	2 character	2 character	4 character	4 character	2 character	2 character

Query command：3A 30 31 30 35 30 30 33 38 46 46 30 30 43 33 0D 0AReceived data sequence is correct：3A 30 31 30 35 30 30 33 38 46 46 30 30 43 33 0D 0A

The coil0056 is set to be “ON” status.

06 Preset Single Holding Register

Query

Query information assigns the address of the register need to be preset, the request preset value is in the query data field.

Response

The register returns to normal response after presetting.

For example:

1) Under RTU Mode:

Query command:

Transmitter Address	Function Code	Preset Register Address	Preset Value	CRC Check
1 byte	1 byte	2 byte	2 byte	2 byte

Received data sequence is correct:

Transmitter Address	Function Code	Preset Register Address	Preset Value	CRC Check
1 byte	1 byte	2 byte	2 byte	2 byte

Query command：01 06 00 09 00 05 99 CB

Received data sequence is correct：01 06 00 09 00 05 99 CB

The register 0009: 5(Hex：0005H)

2) Under ASCII Mode:

Query command:

Start Address	Transmitter Address	Function Code	Preset Register Address	Preset Value	LRC Check	End
1 character	2 character	2 character	4 character	4 character	2 character	2 character

Received data sequence is correct:

Start Address	Transmitter Address	Function Code	Preset Register Address	Preset Value	LRC Check	End
1 character	2 character	2 character	4 character	4 character	2 character	2 character

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

Received data sequence is correct：3A 30 31 30 36 30 30 30 39 30 30 30 35 45 42 0D 0A

The register 0009： 5（Hex：0005H）

16 (10 Hex)Preset multiple Holding Registers

Query

Query information assigns the address of the register need to be preset, the preset value of the register is in query data field.

Response

Normal response: Return to the transmitter address、function code、start address and the number of preset registers.

For example: Request to put the preset value into 2 registers of Transmitter01,the start register:0030; preset value: 0001H and 7318H

1) Under RTU Mode:

Query command:

Transmitter Address	Function Code	Start Address	Number of Registers	Counting byte	Preset value	CRC Check
1 byte	1 byte	2 byte	2 byte	1 byte	4 byte	2 byte

Received data sequence is correct:

Transmitter Address	Function Code	Start Address	Number of Registers	CRC Check
1 byte	1 byte	2 byte	2 byte	2 byte

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

Received data sequence is correct：01 10 00 1E 00 02 21 CE

2) Under ASCII Mode:

Query command:

Start	Trans-mitter Address	Function Code	Start Address	Number of Registers	Count-ing Byte	Preset Value	LRC Check	End
1char-acter	2char-acter	2char-acter	4char-acter	4char-acter	2char-acter	8char-acter	2char-acter -	2char-acter -

Received data sequence is correct:

Start	Transmitter Address	Function Code	Start Address	Number of Registers	LRC Check	End
1 character	2 character	2 character	4 character	4 character	2 character	2 character

Query 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

Received data sequence is correct：3A 30 31 31 30 30 30 31 45 30 30 30 32 43 46 0D 0A

5.2.4 Error Message during Communication

The transmitter sends message back to host when detecting error except check code(CRC or LRC). The highest bit of function code is **“1”**, I t means that the function code which is sent by transmitter is 128 more than the function code which is sent by host（for example: reading register command,03H will be changed to 83H）.

Abnormal code:

02: illegal data address: the received data address is the unallowed address of transmitter.

03: illegal data: the value of query data field is the unallowed value of transmitter.

The data frame of error message:

1) Under RTU Mode:

Transmitter Address	Function Code	Abnormal Code	CRC Check
1 byte	1 byte	1byte	2 byte

2) Under ASCII Mode:

Start	Transmitter Address	Function Code	Abnormal Code	LRC Check	End
1 character	2 character	2 character	2 character	2 character	2 character

For example:

Upper computer: Reading coil(0040) using function code:03”

1) Under RTU Mode:

Query command：01 03 00 28 00 01 04 02

Received data sequence is incorrect：01 83 02 C0 F1

2) Under ASCII Mode:

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

Received data sequence is incorrect：3A 30 31 38 33 30 32 37 41 0D 0A

According to the response data sequence, we know that the current error code is “02”.It means that the current received data address is illegal and it’s the unallowed address of transmitter.

5.3 PROFIBUS

GM8802S can connected with master line by **PROFIBUS-DP.**

5.3.1 I/O define

GM8802S supply **8DI**、**8DO** 和 **2AI**，so host computer can read indicator status by these **I/O.**

5.3.1.1 Read indicator status

DI0：Stable status，**0: stable**，**1: motion**

DI1：Overflow status，**0: normal**，**1: overflow**

DI2：Zero status，**0: non-zero**，**1: zero**

DI3：Response to check if the line is broken(**0 or 1**，decided by **DO3** status)

DI4-DI6：Reserved

DI7：Positave / negative sign，0: +，1: -

5.3.1.2 Set indicator status

DO0：Zeroing(**1:** effective)

DO3：Check if the line is broken(**0** or **1**）

DO1-DO2：Reserved

DO4-DO7：Reserved

5.3.1.3 Read weight value

AI0： High two bytes on present weight value

AI1： Low two bytes on present weight value

5.3.2 GSD file

Please contact our company service person for .GSD file.

6. Error message

Err 2: The present weight value is over zeroing range.

Err 3: The system is not stable in zeroing.

OFL : Positive overflow.

-OFL: Negative overflow.

OVER: Load cell input sign is too strong in calibrating zero.

UNDER: Load cell Input sign is too weak in calibrating zero.