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Chapter I. Overview

1.1 Cautions

1) Unpacking

※ After unpacking case, please properly keep the packing list, certificate of conformity, instructions, accessories and parts.

2) Installation

※ This controller is fit for being fixed and installed on the control panel of electrical cabinet and etc.

※ The installation site of the controller shall be free from vibration source, and be equipped with sun proof, high-temperature baking proof, freeze proof , moisture proof and rain proof measures.

3) Wiring

※ Please be sure that each ground is terminal well grounded, and make sure all connections are correct and

securely fastened.

- ※ This controller shall not share any distribution box, power socket, power lines (including ground lead) and etc with any other electric equipment which is easy to generate interference, for fear that such electric equipment affects the performance of this controller. When inevitable, a power filter shall be added in the power circuit of this controller for isolation.
- ※ To prevent any possible interference, it shall shorten the length of sensor cables as much as possible and keep the controller away from power lines and control lines.

4) Using

- ※ It shall maintain the stability of power supply as much as possible, so as to avoid any negative phenomena such as over high and over low voltage, waveform distortion and etc.
- ※ No matter when the controller is powered on or powered off, please be sure not to disassemble this controller to void any personal injury or equipment damage.

5) Maintenance

- ※ Never plug in or pull out the connectors on rear board of

the controller or replace the sensors in a power-on state.

- ※ To prevent any misalignment or imbalance, instrument calibration or setting shall only be carried out by our company personnel or professional.
- ※ Do not clean this controller with HC, alcohol and ketone and other type of organic solvents, or with strong acid or alkali solution, so as not to damage the enclosure, panel and internal components of this controller.
- ※ This controller will not accept your arbitrary repair or modification on it. If the equipment breaks down, please follow this Instructions or contact us, otherwise you will lose the favorable terms of after-sales service.
- ※ This controller, if left unused, shall be powered on at least once every month with a period of more than 1h, so as to remove its internal moisture.

1.2 Functions and Features

1) For the circumstance which needs to convert dynamometry

signal into digital communication signal and standard analog output signal, and needs a simple control.

- 2) For analog output signal, it may select 0-20mA, 4-20mA, 0-10V, 1-5V, and for digital communication interface, it may select RS485 or RS232, both of which come with isolation.
- 3) The double-row 6-position LED nixie tubes display the real-time measured value, peak value, output current value, I/O status information respectively.
- 4) The controller has the limit judgment function for upper limit, median limit and lower limit, and please see the Note 3 to Instructions for specific control functions.
- 5) The limit output contains three output modes: upper, lower, up and down judgment, and please see the Note 2 to Instructions for detailed explanation.
- 6) The I/O includes 4 inputs and 6 outputs, which can customize the function of input and output interfaces.
- 7) The output of driving controller can realized through upper computer, which can partially substitute the PLC.
- 8) The power supply of the controller is DC24V, with $\pm 5V$ of

wide voltage range, which is more safe and stable.

9) The panel is in the form of installation, and the panel area is only 110mm (width) × 62mm (height).

Chapter II. Technical Specifications

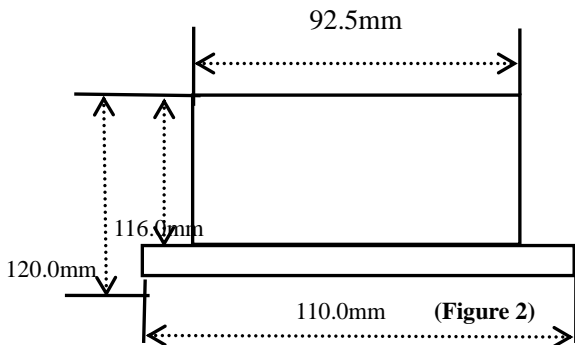
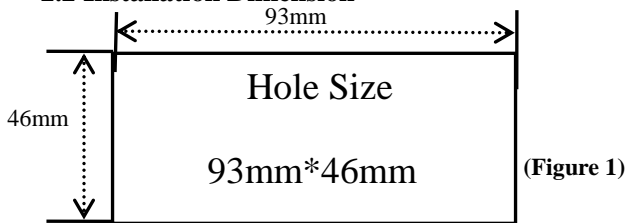
2.1 Technical Parameters

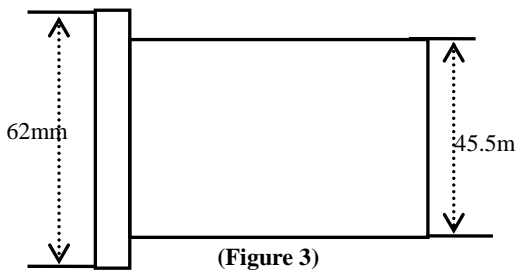
Display window	Double-row 6-position LED display, with 9mm and 7.5mm of letter height respectively
Division value	1, 2, 5, 10, 20, 50
Max weighing display range	999999
Number of decimal place	0、0.0、0.00、0.000、0.0000、0.00000
Static accuracy class	Resolution 900000
Max signal input	-3.6 mV/V ~ 3.6 mV/V

range	(equivalent to -18 mV ~ 18 mV/V)
Zero drift	$\leq 0.05\mu\text{V}$ (@ 0.02mV/V)
Span temperature coefficient	$\leq 10\text{ppm}/^\circ\text{C}$
Input impedance of sensor interface	$\geq 20\text{M}\Omega$
Non-linear error	$\leq 0.002\%\text{FS}$
A/D switching speed	≤ 400 times / second
Zero drift	$\leq 10\mu\text{V}/^\circ\text{C}$
Span temperature coefficient	$\leq 0.02\%\text{FS}/^\circ\text{C}$
Sensor Type	Resistance strain sensor
Sensor excitation voltage	DC5V, up to 8 350 Ω sensors connection in parallel
On-off (contact) capacity	Relay output capacity: AC220V 1A Totally 6 routes / Transistor output capacity: DC24V 0.5A
On-off input voltage	DC24V
On-off input current	4-6mA

Power supply range	DC24V (±5V)
Product power	≤10W
Working temperature	-10 ℃~50 ℃
Humidity range	≤90% relative humidity (non-condensing)

2.2 Installation Dimension





(Figure 3)

Chapter III. Instructions on Terminal Wiring and Panel

3.1 Terminal Definition List and Wiring

Schematic Diagram

3.1.1 Port Definition for Double-row Terminal Controller

Lower Row	Port Definition	Upper Row	Port Definition
SHD	DC 24V ground wire	OU1	6 output ports, including relay-type and
24-	DC 24V-	OU2	

24+	DC 24V+	OU3	transistor-type The transistor-type is low level (DC24V-) effective output
T	RS232 TXD	OU4	
R	RS232 RXD	OU5	
CGD	RS232 signal ground wire	OU6	
A	RS485 A(+)	COM	Common port of relay contact
B	RS485 B(-)	PGD	Linked with 24- internally
TCL	TDES clock	IN1	4 input ports, effective if short connected with PGD.
TDA	TDES data	IN2	
EX+	Excitation power supply +	IN3	
EX-	Excitation power supply -	IN4	
SN+	Signal+	AO-	Analog output ground wire
SN-	Signal-	AO+	Analog output signal line

SHD	Sensor ground wire		
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3.1.2 Port Definition for Single-row Terminal

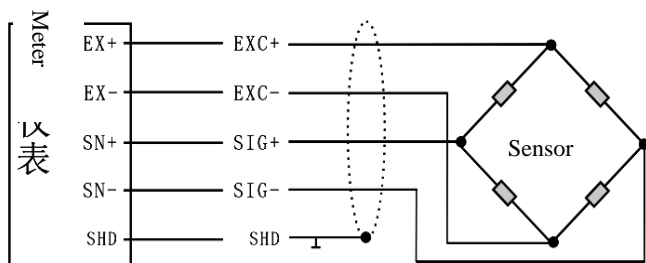
Controller

Port	Definition	Port	Definition
SHD	DC 24V ground wire	TDA	TDES data
24V-	DC 24V-	EX+	Excitation power supply +
24V+	DC 24V+	EX-	Excitation power supply -
T	RS232 TXD	SN+	Signal +
R	RS232 RXD	SN-	Signal -
CGN D	RS232 signal ground wire	SHD	Sensor ground wire
A	RS485 A(+)		

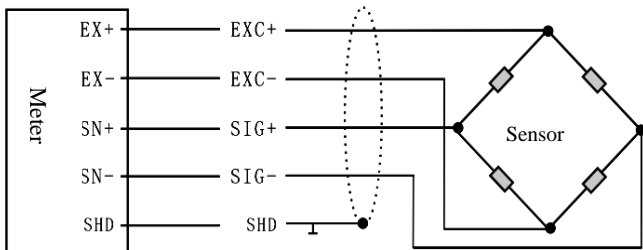
B	RS485 B(-)		
TCL	TDES clock		

3.1.3 Wiring Schematic Diagram

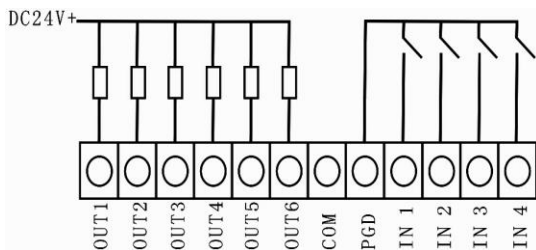
Wiring Connection for Six-wire Sensor



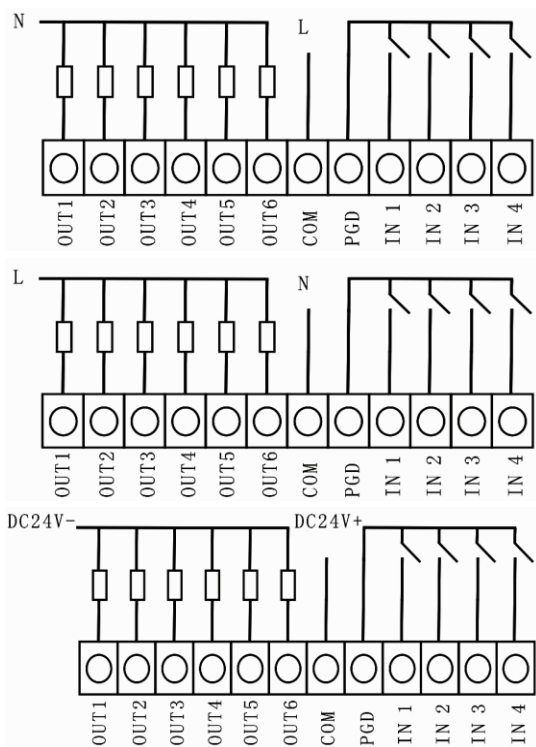
Wiring Connection for Four-wire Sensor

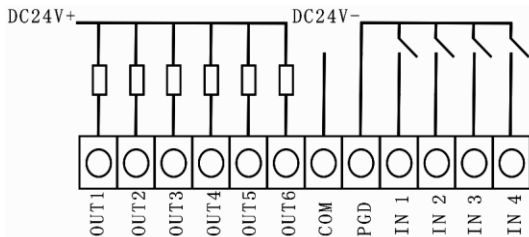


I/O Input and Output Wiring Diagram (Transistor NPN)

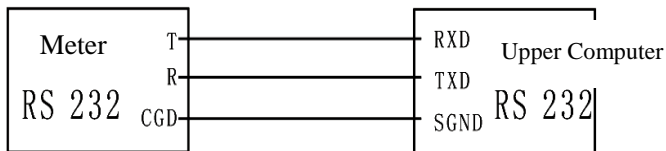


I/O Input and Output Wiring Diagram (Relay)

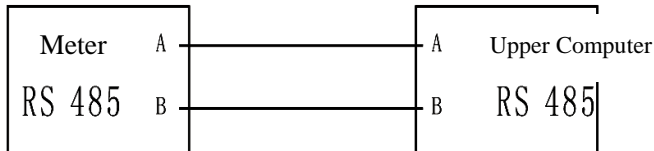




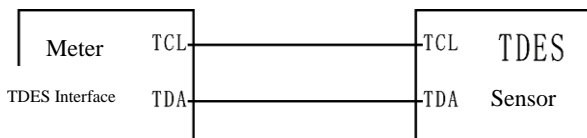
Method of Connecting RS232 with Upper Computer



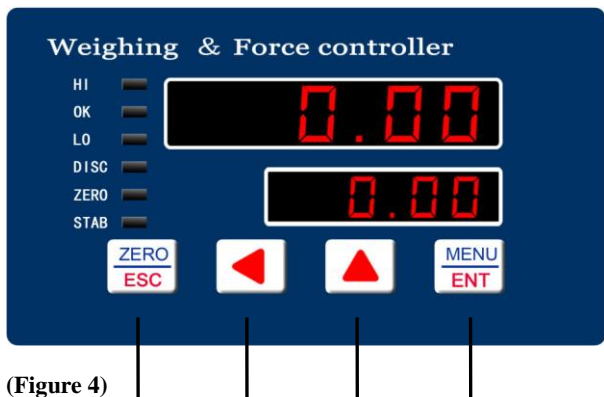
Method of Connecting RS485 with Upper Computer



Connection of Sensor with TDES Function (Calibration-free)



3.2 Panel Operating Instructions



(Figure 4)

Zero Clearing
/ Return Key

Data
Adjusting
Key

Shift Key

Menu / Enter Key

3.2.1 Instructions on Indicator Light

HI: Upper limit output indicator light

OK: Qualified / median limit indicator light

LO: Lower limit output indicator light

DISC: Peak value indicator light

ZERO: Zero position indicator light

STAB: Stable status indicator light

3.2.2 Instructions on Keys and Shortcut Keys



Zero Clearing / Return Key

: Short press for zero clearing (on main interface);

Short press to scroll items after entering the secondary menu;

Enter and set up the activated state, short press to cancel activated state;

Under secondary menu, long press the option key for 3 seconds to exit to the main interface.



Shift Key

: Long press shift key on main interface for 3 seconds to enter the calibration interface directly;

On parameter setting interface under the secondary menu, short press to activate the setting;

After the set status is activated, short press to move the figure cursor;

On the weighing interface, short press to clear tare.



Data Adjusting Key

: Under the secondary menu, adjust the size of data;

Under the primary menu, select each main menu;

On main interface, short press this key to select the displayed items: peak value, analog quantity, I/O indication.



Menu / Enter Key

: On the main menu, long press for 3 second to enter the primary menu;

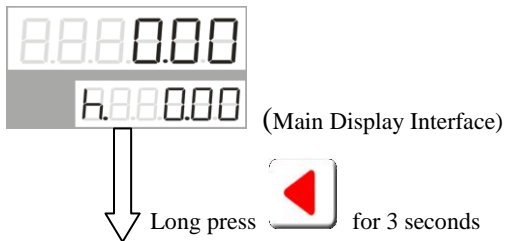
Under the primary menu, short press the Enter Key to enter the secondary menu;

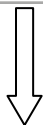
Under the secondary menu, modify the data and short press the Enter Key to write in;

Short press on the main interface, to enter the setting interface for upper, median and lower limit value.

Chapter IV. Verification of Calibration

4.1 Sensor Calibration with Weights



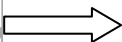


Let the sensor vacancy, and wait until the digits on lower row are displayed steadily.

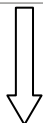
Short press



to calibrate zero.

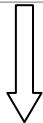


Turn to next page



Put weights onto the sensor tooling
Wait until the digits are displayed steadily,

short press



Keep the weights on the sensor tooling,
Input the weights' weight to following display

box, and short press



The weight calibration is finished.

4.2 Calibration without Weights



(Main Display Interface)



Long press



for 3 seconds.




Let the sensor vacancy, wait until the digits

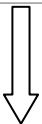



are displayed steadily,

short press  to calibrate zero.




On this interface, short press  to enter calibration without weight



Input the sensor's sensitivity, and short press 



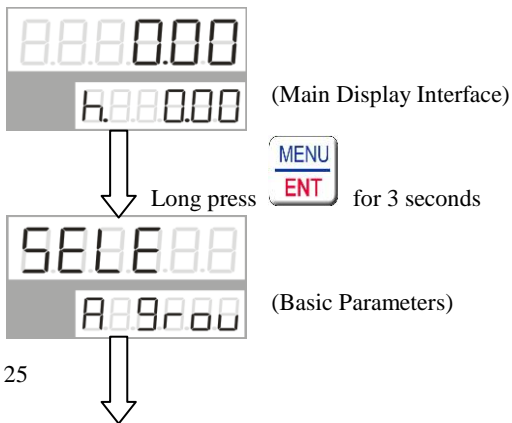
Input the sensor's measuring rang, and short
press 

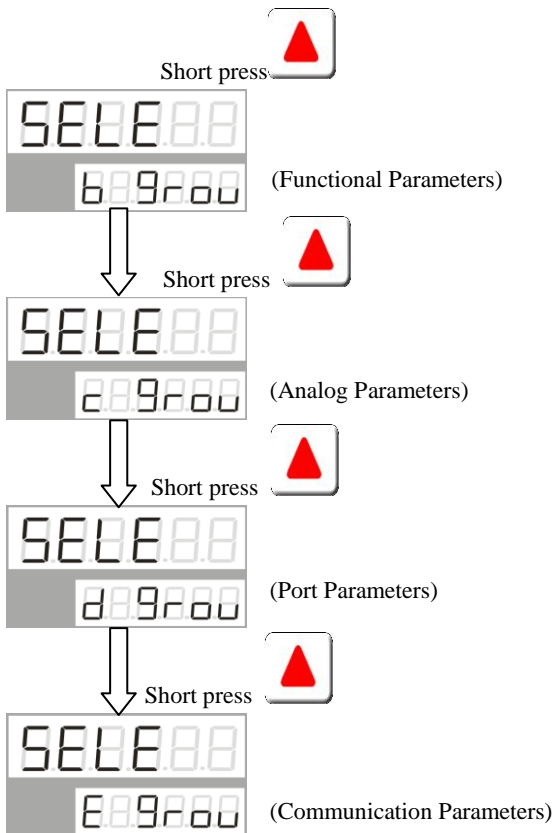


The calibration without weights is completed.


Chapter V. Detailed Instructions on Menu

5.1 Primary Menu







Short press  to enter the secondary menu from the primary menu.

5.2 Secondary Menu

5.2.1 Basic Parameters

Code	Parameter Name	Parameter Description	Value Range	Initial Value
AD dd	Division value	Difference value of two adjacent indicating values	1, 2, 5, 10, 20, 50	1
AI dot	Decimal place	Number of decimal place of the indicating value	0, 1, 2, 3, 4, 5	0

A2 FUL	Full scale	Max weighing range of the equipment	1-99999 9	5000 0
A3 cLF	Zero setting range	Limit of zero setting	0-99999	500
A4 ScL	Range of start-up zero	Limit of power-on zero setting, it will be null when it is 0	0-99999	0
A5 ELF	Range of auto zero	The range of ZLF auto zero, the time of ZLT auto zero, suppose the weight value is 2, when w is continuous or exceeds the time of auto zero, it satisfies	0-999	0
A6 ELT	Time of auto zero		0.0-9.9	0.0

		ZLF>w>-ZLF, and is stable, the equipment will automatically set zero		
A7 PF	Range of stabilit y criterio n	Limit of judge the data stabilization, it will be dynamic if exceeding this limit	0-99	1
A8 Pt	Time of stabilit y criterio n	Time of judge the data stabilization	0.0-9.9	1.0
A9 cPF	Tare range	Range of tare, this function will be	0-99999	9999 9

		disabled when it is set as 0		
AA FrE	Conversion frequency	Frequency of AD conversion	6d25,12d5,25,50,100,200,400	200
Ab FiL	Filter coefficient	Ability of reducing unstable weighing data fluctuation	0-20	6
Ac FES	Negative display	Display the value is negative or not	OFF/ON	ON

5.2.2 Functional Parameters

Code	Parameter Name	Parameter Description	Value Range	Initial Value
------	----------------	-----------------------	-------------	---------------

b0 Lo	Lower limit value	Limit value for comparative judgment	0-99999	500
b1 E J	Median limit value	Limit value for comparative judgment	0-99999	2000
b2 Hi	Upper limit value	Limit value for comparative judgment	0-99999	6000
b3 bJF	Comparison mode	0: continuous comparison; 1: automatic comparison; 2: external input triggered comparison; 3:1 and 2;4: external input start and stop	0, 1, 2, 3, 4	0

		comparison. See Note 2		
b4 bJc	Auto comparison triggering value	When judgment model is selected as 1, it will only make comparison when the value is greater than the set value	0-99999	0
b5 bJt	Comparison delay	When judgment model is selected as 1 or 2, it will delay to compare subsequent output judgment signal later.	0.00-20.00s	0.00
b6 PdF	Judgment way	0: lower judgment 1: upper judgment 2: up and down judgment, See	0, 1, 2	2

		Note 3		
b7 Fu	Peak value reset threshold value	The threshold value which the peak value displayed on lower row can update	0-99999	0
b8 bJL	Comparison source	0: real-time value 1: peak value 2: negative peak value	0, 1, 2	0
b9 Sct	Output time	Limit output time, 0.0 is to keep outputting before the limit output is changed	0-20.0s	0.0

5.2.3 Analog Parameters

Code	Parameter Name	Parameter Description	Value Range	Initial Value
c0 A04	Analog 4mA DA value	For calibration of 4mA point	0-10000	6554
c1 A20	Analog 20mA DA value	For calibration of 20mA point	0-40000	32768
c2 AFS	Analog output mode	0-20 mode: 0 point is 0mA 4-20 mode: 0 point is 4mA 0-10-20 mode: 0 point is 10mA 4-12-20 mode: 0 point is 12mA	0-20, 4-20, 0-10-20 4-12-20	4-20

c3 A0E	0 point weight value	Positive or negative weight available	-99999 to 99999	0
c4 AF3	20mA weight value	Weight value indicated by 20mA current output	0-99999 9	50000

5.2.4 Port Parameters

Code	Parameter Name	Parameter Description	Value Range	Initial Value
d0 in1	IN1 function	0: none; 1: zero clearing; 2: tare; 3: enable comparison; 4:print; 5: clear	0-8	1
d1 in2	IN2 function			0
d2 in3	IN3 function			3

d3 in4	IN4 function	peak value; 6: lock key; 7: start comparison; 8: stop comparison		4
d4 ou1	OUT1 function	0: communication setting; 1: lower limit; 2: median limit; 3: upper limit; 4: zero zone; 5: stable. (Communicatio n setting: it may communicate with the controller through upper computer, and trigger the	0-5	1
d5 ou2	OUT2 function			2
d6 ou3	OUT3 function			3
d7 ou4	OUT4 function			4
d8 ou5	OUT5 function			0
d9 ou6	OUT6 function			0

		on-off of such port)		
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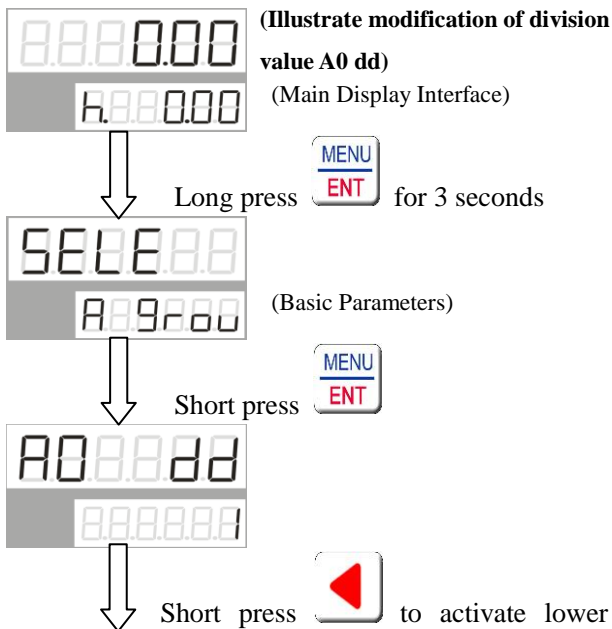
5.2.5 Communication Parameters

Code	Parameter Name	Parameter Description	Value Range	Initial Value
E0 bdl	Baud rate	Data transmission quantity of serial communication bit	1200, 2400, 4800, 9600, 19200, 38400,	9600
E1 5J9	Data format	Data bit Stop bit Check bit	8n1	8n1
E2 tFS	Communication mode	0: MODBUS-RTU	0, 1, 2, 3	0

		1: continuous output 2: connect the large screen (Toledo) 3: print		
E3 ADr	Communication address	Slave station address during MODBUS communication	1-128	1
E4 232	RS232 interface function	0: communication 1: print	0, 1	0
E5 FJ9	Sending interval	Interval for continuous communication mode and data frame of	5-2000 ms	100

		output format		
--	--	---------------	--	--

5.3 Illustration for Parameter Modification



row parameters



Figures on lower row flash



Short press



to modify parameters



After modification, short press



to write in.



Long press



for 3 seconds to return to



the main display interface

(Main Display Interface)

Chapter 6. Serial Communication

6.1 MODBUS Communication

This controller supports the register write-read function (supporting function code 03H and 10H) in standard MODBUS—RTU network communication protocol in master-slave form. It normally applies to data exchange in bus network as slave and master.

If the address sent to slave is incorrect or CRC makes error, the slave will not respond.

6.1.1 Description of Function Codes and Data

Frames

Sending format of read command 03H

Byte	XX	Function Code	XX	XX	XX	XX	CRC _H	CRC _L
Definition	Controller address	03H	Initial address Hi (H)	Initial address Lo (L)	Number of registers Hi (H)	Number of registers Lo (L)	Check (H)	Check (L)

Response format for read command 03H

Byte	XX	Function code	XX	XX	XX	CRC _H	CRC _L
Definition	Controller address	03H	Number of bytes	Data 1	Data 2.....n-1	Data n	Check (H)	Check (L)

Sending format of write command 10H

Byte	XX	Function code	XX	XX	XX	XX	XX	CRC _H	CRC _L
Definition	Command	10H	Initial	Initial address	Number of	Number of	Number	Data 1	Check	Check (L)

tion	tr ole r ad dr es s		addr ess Hi (H)	Lo (L)	register s Hi (H)	register s Lo (L)	of byte s Data n	(H)	
------	---------------------------------------	--	--------------------------	-----------	-------------------------	-------------------------	-----------------	--------------------	-----	--

Response format of write command 10H

Byte	XX	Func tion code	XX	XX	XX	XX	CRC H	CRC _L
Defini tion	Cont rolle r ad dr ess	10H	Initial address Hi (H)	Initial address Lo (L)	Number of register s Hi (H)	Numbe r of register s Lo (L)	Chec k (H)	Check (L)

Example of serial debugging: Read the real-time measured value (Baud rate: 9600, data format 8n1, hexadecimal for both sending and receiving)

Sending: 01 03 00 01 00 02 95 CB

Sending back: 01 03 04 00 00 0A 0B BD 54

Send-back analysis: It is the real-time measured value from the fourth byte, 00 00 0A 0B, computing method: $00 \times 256^3 +$

$00 \times 256^2 + 0A \times 256 + 0B = 2571$

6.1.2 Register Address and Data Contrast

Table of Register Address and Data Contrast

Address	Data Type	Name	Range	Instruction on Read (03H) and Write (10H)
0	2-byte integer	Decimal place	0: 000000 1: 00000.0 2: 0000.00 3: 000.000 4: 00.0000 5: 0.00000	Read-write
1	4-byte long integer	Weight	0~999999	4-byte long integer data, write 0 to clear zero
3	2-byte integer	Status		08 bit: 0, unstable; 1, stable 09 bit: 0, not in zero zone; 1, zero zone

				00 bit: lower limit 01 bit: median limit 02 bit: upper limit
4	2-byte integer	Sensor status	0~1	0: normal 1: sensor error, read only
5	2-byte integer	Input and output status		00 bit: OUT1 01 bit: OUT2 02 bit: OUT3 03 bit: OUT4 04 bit: OUT5 05 bit: OUT6 08 bit: IN1 09 bit: IN2 10 bit: IN1 11 bit: IN2 The whole register is read-write, 00-05 is read-write,

				08-11 is read only
6	4-byte long integer	Peak value	0~999999	Write 0 to reset peak value
8	4-byte long integer	Lower limit value	0~999999	Read-write
10	4-byte long integer	Median limit value	0~999999	Read-write
12	4-byte long integer	Upper limit value	0~999999	Read-write
14	4-byte long integer	Division value	1, 2, 5	Read-write
15	4-byte long integer	Full scale	1~999999	Read-write
17	4-byte	Zero	1~999999	Read-write

	long integer	setting range		
19	4-byte long integer	Start-up zero setting range	1~999999	Read-write
21	2-byte integer	Zero trace range	0~999	Read-write
22	2-byte integer	Zero trace time	0~99	Read-write
23	2-byte integer	Current 4mA output calibration value	0~1000	Read-write
24	2-byte integer	Current 20mA	0~4095	Read-write

		output calibration value		
25	4-byte long integer	Comparison triggering value	0~999999	Read-write
27	4-byte long integer	Peak value reset value	0~999999	Read-write
29	2-byte integer	Zero and gain calibration triggering		00 bit: Zero calibration, effective when writing 1 01 bit: Gain calibration, effective when writing 1
30	4-byte long integer	Weights	1~999999	Read-write

6.2 Continuous Output Format

This communication protocol requires to set the `E2 EFS` as 1. Under this mode, when the controller is in weighing status, it will output real-time weight data to the serial port, for instance, current display is +123456, then the data sent by the controller will be as below:

```
ST,GS,+0123456[OD][OA]
```

OL==over load; ST==stable; US==unstable; NT==net weight;

GS==gross weight

Chapter VII. Notes

Note 1: Explanation on Communication Data Type

All 2-byte integer data is 32-bit unsigned integer data; all 4-byte long integer is 32-bit signed long integer data.

Note 2: Explanation on Limit Judgment Function

1. Real-time comparison: Under Functional Parameters

in the secondary menu, select 0 as the `b3 bJF` “comparison mode” to enable this function, namely the limit output will output the real-time measured value displayed on the upper row.

2. Auto comparison: Under Functional Parameters in the

secondary menu, select 1 as the `b3 bJF` “comparison mode” to enable this function, when real-time measured value exceeds the set value of `b4 bJc` “auto comparison triggering value”, it will make judgment and output after a period of delay set in `b5 bJt` “comparison delay”. (This function is to prevent to output misjudged signal in drop

test.)

3. External input triggered comparison: Under Functional Parameters in the secondary menu, select 2 as the

b3 bJF “comparison mode” to enable this function, when there is input port “enabled” and pulse signal input, it will make judgment and output after a period of delay set in **b5 bJt** “comparison delay”. (This function is to prevent faulty action when the previous / next working station has not completed the input)

4. Peak value comparison: Under the Functional Parameters in the secondary menu, select 1 as the

b8 PdL “judgment source” to enable this function, when the **b3 bJF** “comparison mode” is selected as 1, the limit output will output the real-time measured value displayed on the lower row; when the **b3 bJF**




“comparison mode” is selected as 1, and the real-time measured value exceeds the value set in **b4 bJc** “auto comparison triggering value”, it will make judgment and output after a period of delay set in **b5 bJt** “comparison delay”; when the **b3 bJf** “comparison mode” is selected as 2, and there is input port “enabled” and pulse signal input, it will make judgment and output after a period of delay set in **b5 bJt** “comparison delay”.

Note 3: Explanation on Judgment Mode (X is the real-time weight value or peak value)

Judgment mode	$X <$ lower limit	Lower limit $< X <$ median limit	Median limit $< X <$ upper limit	Upper limit $< X$
0	Lower limit output	Median limit output	Upper limit output	No output
1	No output	Lower limit output	Median limit output	Upper limit output

2	Lower limit output	Median limit output	Upper limit output
When selecting 2, there is no need to set median limit parameter, it will make judgment according to the lower limit and upper limit.			

Note 4. Operation of Restoring Factory Settings

Keep pressing  to start up, wait until the interface is displayed as (Figure 5) and release , input “000111” and then press  to restore to the factory default parameters. (the calibration results will not be restored)



(Figure 5)

Note 5. Failure Alarm Message and Troubleshooting



This error alarm means overload

failure, please check whether the sensor is overloaded, or increase the full scale.



This error alarm means the failure of

sensor or AD, please check whether the wiring of sensor has any problem, or replace the sensor or controller.

Note 6. Optional Model and Hardware

B—4—JTG—AI4

B: Transmitting comparison

P: Batching

D: Quantitative ration

J: Quantity reduction

AI4: Analog current 4-20mA

AV0: Analog voltage 0-10V

AV1: Analog voltage 1-5V

000: No analog quantity

4: RS485 communication

2: RS232 communication

C: CAN communication

0: No communication

JTG: Transistor output

JDQ: Relay output

000: No I/O