TR700

DIGITAL LOADCELL TRANSMITTER

INSTRUCTION MANUAL

V01.14

LONGTEC

Note:

- Observe the instruction manual carefully before using the weighing indicator for the first time, where you can find answers for many questions existing in the site operation.
- Check whether the other accessories of the weighing system match.
- Avoid being exposed in direct sun shine, splashing of water and physical shocks.
- Equip with the installation and repairing tools as possible: the mini-type minus screw driver, digital multimeter, load cell simulator (mV signal generator).

CONTENT

1. General Instruction

1.1. Instruction

TR700 strain load cell, digital transmitter (transmitter for short) is a kind of multi-purpose signal converter, integrating display, transmitting and control, with the function of serial digital signal output and analog output etc. It is small and light, adopting guide way installation. Besides, it is strictly tested by EMC, of high reliability, and adopts key operation and LED display at the same time. It is applicable to all kinds of load cells of resistance strain gauge used in testing of pull, pressure, tension, weighing material level, hopper scale, crane scale, hook scale, and tension & pressure testing machine etc. Moreover, the analog load cell can be updated digitally, so that it could be widely used for weighing and tension measurement in provision, light industry, metallurgy, building material, chemical industry, colored metal, energy, and mechanism etc.

Terms Related	Definition
Scale Division	The change of the show value in unit; Only one of the numerical values (1, 2, 5, 10, 20, or 50) is optional.
Excitation Voltage	The voltage to drive the resistance strain gauge sensor, provided by the display
Resistance Strain Gauge Sensor	It is a kind a assembly, converting force or weight data to voltage signal One resistance Gauge sensor contains two parts: one is a kind of metal assembly called elastomer, deformed linearly via the force acting on it; the other is a kind of strain chip, the resistance of which will change via the magnitude of the elastomer’s deformation.
Output Ratio of Resistance Strain Gauge Sensor	The ratio of output signal voltage and excitation voltage of resistance strain Gauge sensor, which is also called output sensitivity
Maximum Capacity	The maximum that the weighing display could display; It is preset before.
Resolution	The minimum signal the meter can differentiate
Tare Load	The weight of the carrying device which can make the resistance strain Gauge sensor output voltage
Weighing Division	The change of calibrating weight in unit, displayed on the weighing display

2. Technical Parameters

2.1. General Specifications

1. Power supply : DC 24V (18V～30V)
2. Power consumption : Max. 10W
3. Operating temperature : -5℃～to 45℃（23℉～117℉）
4. Humidity : ≤90% relative humidity（no condensation）
5. Weight : Approx. 0.5kg

2.2. Digital

1. Digital display : 6 digits LED
2. LED height : 10 mm
3. Indicator : Display the gross weight, the net weight, weight variation, zero position, weight unit (Kg)
4. Negative display : '-'is at the most left digit
5. Overload display : Display "O.L"
6. Scale capacity : 100～900,000
7. Scale division : 1，2，5，10，20 or 50
8. Decimal point : 4 different positions optional

2.3. Analog

1. Load cell type : All kinds of resistance strain gauge force and weighing load cell
2. Load cell in/output voltage : DC 10V±5%，Maximum230mA
3. Output sensitivity : 0.5μ V/D～200μ V/D
4. Input resistance : The resistance between each terminal can't be less than 100MΩ at DC 500V
5. Zero voltage adjustment : 0.05mV～15.0mV
6. Input signal range : 0mV～+31mV
7. Capacity stability : ±8ppm/k of the reading
8. Temperature coefficient : ≤（0.0008% of the reading +0.3 division）/℃
9. Non-linear deviation : ≤0.005% of F.S
10. Conversion method : Delta-sigma
11. Sampling speed : Max. 100 times per second
12. Internal resolution : 16,000,000
13. Maximum display division : 50,000 divisions
14. Comparison cycle : Approx. 100 times per second：

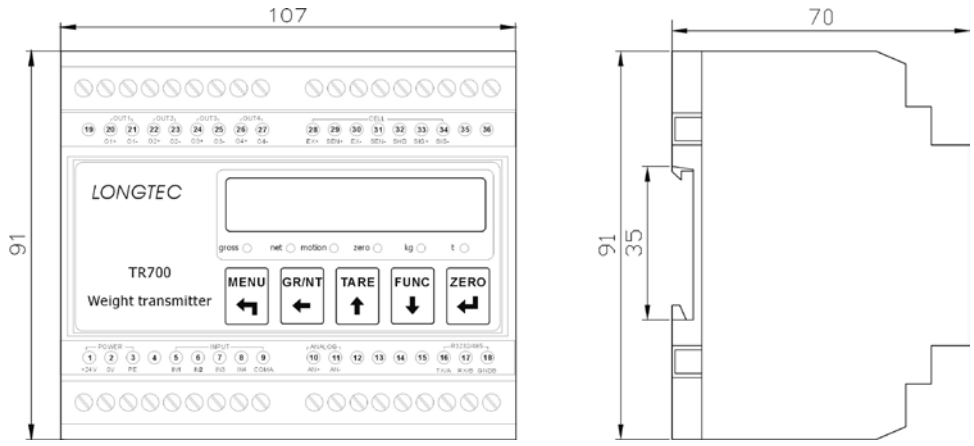
Standard Accessory	Digital output	： RS232 /RS485
Optional Accessory	Analog ouput	： 0～5V，0～10V，1~5V, 0～20mA, 4～20mA optional

3. Installation and Connection

3.1 Caution

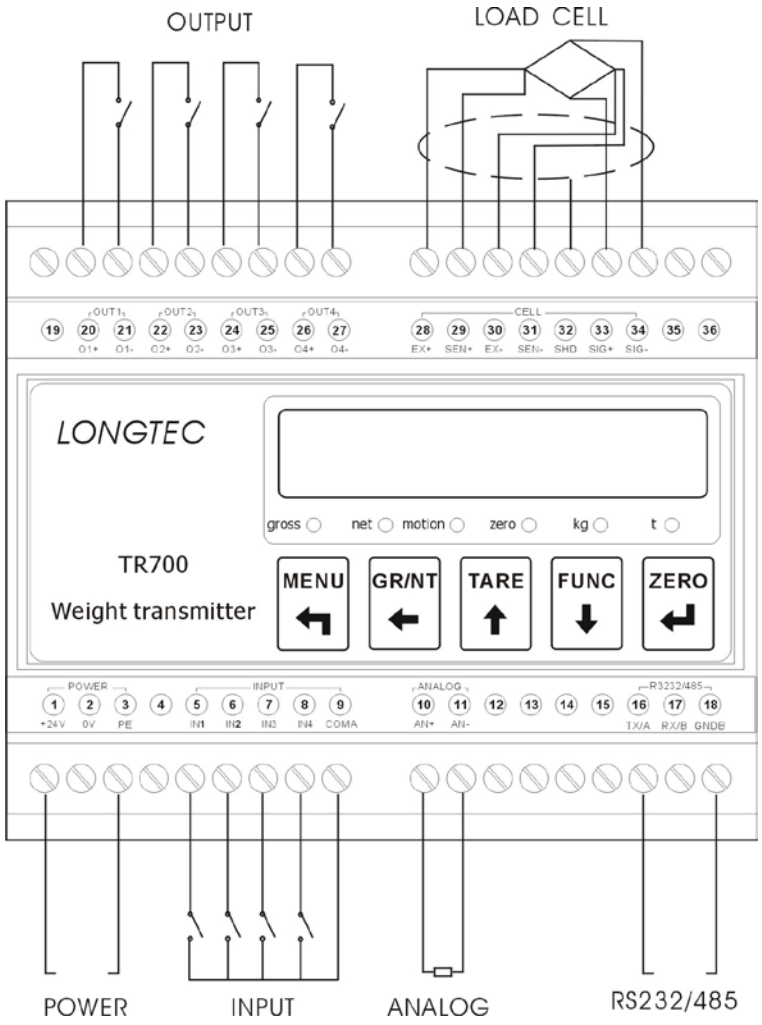
- Avoid being exposed to direct sun shine, an abrupt change of temperature and vibration；
- The meter is in the best working state When temperature is approximate 20℃ or 68℉ and relative humidity is about 50%;
- It was tested by EMC, having the strong anti-interference ability. However, the analogue output of sensors and in/output of RS232/RS485 is very sensitive to electronic noise, so forbid connecting these signal cores with the power lines together, or the meter will be disturbed. Meanwhile, keep these signal wires away from meters and other equipments' AC power. And shorten the length of signal wires or coaxial cables at the same time.
- The ultimate accuracy of the weighing system is determined by the selection of weighing sensors, installation, weight, signal connection, power etc together, not just by one of them.;
- Analogue output is supported by single power, and the common terminal of the power can't be connected with other common wires or shielded wires together in case of short circuit or damaging the meter.
- The shielded wire of weighing sensor and signal wires or impulsive wires can't compose a circuit, or the input signal of the meter will not be stable.

3.2 Dimensions



Vertical view **Side view**

3.3 Wire Connection and Interfaces



Charm 3-2 TR700 Wire Connection

Number	Definition	Description
1	＋24V	The positive polarity of the module's power supply，24V(18V-30V), switch power supply
2	0V	The ground of the module's power
3	PE	The protection of the module, for ground
4	Reservation	
5	IN1	Digital input 1, Passive Connection Point
6	IN2	Digital input 2, Passive Connection Point
7	IN3	Digital input 3, Passive Connection Point
8	IN4	Digital input 4, Passive Connection Point
9	COMA	Digital input for ground
10	AN+	Analog output+
11	AN-	Analog output-
12		NC
13		NC
14		NC
15		NC
16	TX/A	RS232 send terminal, RS485 A signal terminal
17	RX/B	RS232 receive terminal, RS485 B signal terminal
18	GNDB	RS232 和 RS485 ground wire
19		NC
20	O1+	Solid relay output 1
21	O1-	Solid relay output 1
22	O2+	Solid relay output 2
23	O2-	Solid relay output 2
24	O3+	Solid relay output 3
25	O3-	Solid relay output 3
26	O4+	Solid relay output 4
27	O4-	Solid relay output 4
28	EX+	Excitation voltage output+
29	SENSE+	Solid relay feed up+
30	EX-	Excitation voltage output-
31	SENSE-	Solid relay feed up-
32	SHD	The shield of sensors
33	SIG+	Signal input+
34	SIG-	Signal output-
35		NC
36		NC

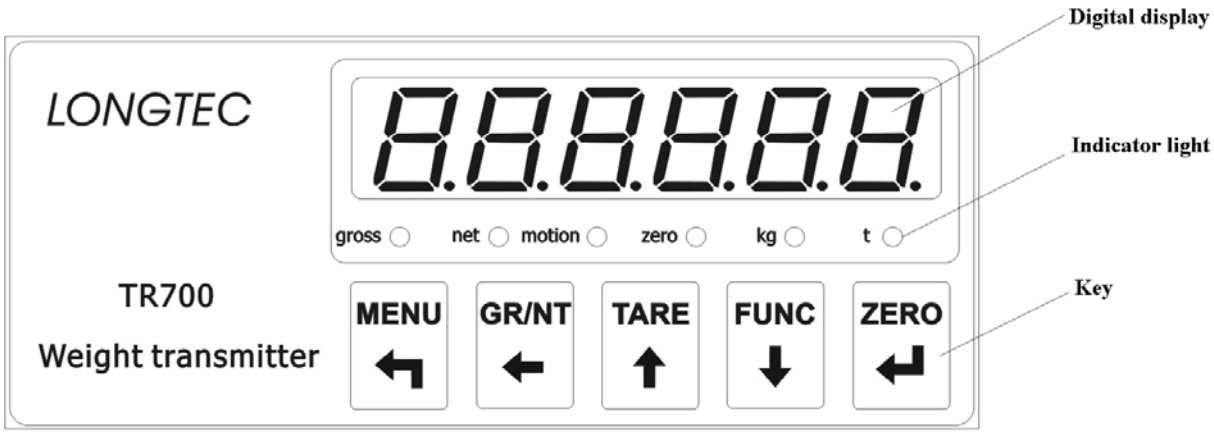
Table 3-1 the List of Terminals

It is only used as a signal transmitting. When multi-load cells are used, a junction box is to be used to connect them in a parallel circuit and the final weighing signal is sent to the transmitter. The cable between the junction box and the transmitter must have metal shielding. Refer to the Table 3-2.

Table 3-2

The amount of load cells of 350Ω connected together	Wire of NO.24（m）	Wire of NO.20（m）	Wire of NO.16（m）
1	240	600	1200
3	60	180	300
8（maximum）	40	120	200

3.4 Display panel



1,

Display Window

It is six-bit LED display, mainly used to display weight data or the other functional parameters. After it is connected to the power supply, it displays ‘8.8.8.8.8.8.’for about 5 seconds, and then automatically enters the weighing status.

The details are as follows.

Table 3-3

Display status	Weighing display	Function setting	Calibration	Higher/lower limit setting	Diagnosis
Display contents	Weighing value	Functional parameter	Calibration parameter	Higher/lower limit parameter	Diagnosis parameter

2, Status Lamp

Light	ON	OFF	Note
Gross	Display the gross weight of the front panel.		Only one light of Gross or Net is on in the weighing display state.
Net	Display the net weight of the front panel.		
Motion	Scale on motion	Scale on the stable state	
Zero	The gross weight is zero.	The gross weight is not zero.	

Kg	The unit is kilogram.		Only one light of Kg or T is on in the weighing display state.
T	The unit is ton		

3, Key

From left to right： 

Table 3-5

Key	Function	Description
	Menu	1）In the weighing status, enter the menu; 2）In the menu setting, quit the menu; 3）In the sub-menus, enter the next sub-menu without saving the parameters.
	Gross/Net	1）In the weighing status, exchange the state of net weight or gross weigh; 2）In the state of inputting data，move left.
	Tare	1）In the weighting status, it is a key‘tare’（tare range：80% of the max capacity; 2）In the menu setting, enter the former menu; 3）In the state of inputting data, increase the value.
	Function	1）In the menu setting, enter the next menu; 2）In the state of inputting data，decrease the value.
	Zero	1）In the weighing status, clear zero; 2）In the menu setting, conform; 3）In the sub-menu，save the parameters and enter the next sub-menu .

4. Basic Operation Diagram

4.1 Block Diagram

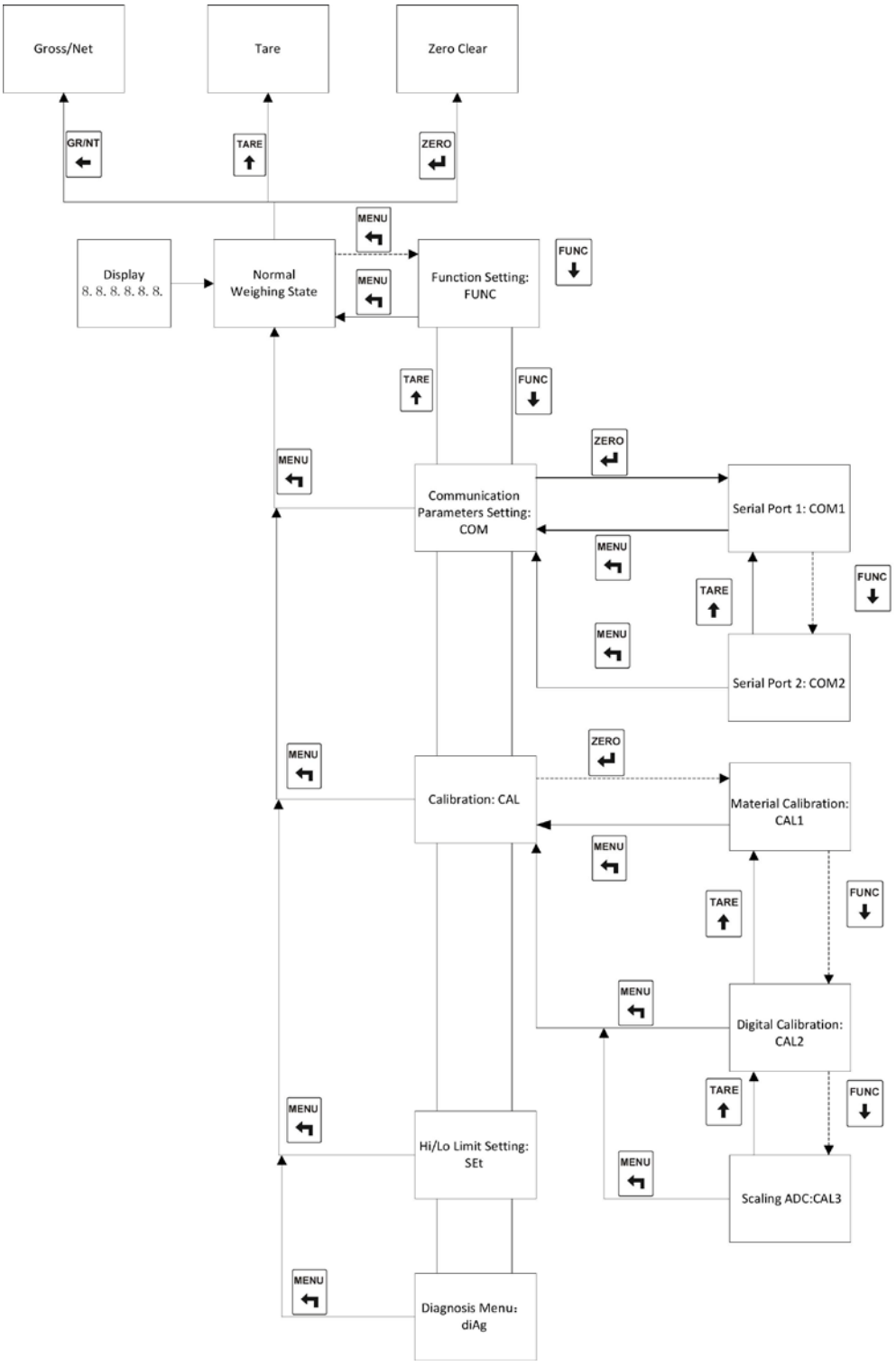


Diagram 4-1 Block Diagram

4.2 TR700 Operation Flow Chart

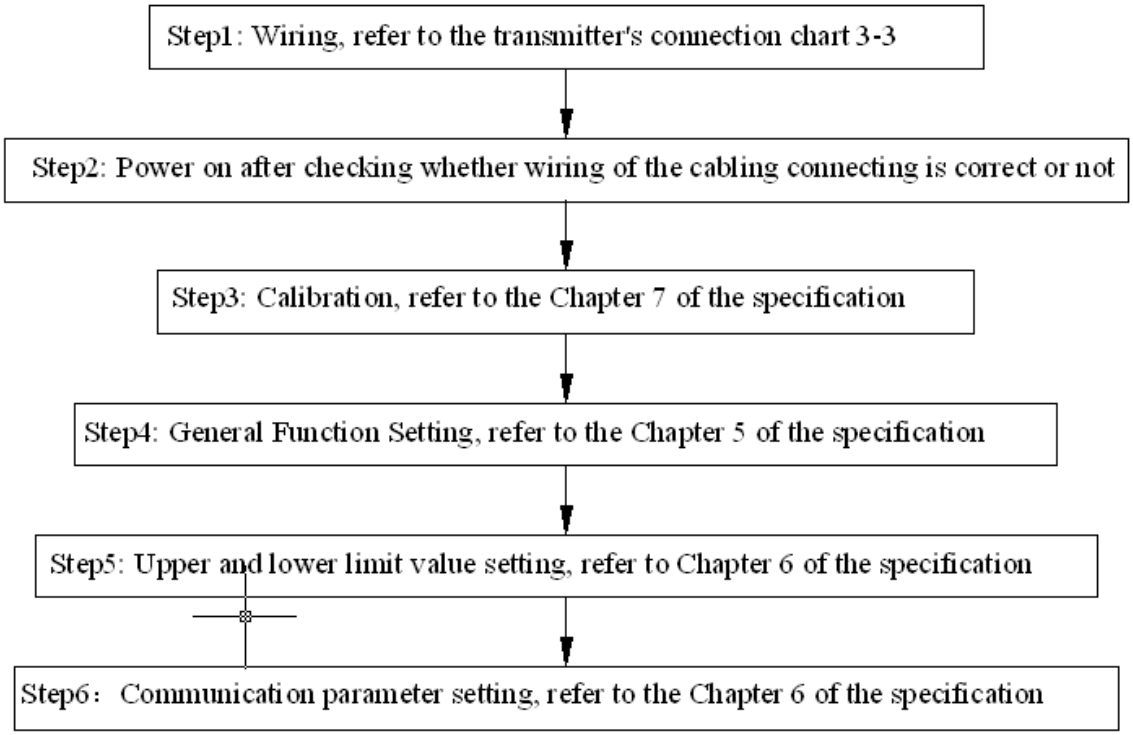


Chart 4-2 TR700 Basic Flow Char

4.3 TR700 Function Tree

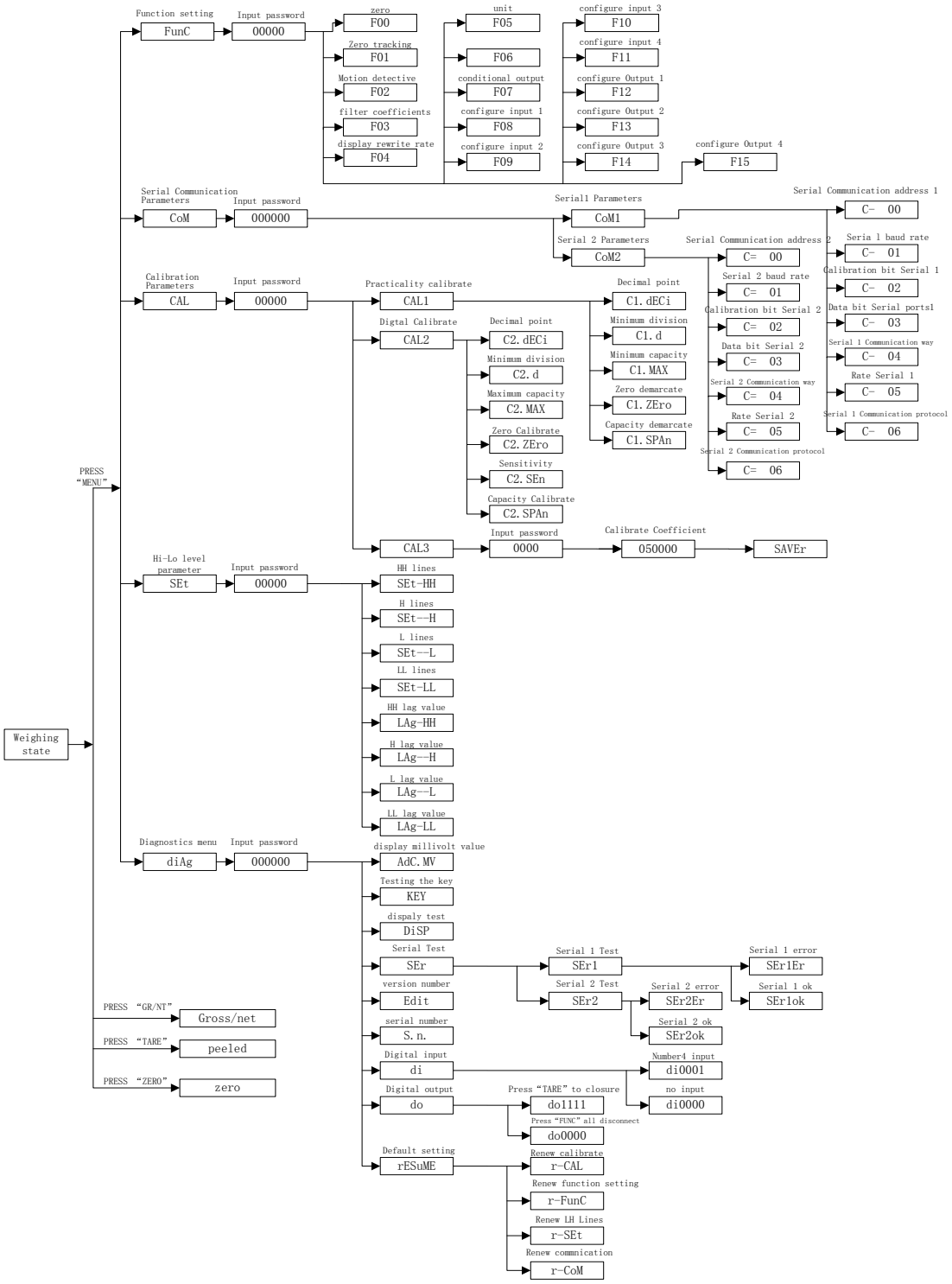


Chart 4-3 Function Tree

5. General Function Setting

5.1. Steps

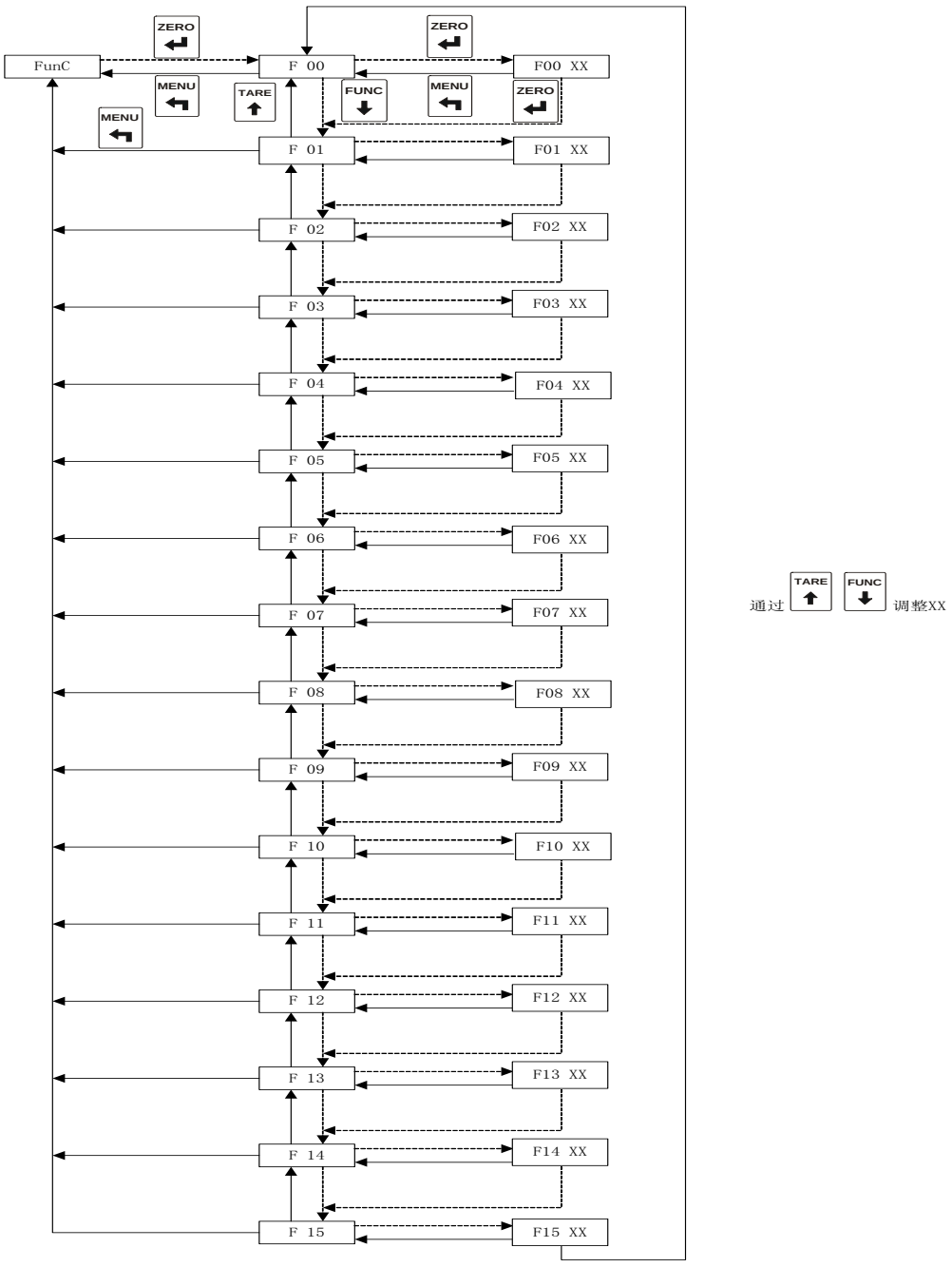


Chart 5-1 Function Parameter Setting Diagram

Press MENU to display “FUNC”, and press ZERO to display“F0 00”, and press the TARE、FUNC to select “F XX”，and then press ZERO to enter the parameter setting“FXX XX”. Press TARE、FUNC

to input parameters，and press ZERO to save the parameters and enter the next function setting,. Press MENU to get back to the former function setting without saving the parameters, and then go on pressing MENU to get back to “FUNC”, and press MENU again to get back to normal display.

5.2. Function Table

Number F XX	Name	Default	Setting		
			Parameters Range	Description	
00	Zero range	3	0-10	0 ： Zero function off; 1-10 ： It is 1%-10% of the capacity.	
01	Zero tracking range	0	0-10	The display must be in zero tracking range in 2s, and later it goes back to zero. 0 ： Do not perform zero tracking; 1-10 ： Display division.	
02	Motion detection range	3	0-10	0 ： Motion detection is off; 1-10 ： Display division.	
03	Filter coefficient	3	0-9	0 ： No filtering; 1-9 ： The larger the figure is, the greater the filter is.	
04	Display updating rate	3	0-4	0	1 times per second
				1	4 times per second
				2	8 times per second
				3	16 times per second
				4	30 times per second
05	Unit conversion	0	0-1	0	kg
				1	t
06	Sampling rate	0	0-3	0	25 times per second
				1	50 times per second
				2	100 times per second
				3	200 times per second
07	Conditions of comparison output	0	0-2	0	Gross weight
				1	Net weight
				2	Display value
08	Distribution of external control input 1	3	0-8	0	Gross/net
				1	Tare
				2	Clear zero
				3-7	Extended Functions
				8	Keyboard lock，only lock the “zero, tare, gr/nt” keys
				0	Gross/net

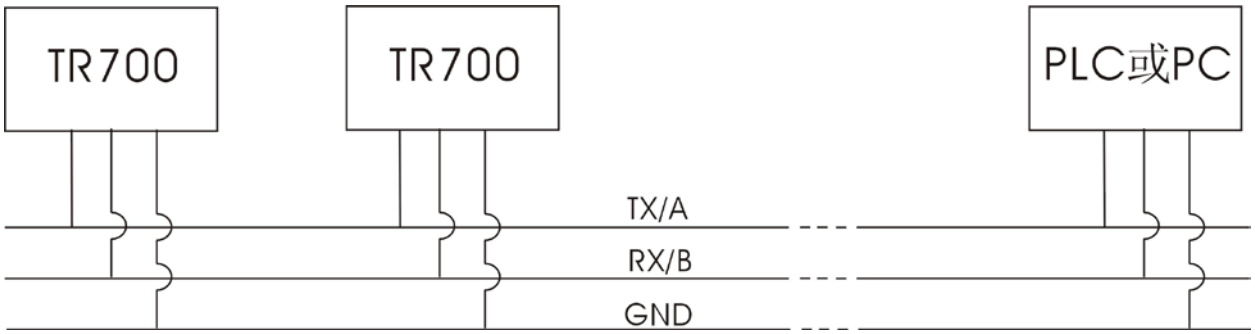
09	Distribution of external control input 2	3	0-8	1	Tare
				2	Clear zero
				3-7	Extend Functions
				8	Keyboard lock，only lock the “zero, tare, gr/nt” keys
10	Distribution of external control input 3	3	0-8	0	Gross/net
				1	Tare
				2	Clear zero
				3-7	Extended Functions
				8	Keyboard lock，only lock the “zero, tare and gr/nt” keys
11	Distribution of external control input 4	3	0-8	0	Gross/net
				1	Tare
				2	Clear zero
				3-7	Extended Functions
				8	Keyboard lock，only lock the “zero, tare and gr/nt” keys
12	Distribution of relay output 1	1	0-8	0	Forbidden output
				1	Hi-Hi limit output
				2	Hi limit output
				3	Lo limit output
				4	Lo-Lo limit output
				5-8	Extended function
13	Distribution of relay output 2	2	0-8	0	Forbidden output
				1	Hi-Hi limit output
				2	Hi limit output
				3	Lo limit output
				4	Lo-Lo limit output
				5-8	Extended function
14	Distribution of relay output 3	3	0-8	0	Forbidden output
				1	Hi-Hi limit output
				2	Hi limit output
				3	Lo limit output
				4	Lo-Lo limit output
				5-8	Extended function
15	Distribution of relay output 4	4	0-8	0	Forbidden output
				1	Hi-Hi limit output
				2	Hi limit output
				3	Lo limit output
				4	Lo-Lo limit output
				5-8	Extended function

6. Communication Parameters and Communication Protocol

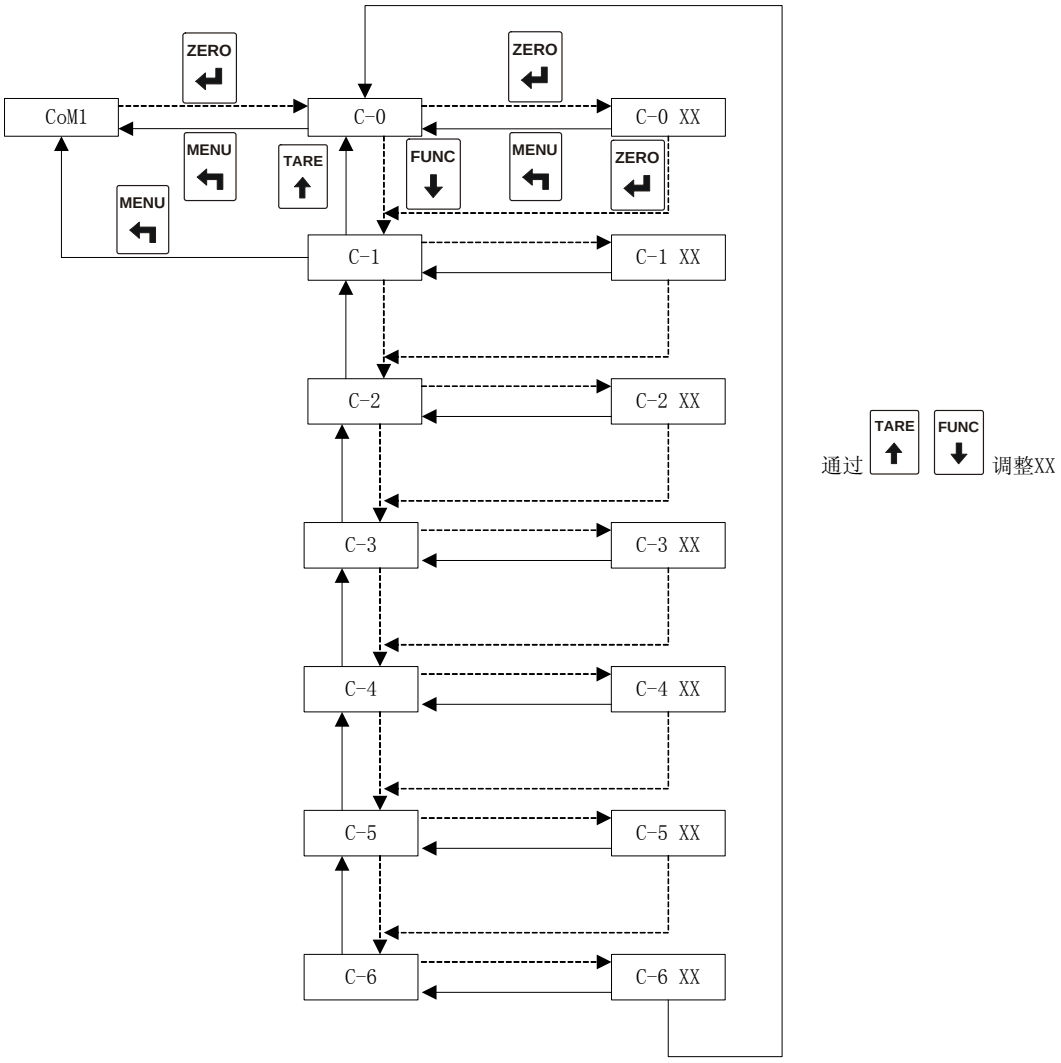
6.1. RS232/RS485 Communication Selections

TR700 can be calibrated directly through interface that maybe choose one by switch. Two communication modes of the TR700's serial interface 1, RS232 and RS485, are optional. It is chosen by the data-chosen-switch. Refer to the following chart.

While the blue is on the left, and the RS232 is chosen; while on the right, the RS485 is chosen.



6.2. Communication Parameter Setting of Serial Interface 1



6.3. List of Communication Parameters of Serial Interface 1

Number C-XX	Name	Default	Setting		
			Parameter range	Description	
00	Communication address	1	0-99	Communication address	
01	Baud rate	1		0	4800 bps
				1	9600 bps
				2	19200 bps
				3	38400 bps
				4	57600 bps
				5	115200 bps
02	Parity bit	2	0-2	0	Non
				1	Odd
				2	Even
03	Data bit	0	0-1	0	7
				1	8
04	Communication mode	1	0-1	0	Continuous mode
				1	instruction mode
05	Communication rate	2	0-5	0	4 times per second
				1	8 times per second
				2	16 times per second
				3	20 times per second
				4	32 times per second
				5	50 times per second
				6	60 times per second
06	Communication protocol	0	0-3	0	Zhimei protocol
				1	Modbus protocol
				2	Longtec protocol

6.4. Communication Protocol of Serial Interface 1

6.4.1. Zhimei Protocol

6.4.1.1. Signal Format

Data bit = 7 or 8;

Parity bit = 1（non, even or odd）;
Stop bit = 1;
Code standard = ASCⅡcode;
Ending code = CR/LF.

7-bit odd parity, 7-bit even parity, 8-bit no parity, 8-bit odd parity and 8-bit even parity are optional.

6.4.1.2.Datagram Format

Status 1			Status 2			Data (polarity, decimal point)								Unit		Ending code	
S	T	,	G	S	,	+		0	0	0	0	0	0	K	g	CR	LF

	ASCII	Hexadecimal	Description
Status 1	ST	【53 54】	Stable
	US	【55 53】	Unstable
	OL	【4F 4C】	Over load
Status 2	GS	【47 53】	Gross weight
	NT	【4E 54】	Net weight
Delimiter	“, ”	【2C】	
Data（ASCII）	0~9	【30～9】	
	“+”	【2B】	
	“-”	【2D】	
	“space”	【20】	
	“.”	【2E】	g
Unit	“space”g	【20 67】	kg
	“kg”	【6B 67】	T

Note: If there is no decimal point, the 8th bit is “space”.

6.4.1.3.Instruction of Zhimei Protocol

Instruction	TR700 output	Description
<ENQ>IDXX<CR><LF>	<ACK>XX<CR><LF>	Read the meter’s address
READ	ST,GS,+ XXXXX.Xkg <CR><LF>	Read the actual value
TARE ON<CR><LF>	YES<CR><LF> or NO? <CR><LF>	Exclude tare
TARE OFF<CR><LF>	YES<CR><LF> or NO? <CR><LF>	Clear tare
ZERO ON<CR><LF>	YES<CR><LF> or NO? <CR><LF>	Clear zero
ZERO OFF<CR><LF>	YES<CR><LF> or NO?	Relieve zero

	<CR><LF>	

6.4.2. Modbus Protocol

6.4.3.1.Signal Format

Data bit = 8;
Parity bit = 1(non, even or odd);
Stop bit = 1;
Code standard = hexadecimal.

8-bit no parity, 8-bit odd parity and 8-bit even parity are optional.

6.4.3.2.Datagram Format

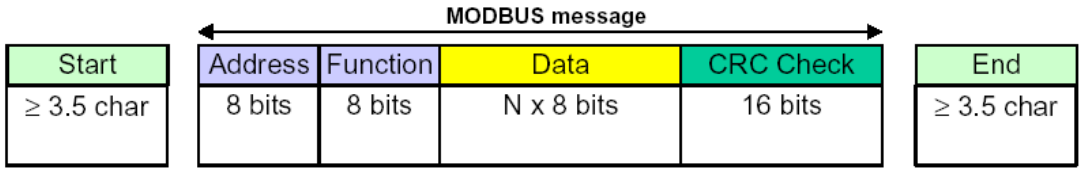
TR700 Modbus protocol is in RTU (Remote Terminal Unit) communication mode.。A byte (8 bits) in the message contains two 4-bit hexadecimal characters.

RTU Mode

Address	Function code	The number of data	Data 1	...	Data n	CRC high byte	CRC low byte

Address Domain **Function Domain** **Data Domain** **Fault Checking Domain**

The delimitation of frame: In the mode of MODBUS，the interval between two characters' sending or receiving can not exceed 1.5 times of the transmitting time of every character. If it exceeds 3.5 times of the transmitting time of every character, it is considered that the data of this frame has been all received and a new frame starts transmitting.



Startup bit	1	2	3	4	5	6	7		8	Parity bit	Stop bit

The bit serial number in the RTU mode with parity bit

Startup bit	1	2	3	4	5	6	7		8	Stop bit	Stop bit

The bit serial number in the RTU mode without parity bit

List of Communication Parameter of TR700 Modbus

Address code	Data domain	The code of reading function	The code of writing function	
		03	06	16
40001	Display the higher 16 bits	Y	-	-

	(the 16 bits of the register)			
40002	Display the lower 8 bits (the lower 8 bits of the register)	Y	-	-
40003	Meter's status （the lower 8 bits of the register）	Y	-	-
40004	DI status （the lower 8 bits of the register）	Y	-	-
40005	DO status （the lower 4 bits of the register）	Y	Y	-
40006	Hi-hi limit higher 16 bits （the 16 bits of the register）	Y	-	Y （It must be continuous from 06 to 17.）
40007	Hi-hi limit lower 8 bits （the lower 8 bits of the register）	Y	-	
40008	Up limit higher 16 bits （the 16 bits of the register）	Y	-	
40009	Up limit lower 8 bits （the lower 8 bits of the register）	Y	-	
40010	Low limit higher 16 bits （the 16 bits of the register））	Y	-	
40011	Low limit lower 8 bits （the lower 8 bits of the register）	Y	-	
40012	Low-low limit lower 8 bits （the lower 8 bits of the register）	Y	-	
40013	Low-low limit lower 8 bits （the lower 8 bits of the register）	Y	-	
40014	Hi-hi limit lag （the lower 8 bits of the register）	Y	Y	
40015	Up limit lag（ the lower 8 bits of the register）	Y	Y	
40016	Low limit lag （the lower 8 bits of the register）	Y	Y	
40017	Low-low limit lag （the lower 8 bits of the register）	Y	Y	
40018	The range of zero （the lower 8 bits of the register）	Y	Y	Y （It must be continuous from 18 to 33.）
40019	The range of zero tacking （the lower 8 bits of the register）	Y	Y	
40020	Motion detection （the lower 8 bits of the register）	Y	Y	
40021	Filtering coefficient （the lower 8 bits of the register））	Y	Y	
40022	The display updated ratio （the lower 8 bits of the register）	Y	Y	

40023	Unit conversion （the lower 8 bits of the register）	Y	Y	
40024	Reservation (the lower 8 bits of the register）	Y	Y	
40025	Conditions of comparison output （the lower 8 bits of the register）	Y	Y	
40026	The distribution of the external control input 1 （the lower 8 bits of the register）	Y	Y	
40027	The distribution of the external control input2 （the lower 8 bits of the register）	Y	Y	
40028	The distribution of the external control input3 （the lower 8 bits of the register）	Y	Y	
40029	The distribution of the external control input4 （the lower 8 bits of the register）	Y	Y	
40030	The distribution of relay output 1 （the lower 8 bits of the register）	Y	Y	
40031	The distribution of relay output 2 （the lower 8 bits of the register）	Y	Y	
40032	The distribution of relay output 3 （the lower 8 bits of the register）	Y	Y	
40033	The distribution of relay output 4 （the lower 8 bits of the register）	Y	Y	
40034	Decimal point （the lower 8 bits of the register）	Y	Y	-
40035	Scale division （the lower 8 bits of the register）	Y	Y	-
40036	The higher 16 bits of the capacity （the lower 8 bits of the register）	Y	-	Y
40037	The lower 16 bits of the capacity（the lower 8 bits of the register）	Y	-	
40038	The higher 16 bits of the calibration coefficient （the 16 bits of the register）	Y	-	Y
40039	he lower 16 bits of the calibration coefficient （the lower 8 bits of the register）	Y	-	
40040	The higher 16 bits of the calibration capacity （the 16 bits of the register）	-	-	Y
40041	The lower 16 bits of the calibration capacity	-	-	

	（the lower 8 bits of the register）			
40042	The higher 16 bits of the sensitivity （the higher 8 bits of the register）	-	-	Y
40043	The lower 16 bits of the sensitivity （the lower 8 bits of the register）	-	-	
40044	The higher 16 bits of the sensor capacity （the 16 bits of the register）	-	-	
40045	The lower 16 bits of the sensor capacity （the lower 8 bits of the register）	-	-	
40046	Clear to zero	-	Y	-
40047	Tare	-	Y	-
40048	Gross/net weight	-	Y	-
40049	Weigh (the range：-32768～+32767)	Y	-	-
40050	Calibrate zero	-	Y	-

Note：“Y”: The operation of the function code can be executed;

“-”: The operation of the function code is can not be executed.

🕮 The instructions of meter’s status word：

BIT0～BIT2 ： Decimal point;

BIT3 =1, updated, = 0, the data is invalid;

BIT4 =1, exceed the capacity, = 0, normal;

BIT5 =1, dynamic, = 0, static;

BIT6 =1, gross weight, = 0, net weight;

BIT7 =1, negative， = 0, positive.

🕮 DI status：

BIT0（IN1）: 1:IN1 closed 0：IN1 open

BIT1（IN2）: 1:IN2 closed 0：IN2 open

BIT2（IN3）: 1:IN3 closed 0：IN3 open

BIT3（IN4）: 1:IN4 closed 0：IN4 open

BIT4～BIT7：not used

🕮 DO status：

BIT0（OUT1）: 1:OUT1 close 0：OUT1 open

BIT1（OUT2）: 1:OUT2 close 0：OUT2 open

BIT2（OUT3）: 1:OUT3 close 0：OUT3 open

BIT3（OUT4）: 1:OUT4 close 0：OUT4 open

BIT4～BIT7：not used

🕮 Control DO：

B15	**B14**	**B13**	**B12**	**B11**	**B10**	**B9**	**B8**	**B7**	**B6**	**B5**	**B4**	**B3**	**B2**	**B1**	**B0**
0	**0**	**0**	**0**	**X**	**X**	**X**	**X**	**0**	**0**	**0**	**0**	**X**	**X**	**X**	**X**

The higher 8 bits and the lower bits of the register must be in accord.

🕮 The Instruction of Clear Zero：

When executing the function of clear zero, function code 06 is to be used and the 执行 read-in data must be 0xaa55.

If the read-in data is not be 0xaa55 or the display value exceeds the range of clear zero, the fault code 0x03 will be got.

🕮 **Tare Instruction：**

When executing the tare operation, function code 06 is to be used and the read-in data must be 0xaa55.

If the read-in data is not be 0xaa55 or the display value exceeds the range of clear zero, the fault code 0x03 will be got.

🕮 **The Execution of Gross/Net Weight Conversion：**

When executing the gross/net weight conversion, function code 06 is to be used and the read-in data must be 0xaa55.

🕮 **Zero Calibration：**

When calibrating zero, function code 06 is to be used and the read-in data must be 0xaa55.

Function code: 03 read and reserve the register's data

Example： The slaver's number is 01, and read the 1st and 2nd registers' data: the value got from the meter is 10000.

Request: Master		Response: Slaver	
Domain name	Data（hex）	Domain name	Data（hex）
Address domain	01	Address domain	01
Function code	03	Function code	03
Initial address higher (bytes)	00	Take count of bytes	04
Initial address lower (bytes)	00	Register's higher（01）	00
The reading data's higher (bytes)	00	Resister's lower（01）	27
The reading data's higher (bytes)	02	Register's higher（02）	00
		Resister's lower（02）	10

Function code： 06 Set Single Holding Register

Example： The slaver's number is 01, and set the data of the 18th register 05.

Request: Master		Response: Slaver	
Domain name	Data（hex）	Domain name	Data

			（hex）
Address domain	01	Address domain	01
Function code	06	Function code	06
Setting address higher (bytes)	00	Setting address higher (bytes)	00
Setting address lower (bytes)	11	Setting address lower (bytes)	11
Setting data higher (bytes)	00	Setting data higher (bytes)	00
Setting data lower (bytes)	05	Setting data lower (bytes)	05

Function code： 0X10 Set Multi-holding-Register

Example: Hi-hi limit value：5000 Higher limit value：4000

Lower limit value：3000 Lo-lo limit：2000

Hi-hi Limit Lag: 16 Higher Limit Lag: 17 Lower Limit Lag: 18 Lo-lo Limit Lag: 19

The slaver’s number is 01. Set 12 registers’ values from the 6th one to the 12th one.

Request		Response	
Domain name	Data （hex）	Domain name	Data （hex）
Address domain	01	Address domain	01

Function code	10	Function code	0F
Setting address higher (bytes)	00	Setting address higher (bytes)	00
Setting address lower (bytes)	05	Setting address lower (bytes)	05
Setting data higher (bytes)	00	Setting data higher (bytes)	00
Setting data lower (bytes)	0C	Setting data lower (bytes)	0C
Take count of bytes	18		
Data 1 (higher byte)	00		
Data 1 (lower byte)	13		
Data 2 (higher byte)	00		
Data 2 (lower byte)	88		
Data 3 (higher byte)	00		
Data 3 (lower byte)	0F		
Data 4 (higher byte)	00		
Data 4 (lower byte)	A0		
Data 5 (higher byte)	00		
Data 5 (lower byte)	0B		
Data 6 (higher byte)	00		
Data 6 (lower byte)	B8		
Data 7 (higher byte)	00		
Data 7 (lower byte)	07		
Data 8 (higher byte)	00		
Data 8 (lower byte)	D0		
Data 9 (higher byte)	00		
Data 9 (lower byte)	10		
Data 10 (higher byte)	00		
Data 10 (lower byte)	11		
Data 11 (higher byte)	00		
Data 11 (lower byte)	12		
Data 12 (higher byte)	00		
Data 12 (lower byte)	13		

6.4.3. Longtec Protocol

6.4.3.1.Signal Format

Data bit = 8;
Parity bit = 1（non, even or odd）;
Stop bit = 1;

Code standard = ASCⅡcode;
Code standard = hexadecimal.

8-bit no parity, 8-bit odd parity and 8-bit even parity are optional.

6.4.3.2.Datagram Format

Startup bit	Address	Command	Data length	Data domain	Parity
1 bit	1bit	1 bit	1 bit	Decided by the data length	1 bit

Description：

Startup bit：0x7e (It is regular.)

Meter address：The range is 0x01-0x63.

Data length：The length of data domain

Parity：The lower bits of the summation from the start up bit to the last bit of the data domain

6.4.3.3.Instructions of Longtec Protocol

6.4.3.3.1. Read the Actual Weighing Value

Request：Master		Response：Slaver	
Domain name	Data（hex）	Domain name	Data（hex）
Beginning code	7E	Beginning code	7E
Address	01-63	address	01-63
Function code	01	Function code	01
Length of data	0	Length of data	4
Checking	Accumulation	Weighing value（MMSB）	
		Weighing value（MSB）	
		Weighing value（LSB）	
		Status word of meter	
		Checking	Accumulation

🕮 The Description of Meter's Status Word：

BIT0～BIT2 ： Decimal point, range：0～4；
BIT3 =1，updated， = 0, the data is invalid；
BIT4 =1，exceed the capacity，= 0, normal；
BIT5 =1，dynamic， = 0, static；
BIT6 =1，gross weight， = 0, net weight；
BIT7 =1，negative， = 0, positive.

6.4.3.3.2. Read the Value of ad

Request：Master		Response：Slaver	
Domain name	Data（hex）	Domain name	Data（hex）
Beginning code	7E	Beginning code	7E
Address	01-63	Address	01-63
Function code	02	Function code	02
Length of data	0	Length of data	3
Checking	Accumulation	Mill volt value（MMSB）	
		Mill volt value（MSB）	
		Mill volt value（LSB）	
		Checking	Accumulation

6.4.3.3.3. Read the DIDO

Request：Master		Response：Slaver	
Domain name	Data（hex）	Domain name	Data（hex）
Beginning code	7E	Beginning code	7E
Address	01-63	Address	01-63
Function code	03	Function code	03
Length of data	0	Length of data	1
Checking	Accumulation	Status of switching variable	
		Checking	Accumulation

🕮 Description of Status of Switching Variable：

B7	B6	B5	B4	B3	B2	B1	B0
IN4	IN3	IN2	IN1	OUT4	OUT3	OUT2	OUT1

6.4.3.3.4. Clear to Zero

Request：Master		Response：Slaver	
Domain name	Data（hex）	Domain name	Data（hex）
Beginning code	7E	Beginning code	7E
Address	01-63	Address	01-63
Function code	10	Function code	10

Length of data	0	Length of data	1
Checking	Accumulation	Status word of response	
		Checking	Accumulation

🕮 Description of Status Word of Response：

= 0xaa，Successful;

= 0x55，Failed.

6.4.3.3.5. Cancel Clearing to Zero

Request：Master		Response：Slaver	
Domain name	Data（hex）	Domain name	Data（hex）
Beginning code	7E	Beginning code	7E
Address	01-63	Address	01-63
Function code	11	Function code	11
Length of data	0	Length of data	1
Checking	Accumulation	Status word of response	
		Checking	Accumulation

🕮 Description of Status Word of Response：

= 0xaa, Successful;

= 0x55, Failed.

6.4.3.3.6. Tare

Request：Master		Response：Slaver	
Domain name	Data（hex）	Domain name	Data（hex）
Beginning code	7E	Beginning code	7E
Address	01-63	Address	01-63
Function code	12	Function code	12
Length of data	0	Length of data	1
Checking	Accumulation	Status word of response	
		Checking	Accumulation

🕮 Description of Status Word of Response：

= 0xaa, Successful;

= 0x55, Failed.

6.4.3.3.7. Cancel Tarring

Request：Master		Response：Slaver	
Domain name	Data（hex）	Domain name	Data（hex）
Beginning code	7E	Beginning code	7E
Address	01-63	Address	01-63
Function code	13	Function code	13

Length of data	0	Length of data	1
Checking	Accumulation	Status word of response	
		Checking	Accumulation

🕮 Description of Status Word of Response：:

= 0xaa, Successful;

= 0x55, Failed.

6.4.3.3.8. Net/Gross Weight Conversion

Request：Master		Response：Slaver	
Domain name	Data（hex）	Domain name	Data（hex）
Beginning code	7E	Beginning code	7E
Address	01-63	Address	01-63
Function code	14	Function code	14
Length of data	0	Length of data	1
Checking	Accumulation	Status word of response	
		Checking	Accumulation

🕮 Description of Status Word of Response：

= 0xaa, Successful;

= 0x55, Failed.

6.4.3.3.9. Update DO Output

Request：Master		Response：Slaver	
Domain name	Data（hex）	Domain name	Data（hex）
Beginning code	7E	Beginning code	7E
Address	01-63	Address	01-63
Function code	15	Function code	15
Length of data	1	Length of data	1
Checking		Status word of response	1
	Accumulation	Checking	Accumulation

🕮 Description of Control Code：

The higher four bits and the lower four bits must be in accord. The bits from the higher to the lower correspond to OUT4、OUT3、OUT2、OUT1 respectively.

b7 = b3		B6 = b2		B5 = b1		B4 = b0	
1	0	1	0	1	0	1	0
OUT4 closed	OUT4 open	OUT3 closed	OUT3 open	OUT2 closed	OUT2 open	OUT1 closed	OUT1 open

🕮 Description of Status Word of Response：

If the higher four bits and the lower four bits are not in accord, get back to 0x75. If they are in accord, get back to the following table.

b7 = b3		B6 = b2		B5 = b1		B4 = b0	
1	0	1	0	1	0	1	0
OUT4 Successfully modified	OUT4 Unsucces-sfully modified	OUT3 Successfully modified	OUT3 Unsucces-sfully modified	OUT2 Successfully modified	OUT2 Unsucces-sfully modified	OUT1 Successfully modified	OUT1 Unsucces-sfully modified

6.4.3.3.10. Read the Function Parameters

Request：Master		Response：Slaver		
Domain name	Data（hex）	Domain name		Data（hex）
Beginning code	7E	Beginning code		7E
Address	01-63	Address		01-63
Function code	20	Function code		20
Length of data	0	Length of data		4
Checking	Accumulation	Range of zero tracking	Range of clearing to zero	
		Filtering coefficient	Range of dynamic detection	
		Unit setting	Display updating rate	
		Conditions of comparison out	Sampling rate	
		Checking		Accumulation

The meanings of the parameters are referred to Table 5-1.

6.4.3.3.11. Read the Parameters of DIDO Distribution

Request：Master		Response：Slaver	
Domain name	Data（hex）	Domain name	Data（hex）
Beginning code	7E	Beginning code	7E

Address	01-63	Address		01-63
Function code	21	Function code		21
Length of data	0	Length of data		4
Checking	Accumulation	Distribution of input 2	Distribution of input 1	
		Distribution of input 4	Distribution of input 3	
		Distribution of output 2	Distribution of output 1	
		Distribution of output 4	Distribution of output 3	
		Checking		Accumulation

The meanings of the parameters are referred to Table 5-1.

6.4.3.3.12. Read the Parameters of Serial Port 1

Request：Master		Response：Slaver		
Domain name	Data（hex）	Domain name		Data（hex）
Beginning code	7E	Beginning code		7E
Address	01-63	Address		01-63
Function code	22	Function code		22
Length of data	0	Length of data		4
Checking	Accumulation	Baud rate	Communication address	
		Data bit	Parity bit	
		Communication rate	Communication mode	
			Communication protocol	
		Checking		accumulation

The meanings of the parameters are referred to Table 6-2.

6.4.3.3.13. Read the Parameters of Serial Port 2

Request：Master		Response：Slaver	
Domain name	Data（hex）	Domain name	Data（hex）
Beginning code	7E	Beginning code	7E
Address	01-63	Address	01-63
Function code	23	Function code	23
Length of data	0	Length of data	4

Checking	Accumulation	Baud rate	Communication address	
		Data bit	Parity bit	
		Communication rate	Communication mode	
			Communication protocol	
		Checking		accumulation

6.4.3.3.14. Read the Hi-hi Limit Value

Request：Master		Response：Slaver	
Domain name	Data（hex）	Domain name	Data（hex）
Beginning code	7E	Beginning code	7E
Address	01-63	Address	01-63
Function code	24	Function code	24
Length of data	0	Length of data	4
Checking	Accumulation	Hi-hi limit value（MMSB）	
		Hi-hi limit value（MSB）	
		Hi-hi limit value（LSB）	
		Hi-hi limit lag value	
		Checking	Accumulation

6.4.3.3.15. Read the Up Limit Value

Request：Master		Response：Slaver	
Domain name	Data（hex）	Domain name	Data（hex）
Beginning code	7E	Beginning code	7E
Address	01-63	Address	01-63
Function code	25	Function code	25
Length of data	0	Length of data	4
Checking	Accumulation	Up limit value（MMSB）	

	Up limit value（MSB）	
	Up limit value（LSB）	
	Up limit lag value	
	Checking	Accumulation

6.4.3.3.16. Read the Low Limit Value

Request：Master		Response：Slaver	
Domain name	Data（hex）	Domain name	Data（hex）
Beginning code	7E	Beginning code	7E
Address	01-63	Address	01-63
Function code	26	Function code	26
Length of data	0	Length of data	4
Checking	Accumulation	Low limit value（MMSB）	
		Low limit value（MSB）	
		Low limit value（LSB）	
		Low limit lag value	
		Checking	Accumulation

6.4.3.3.17. Read the Lo-lo Limit Value

Request：Master		Response：Slaver	
Domain name	Data（hex）	Domain name	Data（hex）
Beginning code	7E	Beginning code	7E
Address	01-63	Address	01-63
Function code	27	Function code	27
Length of data	0	Length of data	4
Checking	Accumulation	Lo-lo limit value（MMSB）	
		Lo-lo limit value（MSB）	
		Lo-lo limit value（LSB）	
		Lo-lo limit lag	
		Checking	Accumulation

6.4.3.3.18. Read the Calibration Parameters

Request：Master		Response：Slaver	
Domain name	Data（hex）	Domain name	Data（hex）
Beginning code	7E	Beginning code	7E
Address	01-63	Address	01-63

Function code	28	Function code	28
Length of data	0	Length of data	6
Checking	Accumulation	Decimal point	
		Scale division	
		Capacity（MMSB）	
		Capacity（MSB）	
		Capacity （LSB）	
		Checking	Accumulation

6.4.3.3.19. Read the Calibration Coefficient

Request：Master		Response：Slaver	
Domain name	Data（hex）	Domain name	Data（hex）
Beginning code	7E	Beginning code	7E
Address	01-63	Address	01-63
Function code	29	Function code	29
Length of data	0	Length of data	3
Checking	Accumulation	Calibration coefficient（MMSB）	
		Calibration coefficient（MSB）	
		Calibration coefficient（LSB）	
		Checking	Accumulation

6.4.3.3.20. Set the Function Parameters

Request：Master			Response：Slaver	
Domain name		Data（hex）	Domain name	Data（hex）
Beginning code		7E	Beginning code	7E
Address		01-63	Address	01-63
Function code		30	Function code	30
Length of data		4	Length of data	1
Range of zero tracking	Range of clearing to		Status of	

	zero		response	
Filtering coefficient	Range of dynamic detection		Checking	Accumulation
Unit setting	Display updating rate			
Conditions of comparison output	Sampling rate			
Checking		Accumulation		

The meanings of the parameters are referred to Table 5-1.

🕮 Description of Status Word of Response：

= 0xaa, Successful;

= 0x55, Failed.

6.4.3.3.21. Set the Parameters of DIDO Distributor

Request：Master			Response：Slaver	
Domain name		Data（hex）	Domain name	Data（hex）
Beginning code		7E	Beginning code	7E
Address		01-63	Address	01-63
Function code		31	Function code	31
Length of data		4	Length of data	1
Distribution of input 2	Distribution of input 1		Status of response	
Distribution of input 4	Distribution of input 3		Checking	Accumulation
Distribution of output 2	Distribution of output 1			
Distribution of output 4	Distribution of output 3			
Checking		Accumulation		

The meanings of the parameters are referred to Table 5-1.

🕮 Description of Status Word of Response：

= 0xaa, Successful;

= 0x55, Failed.

6.4.3.3.22. Set the Parameters of Serial Port 1

Request：Master		Response：Slaver	
Domain name	Data（hex）	Domain name	Data（hex）
Beginning code	7E	Beginning code	7E
Address	01-63	Address	01-63

Function code		32	Function code	32
Length of data		4	Length of data	1
Baud rate	Communication address		Status of response	
Data bit	Parity bit		Checking	Accumulation
Communication rate	Communication mode			
	Communication protocol			
Checking		Accumulation		

🕮 Description of Status Word of Response：

= 0xaa, Successful;

= 0x55, Failed.

6.4.3.3.23. Set the Parameters of Serial Port 2

Request：Master			Response：Slaver	
Domain name		Data（hex）	Domain name	Data（hex）
Beginning code		7E	Beginning code	7E
Address		01-63	Address	01-63
Function code		33	Function code	33
Length of data		4	Length of data	1
Baud rate	Communication address		Status of response	
Data bit	Parity bit		Checking	Accumulation
Communication rate	Communication mode			
	Communication protocol			
Checking		Accumulation		

🕮 Description of Status Word of Response：

= 0xaa, Successful;

= 0x55, Failed.

6.4.3.3.24. Hi-hi Limit Value Setting

Request：Master		Response：Slaver	
Domain name	Data（hex）	Domain name	Data（hex）
Beginning code	7E	Beginning code	7E
Address	01-63	Address	01-63

Function code	34	Function code	34
Length of data	4	Length of data	1
Hi-hi limit value（MMSB）		Status of response	
Hi-hi limit value（MSB）		Checking	Accumulation
Hi-hi limit value（LSB）			
Hi-hi limit lag value			
Checking	Accumulation		

🕮 **Description of Status Word of Response：**

= 0xaa, Successful;

= 0x55, Failed.

6.4.3.3.25. Up Limit Value Setting

Request：Master		Response：Slaver	
Domain name	Data（hex）	Domain name	Data（hex）
Beginning code	7E	Beginning code	7E
Address	01-63	Address	01-63
Function code	35	Function code	35
Length of data	4	Length of data	1
Up limit value（MMSB）		Status of response	
Up limit value（MSB）		Checking	Accumulation
Up limit value（LSB）			
Up limit lag value			
Checking	Accumulation		

🕮 **Description of Status Word of Response：**

= 0xaa, Successful;

= 0x55, Failed.

6.4.3.3.26. Lower Limit Value Setting

Request：Master		Response：Slaver	
Domain name	Data（hex）	Domain name	Data（hex）
Beginning code	7E	Beginning code	7E
Address	01-63	Address	01-63
Function code	36	Function code	36
Length of data	4	Length of data	1
Lower limit value（MMSB）		Status of response	
Lower limit value（MSB）		Checking	Accumulation
Lower limit value（LSB）			
Lower limit lag value			

Checking	Accumulation	

🕮 **Description of Status Word of Response：**

= 0xaa, Successful;

= 0x55, Failed.

6.4.3.3.27. Lo-lo Limit Value Setting

Request：Master		Response：Slaver	
Domain name	Data（hex）	Domain name	Data（hex）
Beginning code	7E	Beginning code	7E
Address	01-63	Address	01-63
Function code	37	Function code	37
Length of data	4	Length of data	1
Lo-lo limit value（MMSB）		Status of response	
Lo-lo limit value（MSB）		Checking	Accumulation
Lo-lo limit value（LSB）			
Lo-lo limit lag value			
Checking	Accumulation		

🕮 **Description of Status Word of Response：**

= 0xaa, Successful;

= 0x55, Failed.

6.4.3.3.28. Calibration Parameters Setting

Request：Master		Response：Slaver	
Domain name	Data（hex）	Domain name	Data（hex）
Beginning code	7E	Beginning code	7E
Address	01-63	Address	01-63
Function code	38	Function code	38
Length of data	5	Length of data	1
Capacity（MMSB）		Status of response	
Capacity（MSB）		Checking	Accumulation
Capacity （LSB）			
Decimal point			
Scale division			
Checking	Accumulation		

🕮 **Description of Status Word of Response：**

= 0xaa, Successful;

= 0x55, Failed.

6.4.3.3.29. Calibration Coefficients Setting

Request：Master		Response：Slaver	
Domain name	Data（hex）	Domain name	Data（hex）
Beginning code	7E	Beginning code	7E
Address	01-63	Address	01-63
Function code	39	Function code	39
Length of data	3	Length of data	1
Calibration coefficient（MMSB）		Status of response	
Calibration coefficient（MSB）		Checking	Accumulation
Calibration coefficient（LSB）			
Checking	Accumulation		

🕮 Description of Status Word of Response：

= 0xaa, Successful;

= 0x55, Failed.

6.4.3.3.30. Zero Calibration

Request：Master		Response：Slaver	
Domain name	Data（hex）	Domain name	Data（hex）
Beginning code	7E	Beginning code	7E
Address	01-63	Address	01-63
Function code	40	Function code	40
Length of data	0	Length of data	1
Checking	Accumulation	Status of response	
		Checking	Accumulation

🕮 Description of Status Word of Response：

= 0xaa, Successful;

= 0x55, Failed.

6.4.3.3.31. Calibration in kind

Request：Master		Response：Slaver	
Domain name	Data（hex）	Domain name	Data（hex）
Beginning code	7E	Beginning code	7E

Address	01-63	Address	01-63
Function code	41	Function code	41
Length of data	3	Length of data	1
Input weighing value（MMSB）		Status of response	
Input weighing value（MSB）		Checking	Accumulation
Input weighing value（LSB）			
Checking	Accumulation		

🕮 **Description of Status Word of Response：**

= 0xaa, Successful;

= 0x55, Failed.

7. Calibration of the Meter

- *Note: when the meter is calibrated, the function of zero tracking is not allowed to be performed. , that is to set F1 =0. Besides, the meter should be powered on for half an hour in advance before calibration, in order to make the weighing units of the load cells and the meters up to thermal stability.
- *Note: In the calibration, only when the instrument is stable, i.e. when the weighing detecting indicator motion is off, calibration is allowed. When the indicator motion is on for a long time, check the parameters setting of F2.
- *Note: If the parameters input are not correct, an error screen will be shown for about 2 seconds and then the screen gets back to where the parameters need to be input again.

The input sensitivity of weighing display can be calculated by the following formula.

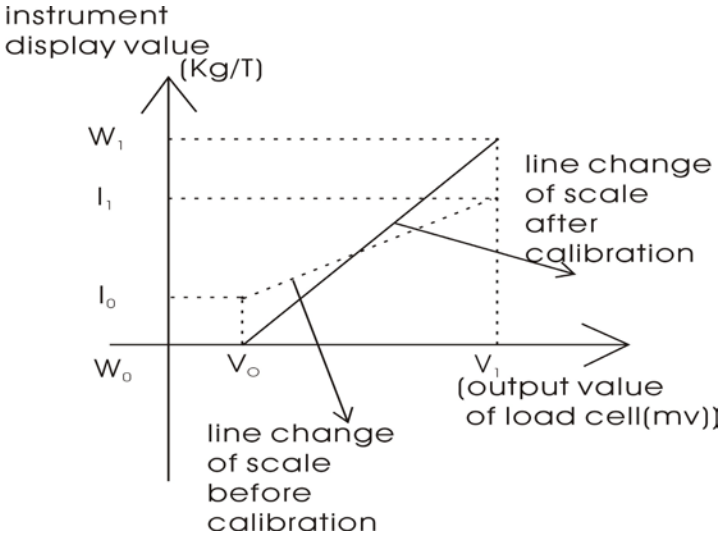
$$A = \frac{\text{（The output voltage of the load cell when the scale is at full load – The output voltage of the load cell when scale is at no load）}}{} \times \text{Scale division（d）}$$

Capacity

For transmitters, A≥0.5μV/d.

7.1. Significance of the Calibration

As a weight signal (mV) processor, the meter need to establish the correspondences between mV signals sent from load cells and the standard value, so that the calibration is needed. It contains Zero Calibration and Scale Division Calibration, and the latter could choose one point or multi-points to perform calibration. This meter adopts one point calibration.



The Diagram of Calibration

V_0：Output signal of load cell when weighing system is at no load;.
V_1：Output signal of load cell when weighing system is at a certain load;
I_0 ： The display value of V_0 input to the meter without calibration;
I_1： The display value of V_0 input to the meter without calibration;
W_0： The display value of V_0 input to the meter after calibration. (I.e. zero);
W_1： The display value of V_0 input to the meter after calibration. (I.e. the standard force values which correspond to the scale division or load).

Note during the calibration:

① W_1 is no less than 100 divisions;

② Resolution ： $\frac{V_1 - V_0}{W_1 - W_0} \geq 0.5\mu V / d$;

③ The range of output signal of Strain gauge load cell : approx. 0～30mV;
Calibration is to realize the new corresponding relation;

④ The input signal of load cell of transmitter should meet： $0.05mV \leq V_0 \leq 15mV, V_0 < V_1 \leq 32mV$.

7.2. Operation of the Calibration

7.2.1. Steps

In the normal state，press [MENU] to enter the menu，and press [TARE]、[FUNC] to choose“CAL” ，and press [ZERO] to display“CA L1”; and press [TARE]、[FUNC] to choose“CAL1”、“CAL2”or“CAL3”， and press [ZERO] to enter calibration parameter setting.

7.2.2. Calibration in Kind

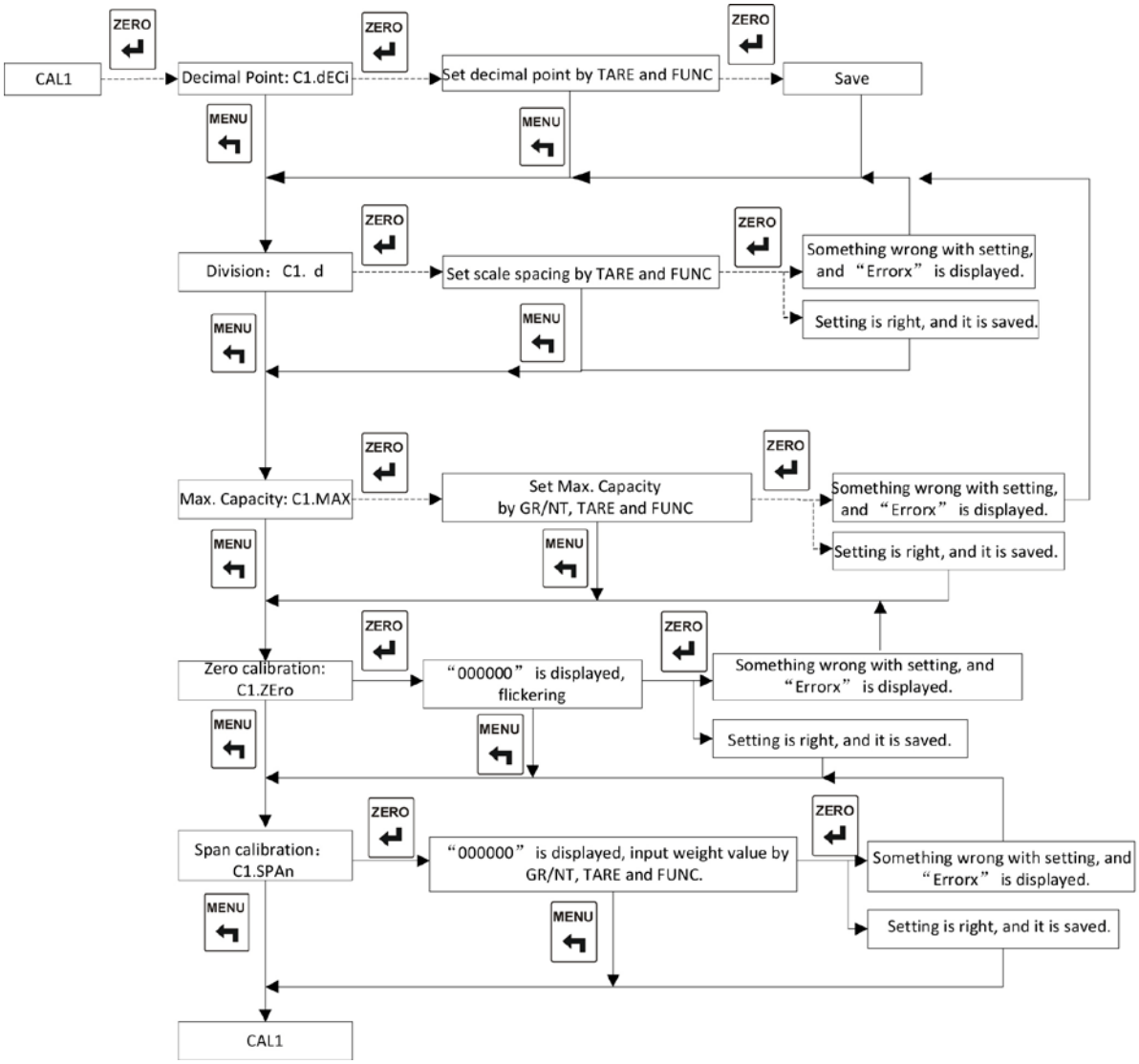


Chart 7-2 Diagram of Calibration in Kind

"CAL1" is displayed，and press [ZERO] to enter the first step.

Step 1：Decimal Point Setting

"C1.dECi" is displayed，and press [MENU] to jump over the decimal point setting; press [ZERO] enter the decimal point setting; press [TARE]、[FUNC] to choose the position of decimal point; press [ZERO] to save the setting and enter the second step, or press [MENU] to enter the second step directly without saving the setting.

Step 2：Scale Division Setting

"C1.d" is displayed，and press [MENU] to jump over the scale division setting; press [ZERO] to enter the division setting; press [TARE]、[FUNC] to choose scale division; press [ZERO] to save the

division input and enter the third step, or press [MENU] to enter the third step directly without saving the division input.

Step 3：Capacity Setting

C1.MAX”is displayed, and press [MENU] to jump over the capacity setting; press [ZERO] to enter the capacity setting; press [GR/NT]、[TARE]、[FUNC] to input the capacity; press [ZERO] to save the capacity input and enter the forth step, or press [MENU] to enter the forth step directly without saving the capacity input.

Step 4：Zero Calibration

“C1.Zero” is displayed, and press [MENU] to jump over the zero setting; press [ZERO] to enter the zero calibration, and “000000”is displayed and all are flickering. If the dynamic detection is on, after the scale is stable and the dynamic indicator is off, press [ZERO] to perform zero calibration and enter the fifth step, or enter the fifth step without zero calibration.

Step4：Weighing Calibration

“C1.SPAn” is displayed，and press [MENU] to jump over the weighing calibration; press [ZERO] to enter the weighing calibration; press [GR/NT]、[TARE]、[FUNC] to input the weight. If the dynamic detection is on, after the scale is stable and the dynamic indicator is off, press [ZERO] to save the weight input and get back to the “CALL” screen, or press [MENU] get back to the “CALL” screen directly without saving the weight input.

7.2.3. Digital Calibration

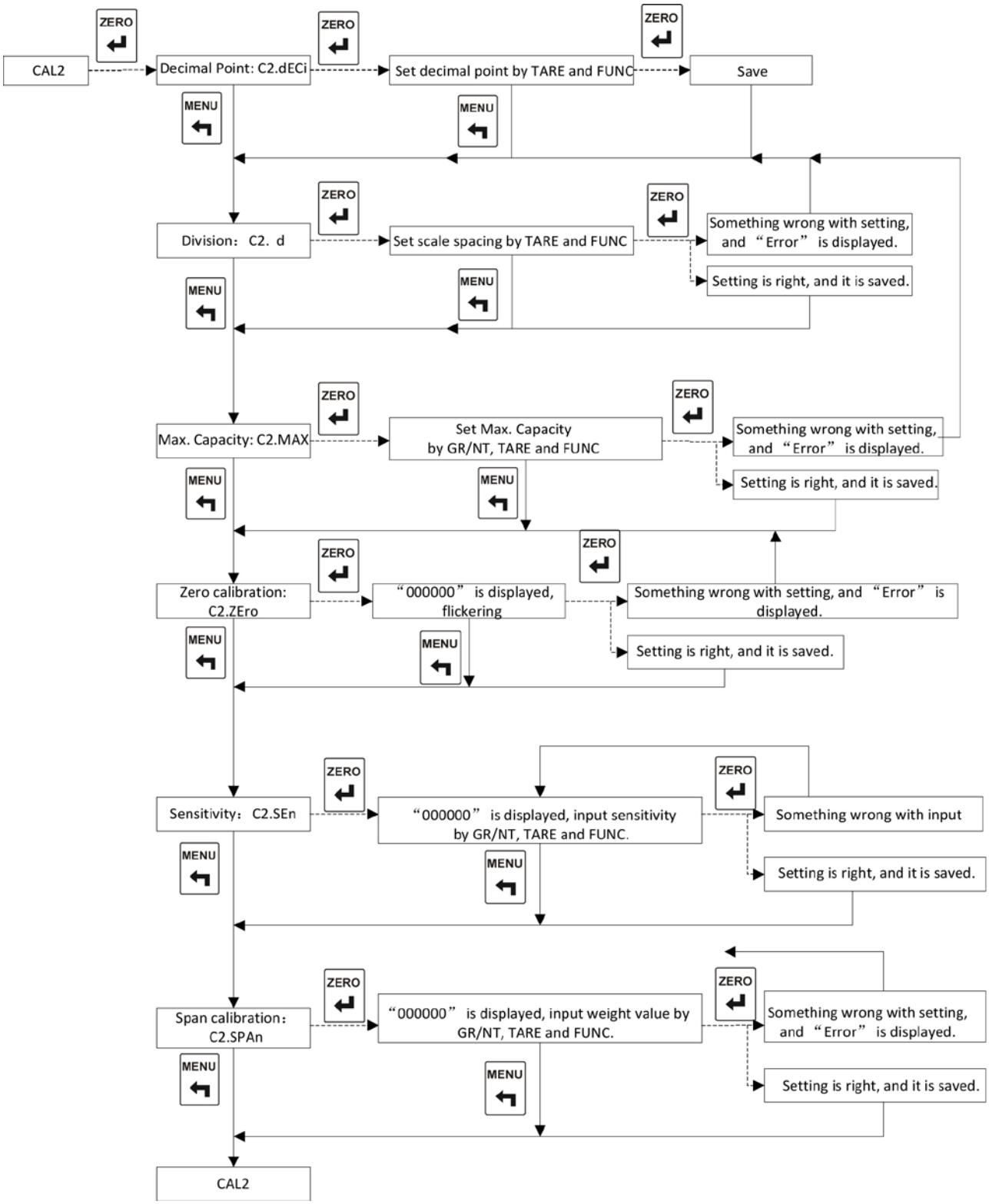


Chart 7-3 Diagram of Digital Calibration

"CAL2" is displayed，and press [ZERO] to enter the first step.

Step1：Decimal Point Setting

"C2.dECi" is displayed，and press [MENU] to jump over the decimal point setting；press [ZERO] to enter the decimal setting; press [TARE]、[FUNC] to select the position of the decimal point; press [ZERO] to save the position selected and enter the second step, or press [MENU] to enter the next step directly without saving the position selected.

Step 2：Division Setting

"C2.d" is displayed，and press [MENU] to jump over the division setting；press [ZERO] to enter the division setting; press [TARE]、[FUNC] to select the division; press the [ZERO] to save the division selected and enter the third step, or press [MENU] to enter the next step without saving the division selected..

Step 3: Capacity Setting

"C2.MAX" is displayed，and press [MENU] to jump over the capacity setting；press [ZERO] to enter the capacity setting; press [GR/NT]、[TARE]、[FUNC] to input the capacity; press [ZERO] to save the capacity input and enter the next step, or press [MENU] to enter the next step directly without saving the capacity input..

Step 4：Zero Calibration

"C1.Zero" is displayed, and press [MENU] to jump over the zero setting; press [ZERO] to enter the zero calibration, and "000000"is displayed and all are flickering. If the dynamic detection is on, after the scale is stable and the dynamic indicator is off, press [ZERO] to perform zero calibration and enter the fifth step, or enter the fifth step without zero calibration.

Step 5：Sensitivity Input（unit：mV）

"C2.SEn" is displayed，and press [MENU] to jump over the sensitivity setting; press [ZERO] to enter the sensitivity input setting; press [GR/NT]、[TARE]、[FUNC] to input the sensitivity; press [ZERO] to save the sensitivity input and enter the next step, or press [MENU] to enter the next step directly without saving the sensitivity input.

Step 6： Capacity Calibration

"C2.SPAn" is displayed，and press [MENU] key to jump over the capacity calibration setting; press [ZERO] to enter the capacity calibration setting; press [GR/NT]、[TARE]、[FUNC] to input the

capacity; press [ZERO] to save the capacity input（If the sensitivity input setting is jumped over，the capacity will not be saved.）and get back to the “CAL2” screen，or press [MENU] to get back to the “CAL2” screen directly without saving the capacity input.

7.2.4. Modification of the Calibration Coefficient

“CAL3”is displayed, and press [ZERO] to enter the first step.

Step 1：Input the Password

“000000”is displayed，and press [ZERO] to enter the password input setting; press [GR/NT]、[TARE]、[FUNC] to input the password and enter the next step.

Step 2: Input the Calibration Coefficient

Press [GR/NT]、[TARE]、[FUNC] to input the calibration coefficient; press [MENU] to get back to “CAL3”screen without saving the calibration coefficient input; or press [ZERO] to enter the third step.

Step 3: Save the Calibration Coefficient

“SAVEr”is displayed, cluing to save the calibration coefficient input or not; press [MENU] to get back to “CAL3”screen without saving the calibration coefficient, or press [ZERO] to save it.

7.3. CAL Drawing

Table 7-1

Function NO.	Description
CAL1	Calibration in kind
CAL2	Digital calibration
CAL3	ADC Calibration
	Modification of the calibration coefficient
	Input the number of airframe

7.4. Parameter List of Calibration in Kind

Table 7-2

CAL1	Name	Default	Setting	
			Parameter range	Descriptions
C1.dECi	Position of decimal point	0	0-4	0：No decimal place 12345
				1：1 decimal places 1234.5
				2：2 decimal places 123.45
				3：3 decimal places 12.345
				4：4 decimal places 1.2345
C1.d	Division	1	1、2、5、10、20、50	The minimum weighing division can be any one of 1、2、5、10、20、50.
C1.MAX	Full capacity	10000	100-900000	The maximum range of weighing; This setting value ＋9d（9 个分度）can be displayed. While the weight exceeds the above value, it can not be displayed.
C1.ZEro	Zero calibration	0.1mV	0.05uV-15mV	The voltage that is input from the load cell at zero is decided in the zero calibration. The unit is mV.
C1.SPAn	Capacity calibration	10000	100-900000	In the calibration in kind, the voltage input from the load cell is decided in the capacity calibration. It is the difference between weighing point and zero point. The unit is mV.

7.5. Parameter List of Digital Calibration

Table 7-3

CAL2	Name	Default	Setting	
			Parameter range	Descriptions
C2.dECi	Position of decimal point	0	0-4	0：No decimal place 12345
				1：1 decimal places 1234.5
				2：2 decimal places 123.45
				3：3 decimal places 12.345
				4：4 decimal places 1.2345
C2.d	Division	1	1、2、5、10、20、50	The minimum weighing division can be any one of 1、2、5、10、20、50.
C2.MAX	Full Capacity	10000	100－900000	The maximum range of weighing; This setting value ＋9d（9 个分度）can be displayed.

				While the weight exceeds the above value, it can not be displayed.
C2.ZEro	Zero calibration	0.1mV	0.05uV-15mV	The voltage that is input from the load cell at zero is decided in the zero calibration. The unit is mV.
C2.SEn	Input sensitivity	1mV/V	Max 5mV/V	The input sensitivity of load cells
C2.SPAn	Capacity calibration	10000	100－900000	The maximum capacity of load cells

7.6. Reminders of Calibration Error

Error0	There's something wrong with AD convertor.
Error1	"Max capa/ Min scale "can not be divisible; display resolution is more than 50000 or less than 300; the capacity is lesson 100 or more than 900000; the last sensitivity or the division just modified is lesson 0.3uV/d.
Error2	Zero voltage is too high.，exceeding 15mV.
Error3	Zero voltage is too low.，less than 0.05mV.
Error4	The weighing value input exceeds the max capacity
Error5	The input sensitivity of load cell is too low.，less than 0.3uV/d, or the weighing value is 0.
Error6	The mV value of the weighing Calibration is less than the mV value of zero calibration.
Error7	The input of the load cell exceeds the range of input signal，more than 31mV.
Error8	The weighing value is less than 100 divisions in the weighing calibration.
Error9	The input weighing value / minimum scale in the weighing calibration can not be divisible.

8. Diagnosis Function

8.1. Operation Procedure of Diagnosis Function

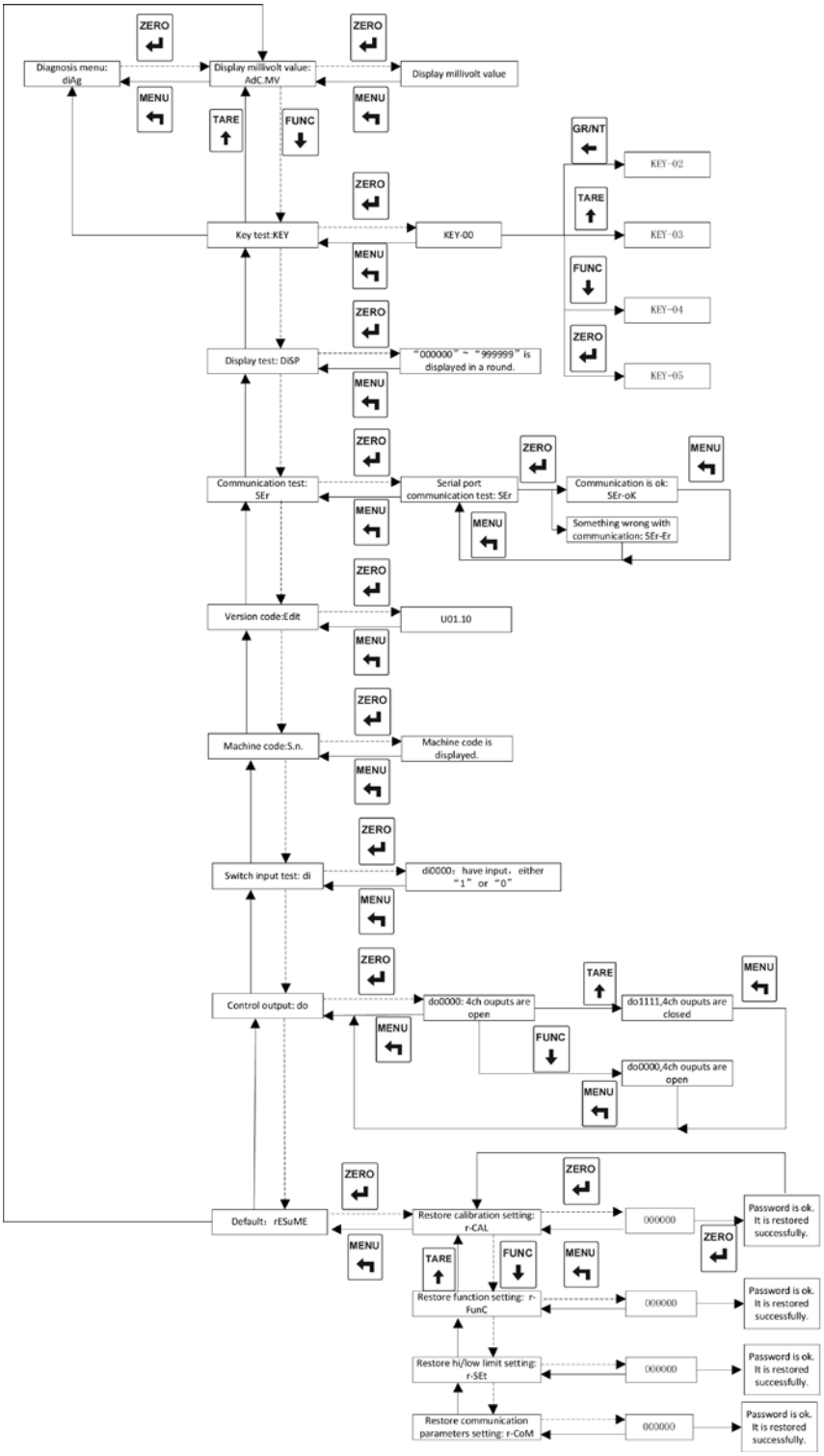


Chart 8-1 Operation Procedure of Diagnosis Menu

In the normal display state，press MENU to enter the menu; press TARE、FUNC to select “diAg”; press ZERO, and “AdC.mV”will be displayed; press TARE、FUNC to select submenu; press ZERO to enter the submenu.

8.2. List of Diagnosis Function

Table 8-1

Menu display		Description
AdC.MV		Display of the mill volt value
KEY		Key-press testing
diSP		Display testing
CoM	SEr1	Serial port 1 testing
	SEr2	Serial port 2 testing
Edit		Display the version number
S.n.		Display the serial number of airframe
di		External controlling input testing
do		Relay output testing
ESuME		Renew to the default
	rE－CAL	Renew to the default of calibration parameters
	rE－FunC	Renew to the default of function setting
	rE－Set	Renew to the default of upper/lower limit value
	rE－CoM	Renew to the default of communication parameters

8.3. Description of Diagnosis Function

8.3.1. Display of the Mill volt Value

“AdC.MV” is displayed; press ZERO, and the voltage input from the load cell will be displayed. The unit is mV.

8.3.2. Key-press Testing

This function is to check whether the key-press can work properly. “KEY” is displayed; press ZERO to enter the key-press testing, and“KEY-00”is displayed; press MENU to get back to the“KEY”； press GR/NT, and “KEY-02”is displayed; press TARE, and “KEY-03”is displayed; press FUNC, and “KEY-04” is displayed; press ZERO, and“KEY-05”is displayed.

8.3.3. Display Testing

"diSP" is displayed, and press ZERO to enter the display testing; the bits of segment code a is lighted from the first bit to the seventh bit in turns, so is the segment b, c, d, e, f, g, dp.

8.3.4. Serial Port Testing

（1）When the product you've purchased is RS232

"SEr"is displayed, and press TARE、FUNC to select "SEr1"（or "SEr2" when there is serial port 2）, and press ZERO to test the serial port. If there's nothing wrong with the communication port, "SEr1-oK"is displayed; otherwise，"SEr1-Err" is displayed.

Note：Before testing RS232，short TX/A and RX/B; don't pull in/out the serial port line when power is on.

（2）When the product you've purchased is RS485

This menu can not be used to test RS485. An external RS485 interface in good state is needed to test the TR700 communication.

8.3.5. Display the Version Number

"Edit"is displayed; press ZERO, and the version number will be displayed.

8.3.6. Display the Serial Number

"S.n."is displayed; press ZERO, and the serial number will be displayed, which is united by the plant and is accord with the transmitter's.

8.3.7. External controlling input testing

"di"is displayed; press ZERO to enter the input testing, and "diXXXX"is displayed. The "di" stands for input testing, and the latter four bits correspond to the four inputs. If there is an input, "1" will be displayed on the corresponding LED, otherwise "0" is displayed.

8.3.8. Relay Output Testing

"do"is displayed; press ZERO to enter the output testing, and"doXXXX" will be displayed. The "do"

stands for output testing, and the latter four bits correspond to the four outputs.

Press TARE; there's four outputs， and "1111" is displayed on the LED. Use a multi-meter to test the four circuits separately. If the circuit is on, it can work properly.

Press FUNC; there's no output, and "0000" is displayed on the LED. Use a multi-meter to test the four circuits separately. If the circuit is not on, it can work properly.

8.3.9. Renew to the Default

"rEsuME", and press ZERO to enter the default renewing setting.

Table 8-2

rE－CAL	Renew to the default of calibration parameters
rE－FunC	Renew to the default of function setting
rE－SEt	Renew to the default of upper/lower limit value
rE－CoM	Renew to the default of communication parameters

Select the corresponding parameter option of the default needed to be renewed and input correct password, and the default can be renewed.

9. Explanation for Comparison Condition

9.1. Procedure of Parameter Setting

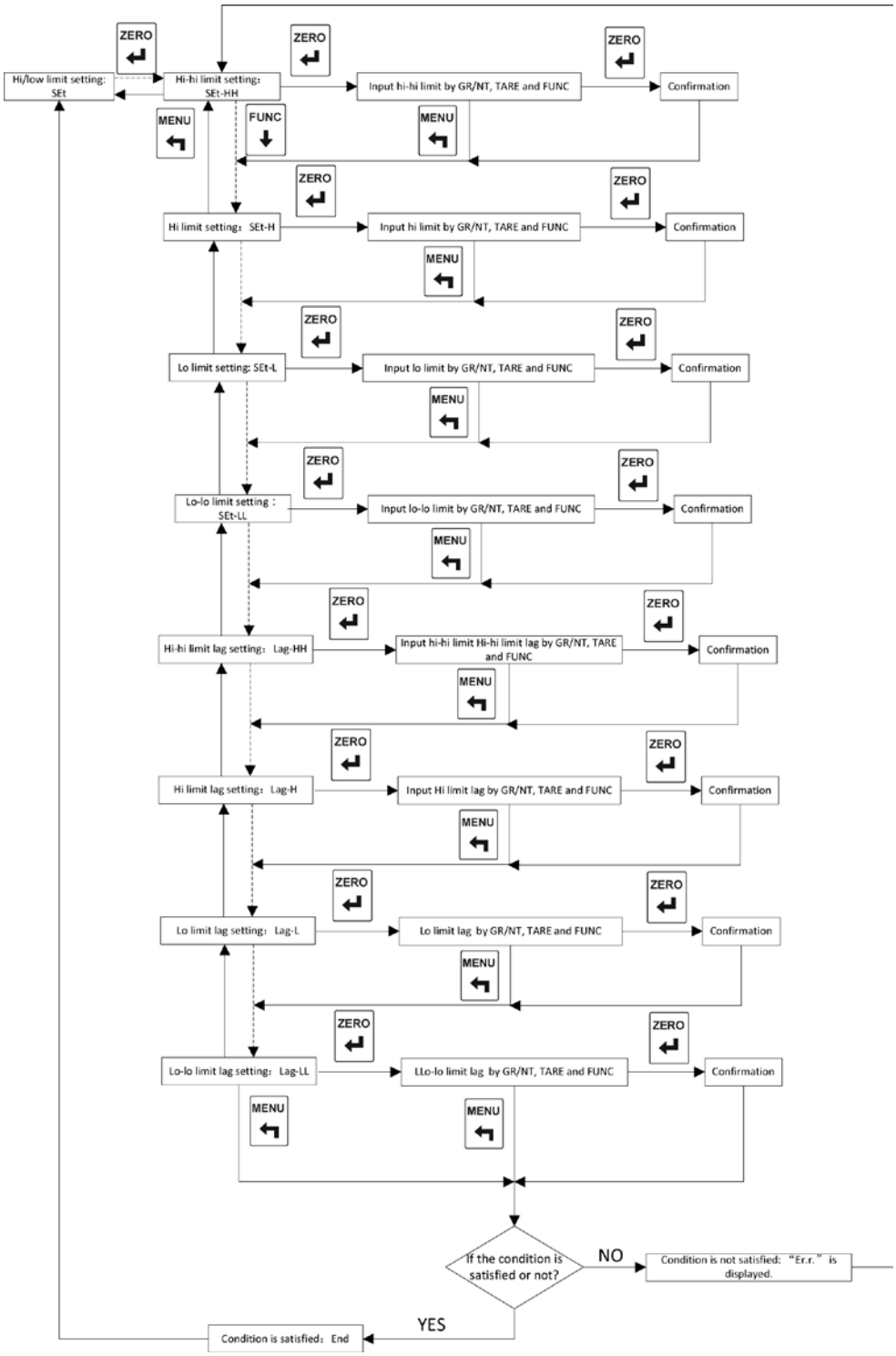


Chart 9-1 Operation Diagram of Higher/Lower Limit Setting

In the normal display status, press MENU to enter the menu, press TARE、FUNC to select “SET”, and press ZERO to enter the first step.

Step 1：the Hi-hi Limit Value Setting

“SEt-HH”is displayed, and press MENU to jump over the hi-hi limit value setting; press ZERO to enter the hi-hi limit value setting, and the “gross” indicator will be on; press GR/NT、TARE、FUNC to input the hi-hi limit value; press MENU to clear the hi-hi limit value input, and enter the second step directly; or press ZERO to confirm the input and enter the second step.

Step 2：the Higher Limit Value Setting

“SEt-H”is displayed, and press MENU to jump over the higher limit value setting; press ZERO to enter the higher limit value setting, and the “net” indicator will be on; press GR/NT、TARE、FUNC to input the higher limit value; press MENU to clear the higher limit value input, and enter the third step directly; or press ZERO to confirm the input and enter the third step.

Step 3：the Lower Limit Value Setting

“SEt-L”is displayed, and press MENU to jump over the lower limit value setting; press ZERO to enter the lower limit value setting, and the “motion” indicator will be on; press GR/NT、TARE、FUNC to input the lower limit value; press MENU to clear the lower limit value input, and enter the forth step directly; or press ZERO to confirm the input and enter the forth step.

Step 4：the Lo-lo Limit Value Setting

“SEt-LL”is displayed, and press MENU to jump over the lo-lo limit value setting; press ZERO to enter the lo-lo limit value setting, and the “motion” indicator will be on; press GR/NT、TARE、FUNC to input the lo-lo limit value; press MENU to clear the lo-lo limit value input, and enter the fifth step directly; or press ZERO to confirm the input and enter the fifth step.

Step 5：the Hi-hi Limit Lag Setting

“LAg-HH” is displayed, and press MENU to jump over the hi-hi limit lag setting; press ZERO to

enter the hi-hi limit value setting; press [GR/NT]、[TARE]、[FUNC] to input the hi-hi limit lag; press [MENU] to clear the hi-hi limit lag input, and enter the sixth step directly; or press [ZERO] to confirm the input and enter the sixth step.

Step 6：the Higher Limit Lag Setting

"LAg-HH" is displayed, and press [MENU] to jump over the higher limit lag setting; press [ZERO] to enter the higher limit value setting; press [GR/NT]、[TARE]、[FUNC] to input the higher limit lag; press [MENU] to clear the higher limit lag input, and enter the seventh step directly; or press [ZERO] to confirm the input and enter the seventh step.

Step 7：the Lower Limit Lag Setting

"LAg-L" is displayed, and press [MENU] to jump over the lower limit lag setting; press [ZERO] to enter the lower limit value setting; press [GR/NT]、[TARE]、[FUNC] to input the lower limit lag; press [MENU] to clear the lower limit lag input, and enter the eighth step directly; or press [ZERO] to confirm the input and enter the eighth step。

Step 8：the Lo-lo Limit Lag Setting

"LAg-L" is displayed, and press [MENU] to jump over the lo-lo limit lag setting; estimate the higher/lower limit parameters; if it answers for the conditions (hi-hi limit value≥higher limit value≥lower limit value≥lo-lo limit value, and the lag is in the range of 0-100), "End"will be displayed about 2 seconds and get back to "SEt"interface; if it doesn't answer for the conditions, "Er.r."will be displayed for about 2 seconds and get back to the first step automatically; press [ZERO] to enter the lo-lo limit lag setting; press [GR/NT]、[TARE]、[FUNC] to input the lo-lo limit lag; press [MENU] to clear the input, and estimate the higher/lower limit parameters; if it answers for the conditions (hi-hi limit value≥higher limit value≥lower limit value≥lo-lo limit value, and the lag is in the range of 0-100), "End"will be displayed about 2 seconds and get back to "SEt"interface; if it doesn't answer for the conditions, "Er.r."will be displayed for about 2 seconds and get back to the first step automatically; or press [ZERO] to confirm the input, and estimate the higher/lower limit parameters; if it answers for the conditions (hi-hi limit value≥higher limit value≥lower limit value≥lo-lo limit value, and the lag is in the range of 0-100), "End"will be displayed about 2 seconds and get back to "SEt"interface.

9.2. List of Higher/Lower Limit Parameter setting

Table 9-1

Function number	Function name	Default	Setting	
			The range of parameters	Description
SEt-HH	Hi-hi limit value	4000	0－999999	
SEt-H	Higher limit value	3000	0－999999	
SEt-L	Lower limit value	2000	0－999999	
SEt-LL	Lo-lo limit value	1000	0－999999	
LAg-HH	Hi-hi limit lag	10	0－100	
LAg-H	Higher limit lag	10	0－100	
LAg-L	Lower limit lag	10	0－100	
LAg-LL	Lo-lo limit lag	10	0－100	

The condition：hi-hi limit value≥higher limit value≥lower limit value≥lo-lo limit value

Note： 1. When one of the higher/lower limit value is set "0", it will not be compared. For example, if HH is set "00", "HH" will not be compared, i.e. the output terminal of "HH" is invalid.

2．Lag：the range of the delay after alarm, the unit is "d".

Example：HH limit value is 1000，and the lag is 20.

When the value participating in the comparison≥1000, the alarm starts. The comparison is selected by the comparison condition of F7.

When the value participating in the comparison≤1000-20, the alarm exits. The comparison is selected by the comparison condition of F7.

In the upper/lower setting, the former two bits before"-"display the limit value，the latter three bits display the lag.

Note：The range of lag is 000-100。The lag>100，"Err" is displayed for about 2 seconds and get back to "SET-HH" automatically。

10. Switch In/Output

10.1. External Control Input

Optical isolation input

1）Input control ：IN1，IN2，IN3, IN4, four inputs in all

2）Input method ：switch without power

3）Input contact time ：not less than 50 ms

4）Every external control input can be used as gross/net display, tare or the function of clearing to zero, matching with F8, F9, F10, and F11.

10.1.1. the Connection between Input Interface and External Switch

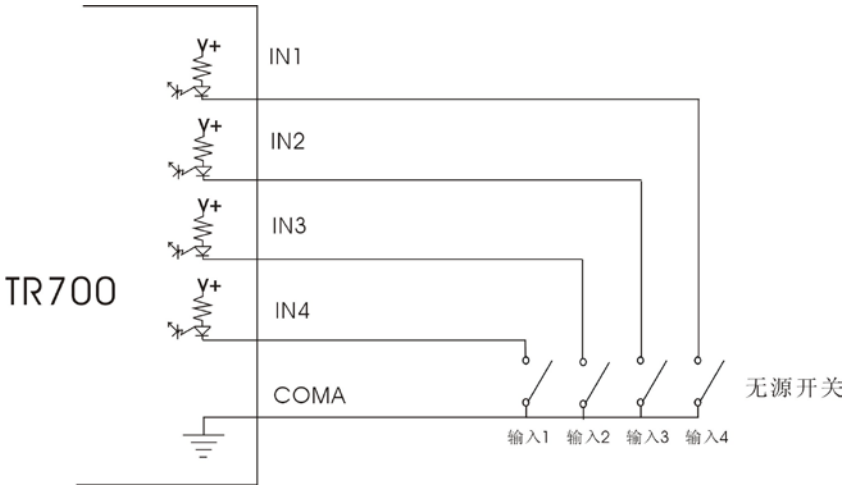


Chart 10-1 Connection Drawing of External Input and Switch Without Power

Note：Input contact adopts the switch without power, and the circuit can not be short for less than 50 ms.

10.1.2. Connection between Input Interface and PLC

In the charm, the DC V+ is provided by TR700 itself, and there is no need to add any power for the output.

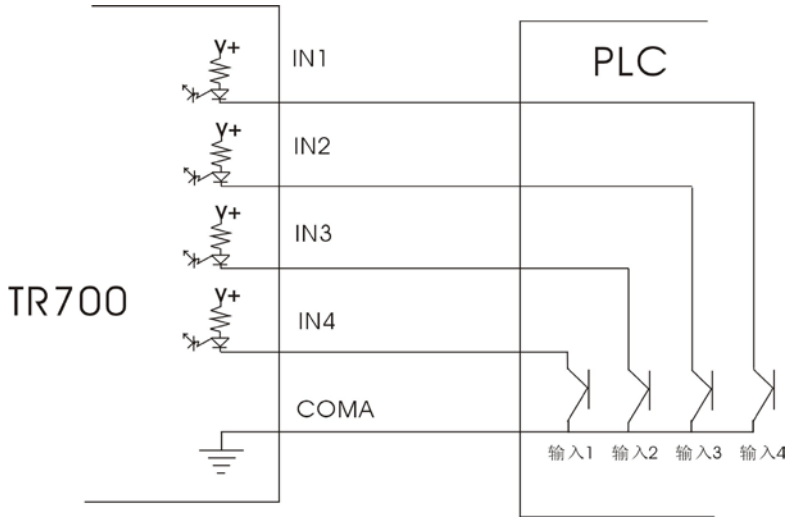


Chart 10-2 Connection Drawing of External Input and PLC

10.2. Control Output

10.2.1. Description of Output

Output method： Solid relay output，every output is individual.
Max capacity： 60V DC/AC，0.4A current
The rate of comparison output： 100 times per second
4 outputs can be distributed individually as hi-hi limit output, higher limit output, lower limit output , lo-lo limit output, CAN bus control output, and the output function matches with F12, F13, F14 and F15.

10.2.2. Description of Comparison Condition

1）When comparison condition F7=0, i.e. gross weight is compared,
HH output = the gross display value ≥HH comparison set value;
H output = the gross display value ≥HH comparison set value;
L output = the gross display value≤ L comparison set value;
LL output = the gross display value≤ LL comparison set value.

2）When comparison condition F7=1, i.e. net weight is compared,
HH output = the net display value ≥HH comparison set value;
H output = the net display value ≥H comparison set value;
L output = the net display value≤ L comparison set value;
LL output = the net display value≤ LL comparison set value.

3）When comparison condition F7=2, i.e. the displayed weight is compared,
If the gross weight is displayed,
HH output = the gross display value ≥HH comparison set value;
H output = the gross display value ≥H comparison set value;

L output = the gross display value ≤L comparison set value;
LL output = the gross display value ≤LL comparison set value.
If the net weight is displayed,
HH output = the net display value ≥HH comparison set value;
H output = the net display value ≥H comparison set value;
L output = the net display value≤ L comparison set value;
LL output = the net display value≤ LL comparison set value.

10.3. Analog Output

10.3.1. Specification

Resolution：1/50000　　Accuracy：0.5%FS

Table 10-1

Output	0～20mA	4～20mA	0～5V	1～5V	0～10V
Load resistance	Max 500Ω	Max 500Ω	Min 10KΩ	Min 10KΩ	Mix 10KΩ
The output voltage/ current when the display value is Zero.	0mA	4mA	0V	1V	0V
The output voltage/ current when the display value is the max capacity.	20mA	20mA	5V	5V	10V

10.3.2. an Example of Output

Capacity：2000　　Output：4~20mA

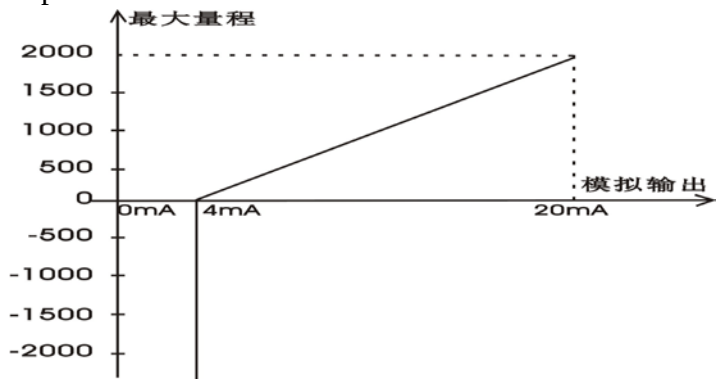


Chart 10-3 Diagram of Analog Output

11. Attach

11.1. Function Table

11.1.1.Parameter List of General Function Setting

Number F XX	Name	Default	Setting	
			Parameters Range	Description
00	Zero range	3	0-10	0 ： Zero function off; 1-10 ： It is 1%-10% of the capacity.
01	Zero tracking range	0	0-10	The display must be in zero tracking range in 2s, and later it goes back to zero. 0 ： Do not perform zero tracking; 1-10 ： Display division.
02	Motion detection range	3	0-10	0 ： Motion detection is off; 1-10 ： Display division.
03	Filter coefficient	3	0-9	0 ： No filtering; 1-9 ： The larger the figure is, the greater the filter is.
04	Display updating rate	3	0-4	0 1 times per second 1 4 times per second 2 8 times per second 3 16 times per second 4 30 times per second
05	Unit conversion	0	0-1	0 kg 1 t
06	Sampling rate	0	0-3	0 25 times per second 1 50 times per second 2 100 times per second 3 200 times per second
07	Conditions of comparison output	0	0-2	0 Gross weight 1 Net weight 2 Display value
08	Distribution of external control input 1	3	0-8	0 Gross/net 1 Tare 2 Clear zero 3-7 Extended Functions 8 Keyboard lock，only lock the “zero, Tare and gr/nt” keys
				0 Gross/net 1 Tare

09	Distribution of external control input 2	3	0-8	2	Clear zero
				3-7	Extend Functions
				8	Keyboard lock，only lock the “zero, tare, gr/nt” keys
10	Distribution of external control input 3	3	0-8	0	Gross/net
				1	Tare
				2	Clear zero
				3-7	Extended Functions
				8	Keyboard lock，only lock the “zero, tare and gr/nt” keys
11	Distribution of external control input 4	3	0-8	0	Gross/net
				1	Tare
				2	Clear zero
				3-7	Extended Functions
				8	Keyboard lock，only lock the “zero, tare and gr/nt” keys
12	Distribution of relay output 1	1	0-8	0	Forbidden output
				1	Hi-Hi limit output
				2	Hi limit output
				3	Lo limit output
				4	Lo-Lo limit output
				5-8	Extended function
13	Distribution of relay output 2	2	0-8	0	Forbidden output
				1	Hi-Hi limit output
				2	Hi limit output
				3	Lo limit output
				4	Lo-Lo limit output
				5-8	Extended function
14	Distribution of relay output 3	3	0-8	0	Forbidden output
				1	Hi-Hi limit output
				2	Hi limit output
				3	Lo limit output
				4	Lo-Lo limit output
				5-8	Extended function
15	Distribution of relay output 4	4	0-8	0	Forbidden output
				1	Hi-Hi limit output
				2	Hi limit output
				3	Lo limit output
				4	Lo-Lo limit output
				5-8	Extended function

11.1.2. RS232/RS485 Communication Parameter List

Function NO. C - XX	Function name	Default	Setting		
			Parameter range	Description	
00	Communication address	1	00-99	RS232/RS485 Communication address	
01		1		0	4800 bps
				1	9600 bps
				2	19200 bps
				3	38400 bps
				4	57600 bps
				5	115200 bps
02	Parity bit	2	0-2	0	Non
				1	Odd
				2	Even
03	Data bit	0	0-1	0	7
				1	8
04	Communication mode	1	0-1	0	Continuous mode
				1	Instruction mode
05	Communication rate	2	0-5	0	4 times per second
				1	8 times per second
				2	16 times per second
				3	32 times per second
				4	64 times per second
				5	80 times per second
				6	100 times per second
06	Communication protocol	0	0-3	0	Zhimei protocol
				1	Modbus protocol
				2	Longtec protocol

11.1.3. Parameter List of Calibration in Kind

CAL1	Name	Default	Setting	
			Parameter range	Descriptions
C1.dECi	decimal point	0	0-4	0：No decimal place 12345
				1：1 decimal places 1234.5
				2：2 decimal places 123.45
				3：3 decimal places 12.345
				4：4 decimal places 1.2345
C1.d	Division	1	1、2、5、10、20、50	The minimum weighing division can be any one of 1、2、5、10、20、50.
C1.MAX	Full capacity	10000	100-900000	The maximum range of weighing; This setting value ＋ 9d can be displayed. While the weight exceeds the above value, it cannot be displayed.
C1.ZEro	Zero calibration	0.1mV	0.05uV-15mV	The voltage that is input from the load cell at zero is decided in the zero calibration. The unit is mV.
C1.SPAn	Capacity calibration	10000	100-900000	In the calibration in kind, the voltage input from the load cell is decided in the capacity calibration. It is the difference between weighing point and zero point. The unit is mV.

11.1.4. Parameter List of Digital Calibration

CAL2	Name	Default	Setting	
			Parameters' range	Descriptions
C2.dECi	Position of decimal point	0	0-4	0：No decimal place 12345
				1：1 decimal places 1234.5
				2：2 decimal places 123.45
				3：3 decimal places 12.345
				4：4 decimal places 1.2345
C2.d	Division	1	1、2、5、10、20、50	The minimum weighing division can be any one of 1、2、5、10、20、50.
C2.MAX	Full Capacity	10000	100－900000	The maximum range of weighing; This setting value ＋ 9dcan be displayed. While the weight exceeds the above value, it can not be displayed.
C2.ZEro	Zero calibration	0.1mV	0.05uV-15mV	The voltage that is input from the load cell at zero is decided in the zero calibration. The unit is mV.
C2.SEn	Input sensitivity	1mV/V	Max 5mV/V	The input sensitivity of load cells
C2.SPAn	Capacity calibration	10000	100－900000	The maximum capacity of load cells

11.2. List of Standard Code ASCII

Character	Hexadecimal code	Decimal code	Name and the meaning
^@	00	00	NUL Null Character
^A	01	01	SOH Start of Heading
^B	02	02	STX Start of Text
^C	03	03	ETX End of Text
^D	04	04	EOT End ofTransmission
^E	05	05	ENQ Enquiring Character
^F	06	06	ACK Acknowledgement Character
^G	07	07	BEL Bell Character
^H	08	08	BS Backspace Character
^I	09	09	TAB Tab Character
^J	0A	10	LF Line Feed Character
^K	0B	11	VT Vertical Tab Character
^L	0C	12	FF Form Feed Character
^M	0D	13	CR Carriage Return Character
^N	0E	14	SO Shift Out Character
^O	0F	15	SI Shift in character
^P	10	16	DLE Data Communication Escapement Character
^Q	11	17	DC1 Device Control 1 Character
^R	12	18	DC2 Device Control 2 Character
^S	13	19	DC3 Device Control 3 Character
^T	14	20	DC4 Device Control 4 Character
^U	15	21	NAK Negative Acknowledgment character
^V	16	22	SYN Synchronization Character
H	17	23	ETB End of Transmission Block
^X	18	24	CAN Cancel Character
^Y	19	25	EM End of Medium
^Z	1A	26	SUB Substitute Character
^[	1B	27	ESC Escape Character
^\	1C	28	FS Form Separators
^]	1D	29	GS Group separator
^^	1E	30	RS Record separator
^_	1F	31	US Unit separator

12. Record

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