Force value display control instrument Operating manual V1.1

Please read this manual carefully before using this product,Base on understanding the contents for correct use.Properly kept for reference when necessary.

■ Safety Precaution

Warning

- For your safe use of this instrument be sure to comply with the following safety precautions.If the instrument is used in a manner not specified in this manual, the protection provided by the instrument may be impaired. We assume no responsibility for the customer's failure to comply with these requirements..
- If the failure or abnormality of this product may lead to a major accident in the system, please set up an appropriate protection circuit externally.
- Do not use this product outside the specification range described in this product. Otherwise, electric shock, fire and malfunction may occur.
- Do not use in flammable and explosive gas places.
- Do not touch high-voltage parts such as power terminals. Otherwise there is a danger of electric shock
- Do not disassemble and modify this product. Otherwise, electric shock, fire, or malfunction may result

Warning

- Please do not use it on equipment such as atomic energy equipment and life-related medical equipment.
- All input and output signal lines of this product should be equipped with appropriate in-rush protector to prevent in-rush.
- The installation form of this product is rail installation. To prevent users from accessing high-voltage components such as power terminals, take necessary measures for the final product.In order to protect the instrument and prevent machine failures, please install safety circuit breakers such as fuses of appropriate capacity on the power line connected to the instrument or the input and output lines with large current capacity.
- Please do not mix metal pieces or wire scraps into this product, otherwise it may cause electric shock, fire and malfunction.
- Tighten the terminal screws securely. Failure to fully tighten them may result in electric shock or fire.
- Be sure to turn off the power before cleaning.
- When cleaning, please wipe off the dirt of this product with a dry soft cloth. Please do not use hygroscopic agents. Otherwise, it may cause deformation and discoloration.
- Do not rub or hit the display part with hard objects.
- The installation, commissioning and maintenance of this product should be carried out by qualified engineering and technical personnel.

Reading Instrument

- In order to use this product safely for a long time, regular maintenance is required. Some parts of this product are limited by life, and some parts may have performance changes due to years of use.
- This manual is subject to change without notice and will be updated at any time. Please refer to the latest version when checking. If in doubt, please contact us.
- Our company is not responsible for any direct or indirect loss except the product itself.

1.Installation

Warning

Be sure to turn off the power supply to prevent electric shock or instrument failure

1.1 Installation location

(1)operating condition:

- operating temperature：-10~50℃，avoid direct sunlight
- operating humidity： 10~90%RH，No condensation （Absolute humidity：MAX. W. C 29.3 g/m3 dry air at 101.3kPa）

indoor use only，height＜2000m

(2) Pay attention to the following notes：

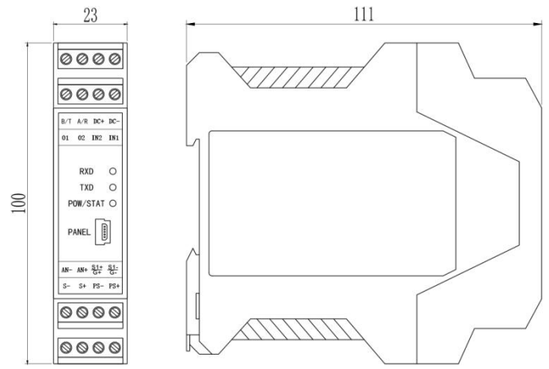
- Places where condensation may occur due to severe temperature changes
- Places where corrosive gas and flammable gas are generated
- Places that directly vibrate or may impact the product
- A place with a lot of dust, salt and metal powder
- Places with large clutter interference and prone to static electricity, magnetic fields and noise
- The place where the air flow of the air conditioner or heating is directly blown
- Places exposed to direct sunlight
- Places where heat accumulation may occur due to thermal radiation, etc.

(3) When installing, please consider the following：

- In order not to hinder the heat dissipation, do not block the surroundings of this product, do not block the ventilation openings, and leave enough space for ventilation.
- ensure that there are more than 50mm of space for connection and maintenance
- Please avoid installing it directly above the instrument (heater, transformer, semiconductor operator, high-power resistor) that generates a large amount of heat。
- If the ambient temperature is higher than 50℃, please use a forced fan or a cooler to cool it, but do not let the cooling air blow directly to the instrument.
- In order to improve noise resistance and safety, please install as far away as possible from high-voltage machines, power lines, and power machines.

1.2 Dimension

Unit: mm



1.3 Installation methods

35mm rail installation

2. Wiring

Warning

- To prevent electric shock, ensure that the power supply source is turned OFF.

2.1 Wiring attention

- To avoid the influence of noise interference, please keep the input signal line away from the power line and load line
- Make sure that the instrument power supply is not affected by power supply noise when wiring. Noise filters are recommended for noise-sensitive applications.

-To minimize noise caused by electromagnetic induction, twist the measurement circuit wires at short, equal intervals.

-Make sure the noise filter is correctly grounded,the wiring between the output side of the noise filter and the power supply terminal is the shortest.

-Do not install the fuse, switch, etc. on the output side of the noise filter, otherwise it will reduce the effect of the filter.

- No fuse inside this instrument. External fuse with specifications below is recommended:

-Rated voltage 250V, rated current 1A delay fuse

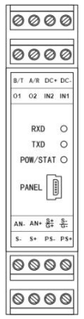
- Please use the power supply match power specifications
- Please avoid mixing interference in the measurement circuit

-The measurement loop is separated from the cable (power loop) or ground loop.

-Shielded wires should be used to minimize noise caused by electrostatic induction.

- In order to prevent mishandled, please do not connect any wires to unused terminals.

2.2 Diagram of connecting Terminals



DC+，DC-external12-30V VDC。AN+,AN-analog variable output.DC-,TX(B-),RX(A+):RS232（RS485）

Communication interface IN1,IN2,PD-:Switch input(if it is signal level, the IN1 input low level means the switch is closed and the high level means the switch is open)O1,DC+:switch output1,O2,DC+:switch output2.

2.3 Sensor connecting

➡ This instrument needs to be equipped with a resistance strain bridge sensor. The wiring method is: four-wire connection method

Note: For dual-channel use, the sensor resistance should be more than 400 ohms

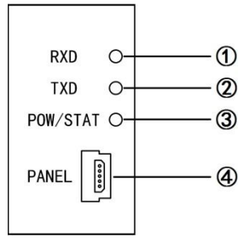
The specific wiring method is shown in the "Sensor" section of the terminal diagram above

Port	EXC+	EXC-	Signal+	Signal -
channel 1	PS+	PS-	S+	S-

★ For multi-sensor parallel applications, measures should be taken to make the sensitivity (mv/v) of each sensor connected to the meter consistent.

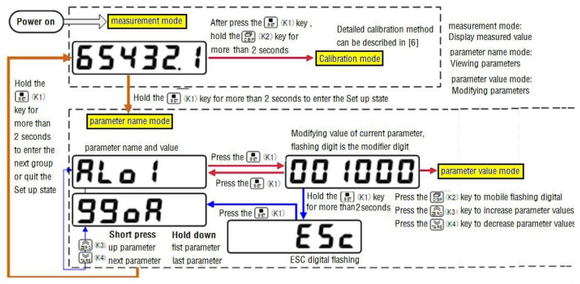
3.Operations

■ Description on indicator



SN	Name	Descripition
①	RXD	When the instrument receives data, the indicator light is on
②	TXD	When the instrument sends data, the indicator light is on.
③	POW/STAT	● The power-on indicator is on, and the power-off indicator is off. ● When an error occurs in the power-on self-check of the instrument (AD abnormality), the indicator light flashes ● When an error alarm occurs, the indicator light flashes
④	PANEL	configuration interface

4.Parameter setting operation（configuration operation）



■ General operation

1. Press and hold the SET key for more than 2 seconds to enter the parameter name mode. Displays the name (symbol) of the first parameter in the first parameter group that matches the current security code.
2. Press the ZERO key or UNIT key to switch to the forward/backward need to modify parameters.
   Press and hold the ZERO key or UNIT key and do not release it, and switch forward/backward to the first or last parameter in this group.
3. Press DISP key out the parameters of the original value, flashing for modification.
4. Press DISP key mobile modification, the ZERO key means up and UNIT key means down
5. Press SET button to save the changes good parameters, and go to the next parameter.

(if need to exit without saving, you can press SET key not loosen after until the instrument shows ESc, press DISP key exit without saving, back to the parameter selection status display, display the next argument symbol).

6. Press SET key not loosen, can order into each parameter SET, instrument display corresponding to the first parameter SET of symbols.
7. Quit setup status: in display parameters symbol, hold the SET/K1 key don't loosen, until the exit parameter setting state.

■ Parameters grouped with password

◆ The parameters of the instrument was divided into several groups, the meter parameter list can be found in the instruction in the next section.

◆ Password check: group 2 and so on parameters are protected by a password, cannot enter when not set the password

1 set of parameters are allowed to change can be set through the oA1 parameters (group 2).

This parameter is set to "ON", 1 set of parameters are allowed to change;

Set to oFF, although group 1 parameter can enter the view, but not allowed to change.

◆ Password method:Through described, 【General key operation 】 button to enter the password parameter oA Group 1 last 1 parameter。 The correct password is 1111 can enter the parameter set (2 ~ 6), password (can enter the parameter set (7) 2027.

◆ Password correctly after, you can see and parameter Settings are password protected

◆ enter the set state, if more than 1 minute without keystrokes, the instrument will automatically quit setup state.

5.Parameter Tables

*The superscript 1 or 2 in the parameter represents the first channel or the second channel

1st Parameter group：Comparison output set value
whether to allow modification of this group of parameters by setting the **oA1** parameter (in group 2).
ON——alarm output parameters can be changed
OFF——alarm output parameters cannot be changed

Symbols	Name	Item	Addr.	Setting Range	Remark
AL-m	AL-m	switch channel	Cannot communicate settings	1~2	7.2
ALS	ALS	Compare data source choices	02H[1], 82H[2]	0～15	7.2
ALo	ALo	comparison method choics	03H[1],83H[2]	0～10	7.2
OUT	oUt	Comparative value	04H[1], 84H[2]	-199999～999999	7.2
HYA	HYA	Comparative sensitivity	05H[1], 85H[2]	0～999999	7.2
dLY	dLY	comparison delay	06H[1], 86H[2]	0～60（sec）	7.2
AV	AV	Deviation comparison value	07H[1], 87H[2]	-199999～999999	7.2
INU	INU	Normally open & closed selection	08H[1], 88H[2]	0～1	7.2
CH	CH	analog channel	can't communicate settings	1~2	7.2
99oA	99oA	password	01H	0～9999	7.2

2nd Parameter group：Measurement & Display protected by Security code 1111

NO.	Symbols	Name	Item	Addr.	Setting Range	Remark
01	in-D	in-d	Decimal Point Position	33H[1], B3H[2]	0~5	7.1.1
02	TR-D	tr-d	Zero tracking range	34H[1], B4H[2]	0~200（division）	7.1.2
03	TRS	trS	Zero tracking time	45H[1], C5H[2]	0.0~10.0	7.1.2
04	ZROR	Zror	Clear range	35H[1], B5H[2]	-99~99 %	7.1.2
05	SZOR	SZOR	Zero save	3DH[1], BDH[2]	0：oFF / 1：on	7.1.2
06	FLTR	FLtr	Digital filtering time constant	36H[1], B6H[2]	1~20	7.1.3
07	notn	notn	Change detection threshold	37H[1], B7H[2]	1~200（indexing）	7.1.3
08	ARMA	ArmA	Moving average filter coefficient	38H[1], B8H[2]	1~10	7.1.3
09	MOTH	MotH	Measurement correction threshold	39H[1], B9H[2]	-199999~999999	7.1.3
10	MOV	Mov	Measuring correction value	3AH[1], BAH[2]	-199999~999999	7.1.3
11	AT	At	Display update rate	3BH[1], BBH[2]	10、20	7.1.3
12	SPS	SPS	Measurement rate selection	3CH	15[1]10[2] / 75[1]19[2] / 150[1]38[2] / 240[1]60[2] / 600[1]150[2] / 1200[1]300[2] / 2400[1]600[2] / 4800[1]800[2]（time/sec）0~7	7.1.3
13	MAT	mAt	Peak hysteresis	3EH[1], BEH[2]	-199999~999999	7.1.4
14	MAB	mAb	Peak value deviation	3FH[1], BFH[2]	0~999999	7.1.4
15	MINT	mint	Valley threshold	40H[1], C0H[2]	-199999~999999	7.1.4
16	MINB	minb	Valley backlash	41H[1], C1H[2]	0~999999	7.1.4
17	DIOF	DIOF	switches quantity 1 input function	09H	0～9	7.1.5
18	DI1F	DI1F	switches quantity 2 input function	11H	0～9	7.1.5
19	OA1	oA1	Compare output password choices	43H[1], C3H[2]	0：oFF / 1：on	7.1.1
20	POC	Poc	Power-on clear function selection	42H[1], C2H[2]	0：oFF / 1：on	7.1.4
21	DISP	disp	Power on display content selection	44H[1], C4H[2]	0~6	7.1.3

3rd Parameter group：transmission output protected by Security code 1111

NO.	Symbols	Name	Item	Addr.	Setting Range	Remark
30	AOS	AoS	Output data source	20H	0~15	7.3
31	AOT	Aot	Output type	21H	0~5	7.3
32	AOTH	AotH	Output upper range	22H	-199999~999999	7.3
33	AOTL	AotL	Output lower range	23H	-199999~999999	7.3

4th Parameter group：Communication protected by Security code 1111

NO.	Symbols	Name	Item	Addr.	Setting Range	Remark
40	ADD	Add	local Address	25H	0~99	7.4
41	BAUD	bAud	Baudrate	26H	0~6	7.4
42	OES	oES	Parity （for modbus only）	27H	0~2	7.4
43	CTD	ctd	Alarm output controlled externally	28H	0：oFF / 1：on	7.4
44	CTA	ctA	analog output controlled externally	29H	0：oFF / 1：on	7.4
45	PRO	Pro	communication protocol	2AH	0: tc-ASC/1:Modbus	7.4
46	ACT	Act	Active Communication data source (for tc-ASC	）2BH	0~16	7.4
47	STOP	StoP	Stop bit selection(only to Modbus)	2CH	1~2	7.4
48	SYS	Sys	Communication format selection	2DH	0~9	7.4
49	DLY	dly	Active transmission	2EH	0~250(ms)	7.4

5th Parameter group: Linearization				protected by Security code 1111		
NO.	Symbols	Name	Item	Addr.	Setting Range	Remark
50	FNUM	Fnum	number of linearization points	4FH',CFH'	0~10	7.5
51	F1	F1	Measured value at the 1st point	50H',D0H'	-199999~999999	7.5
52	S1	S1	Desired value at the 1st point	51H',D1H'	-199999~999999	7.5
53	F2	F2	Measured value at the 2nd point	52H',D2H'	-199999~999999	7.5
54	S2	S2	Desired value at the 2nd point	53H',D3H'	-199999~999999	7.5
55	F3	F3	Measured value at the 3rd point	54H',D4H'	-199999~999999	7.5
56	S3	S3	Expected value at the 3rd point	55H',D5H'	-199999~999999	7.5
57	F4	F4	Measured value at the 4th point	56H',D6H'	-199999~999999	7.5
58	S4	S4	Expected value at the 4th point	57H',D7H'	-199999~999999	7.5
59	F5	F5	Measured value at the 5th point	58H',D8H'	-199999~999999	7.5
60	S5	S5	Expected value at the 5th point	59H',D9H'	-199999~999999	7.5
61	F6	F6	Measured value at the 6th point	5AH',DAH'	-199999~999999	7.5
62	S6	S6	Expected value at the 6th point	5BH',DBH'	-199999~999999	7.5
63	F7	F7	Measured value at the 7th point	5CH',DCH'	-199999~999999	7.5
64	S7	S7	Expected value at the 7th point	5DH',DDH'	-199999~999999	7.5
65	F8	F8	Measured value at the 8th point	5EH',DEH'	-199999~999999	7.5
66	S8	S8	Expected value at the 8th point	5FH',DFH'	-199999~999999	7.5
67	F9	F9	Measured value at the 9th point	60H',E0H'	-199999~999999	7.5
68	S9	S9	Expected value at the 9th point	61H',E1H'	-199999~999999	7.5
69	F10	F10	Measured value at the 10th point	62H',E2H'	-199999~999999	7.5
70	S10	S10	Expected value at the 10th point	63H',E3H'	-199999~999999	7.5
71	FMV	FmV	Polyline Quantity Selection	79H',F9H'	0: oFF / 1: on	7.5

6th Parameter group: Calibration				protected by Security code 1111		
NO.	Symbols	Name	Item	Addr.	Setting Range	Remark
80	CALM	cALm	Calibration method	64H',E4H'	0: norm/1: tEmP/ 2: norm-b/3:TEDS	6.3
81	CALT	cALt	Calibration time allowed	65H',E5H'	1~120 (minute)	6.3
82	MV-V	mv-v	Load cell sensitivity (for tEmP only)	66H',E6H'	0.40000~4.00000 (mV / V)	6.3
83	CAL0	cAL0	Zero calibration	67H',E7H'	real-time measurements	6.3
84	CALF	cALF	Gain calibration (for norm only)	68H',E8H'		6.3
85	CALP	cALP	Weight for Gain calibration	69H',E9H'	1~999999	6.3
86	IN-A	in-A	Zero correction value (for tEmP only)	6AH',EAH'	-199999~999999	6.3
87	FI	Fi	Full scale correction factor (for tEmP only)	6BH',EBH'	0.50000~2.50000	6.3
88	FD	Fd	Scale interval	6CH',ECH'	1,2,5,10,20,50	6.3
89	FR	Fr	Maximum capacity	6DH',EDH'	1~999999	6.3
90	LOCK	LocK	Auto calibration lock	6EH',EEH'	0: oFF / 1: on	6.3

★: The instrument display : 6-digit LED, the first 2 digits from the left display : parameter serial number, and the 4 digits on the right display : parameter symbol

7th Parameter group: parameters backup and restore					protected by Security code 2027	
NO.	Symbols	Name	Item	Addr.	Setting Range	Remark
	VER	VER	Instrument version			
91	SAVE	SAvE	User backup parameter	Cannot set communication settings	0: oFF / 1: on	7.6
92	LOAD	LoAd	Restore user backup parameters		0: oFF / 1: on	7.6
93	DEF	dEF	Restore factory parameters		0: oFF / 1: on	7.6
94	TEAL	TEAL	Alarm code			
95	TEOP	TEOP	operation		0: NONE / 1: SAVE / 2: LOAD	7.6

6. Calibration

Users use the meter for the first time, or any part of measuring system changes and the current equipment calibration parameters can not meet the requirement of the user's use, should be this instrument for calibration.

Calibration parameters in the sixth group set up.(for the calibration parameters for one or more of the parameters of the modified).

6.1 Enter the calibration parameter group

Consult the method of operation【4. Parameter setting method】instrument into the calibration parameter set (set of 6 parameters). Also according to the following method through the keyboard quickly enter the calibration parameter set.

Shortcut to calibration parameters

① Press the SET key after release.

② Holding the DISP key Non-loosen in 2 seconds,until 0000 is displayed.

③ Enter the password after 1111, press SET key, the instrument shows cALm , Into the calibration parameter set (set of 6 parameters).

6.2 Calibration parameters

The following parameters for each calibration parameters to the calibration parameters within the group.

Specific parameter list (parameter symbols, upper and lower, address, etc.), please refer to [5. Parameters sheets].

- cAlm (cALm) —— Calibration method

  0: NOrM (norm): Auto calibration te mp (tEmP): Manual calibration 2: o m-b (norm-b): Bidirectional calibration

  cAlt (cALt) —— Calibration time allowed (minute)

  When timeout, the instrument will automatically returned to measurement mode

- mv-v (mv-v) —— load cell sensitivity (mV / V)

- For manual calibration only, default setting is 2.00000 mV / VcAl0

  (cAL0) —— Zero calibration

- cAlF (cALF) —— Gain calibration, for auto calibration only

It is only used for calibration with weights. After the calibration with weights is completed, the meter will display the value of cAl (cALP) when it measures the mV value.c A l (c A L P) — — Weight display value corresponding to gain calibration

This value needs to be less than the set value of the maximum range F (Fr) of the instrument. It is recommended that the calibration weight be about 80% of the maximum range F (Fr).

- FD (Fd) —— display divisions
- FR (Fr) —— maximum capacity

➡ Since there may be deviations in calibration without weights, when calibration without weights, it can be manually calibrated through the two parameters in-A A (in-A) and Fi (Fi) (there is no such parameter in calibration with weights).

- in-A (in-A) ——Zero correction value, default setting is 0
- Fi (Fi) —— Full Scale correction factor, default setting is 1.00000 Gross value = raw value ×Fi - in-A
- Lock (LocK) —— Auto calibration lock, default setting is OFF
- When set to ON, the calibration parameters are locked, that is, the values of cAL0 and cALF can only be viewed, not automatically calibrated

6.3 Calibration method

■ 6.3.1 Calibration method and process

Auto calibration: Use actual weights to calibrate

Manual calibration: Calibration according to the technical specification of the load cell

➡ When it is inconvenient to load weights for system calibration on site, weightless calibration can be used. When the sensor or meter is replaced, or the weighing system mechanism is changed, please re-calibrate.

Calibration Process

1. Before calibration, enter the display parameter group and set the decimal point position and unit selection parameters to the desired values.

   (The purpose is that when the CALP parameter and the maximum range Fr parameter are subsequently set, the decimal point position of the displayed value is normal)

2. First, enter the calibration parameter group through the above shortcut key operation, and the instrument displays the parameter symbol cALm (cALm) of the first parameter of this group, "calibration parameter selection".

3. Press the key to enter this parameter, and select the calibration method to be used: calibration with weights or calibration without weights. After selecting the corresponding option, press SET to save the parameters.

4. Then set the display partition and maximum range:

   Short press the SET key several times until the meter displays the parameter Fd (Fd) "display division". Press key to enter this parameter, select the minimum division to be displayed (1 or 2, 5, 10, 20, 50), then press SET key to save the parameter.

5. After saving the last parameter, the meter will display the parameter symbol Fr(Fr) of the next parameter "meter maximum range". Press the DISP key to enter this parameter, modify the value to be the maximum weighing capacity of the connected sensor, and press the SET key to save the parameter.

   (★Note: Since the display resolution of the meter is 1/100000, the maximum range of the meter Fr≤display division Fd×100000) The meter display returns the first parameter cALm (cALm) of the calibration parameter group.

   Note 1: If the full-scale display range of the meter does not exceed Fr, the Fr parameter setting in step 5 is not required;

   Note 2: The instrument parameter Fd is set to 1 by default. If there are no special requirements, Fd parameter setting is not required in process 5. Different calibration methods have different next parameters.。

   The following is a detailed description of the calibration process with or without weight calibration:

   For example: sensor capacity 0~10000kg, sensor rated output 2.00010 mV/V

weight calibration

(Continue the above process 4)

6. Zero Calibration:

   Short press the SET key several times until the meter displays the parameter cAL0 (cAL0) "zero mV value during zero calibration", Press the DISP key, input signal value is displayed (in millivolts) and refresh constantly

7. Clear out weighing platform, Press the SET key to confirm zero signal when the display is stable

   (Operation cannot be performed when MOT indicator is ON,after stabilization, the indicator light turns off)

8. Gain Calibration:

   Press the DISP key enter the parameter cALF, input signal value is displayed (in millivolts) and refresh constantly

   Add a weight of 8000kg (close to 80% of the maximum range Fr (Fr)) on the weighing platform. After the display is stable, press the SET key to save the gain mV value.

9. Weight Calibration:

   After saving the last parameter, the instrument displays the parameter symbol(cALP) "the weight display value corresponding to the gain calibration".

   Press the DISP key to enter this parameter, and modify the value to the weight of the gain calibration just now.

   Press the SET key to save the parameters.

Manual calibration

(Continue the above process 4)

5. Sensitivity Calibration:

   After saving the last parameter, the displays the parameter mv-v (mv-v) "Sensor rated output". Press the DISP key to enter this parameter, and modify the value to the sensitivity 2.00010mV/V indicated by the sensor. Press the SET key to save the parameters.

6. Zero Calibration:

   After saving the last parameter, the meter displays the parameter symbol cAL0 (cAL0) of the next parameter "zero mV value during zero calibration".

   Press the DISP key, input signal value is displayed (in millivolts) and refresh constantly

7. Clear out weighing platform, Press the SET key to confirm zero signal (mV)when the display is stable

   (Operation cannot be performed when MOT indicator is ON,after stabilization, the indicator light turns off)

8. Gain Calibration:

   After saving the last parameter, the instrument displays the parameter symbol (cALP) of the parameter "weight display value corresponding to gain calibration". Press the DISP key to enter this parameter, and modify the value to the maximum weighing range of the sensor. Press the SET key to save the parameters.

9. After saving the last parameter, the instrument displays the parameter symbol (in-A) of the next parameter "zero point correction value". Press the DISP key to skip the parameters "zero point correction value" (in-A) and "full scale correction value" Fi (Fi). These two correction parameters will not be dealt with temporarily during the calibration, and will be used only when the actual deviation is found during the measurement, and then the second correction will be made.

   After calibration without weights, check the calibration effect without weights, add a known weight of 800kg to the weighing platform, display 800kg, and it can be used. If 801kg is displayed, calculate 800/801=0.99875, which can be adjusted by setting the full scale correction value 87Fi (Fi) to 0.99875.

Bidirectional calibration with weights

(Continue the above process 4)

6. Zero Calibration:

   Short press the SET key several times until the meter displays the parameter cAL0 (cAL0) "zero mV value during zero calibration", Press the DISP key, input signal value is displayed (in millivolts) and refresh constantly

7. Clear out weighing platform, Press the SET key to confirm zero signal when the display is stable

   (Operation cannot be performed when MOT indicator is ON,after stabilization, the indicator light turns off)

8. Gain Calibration:

   Press the DISP key enter the parameter cALF, input signal value is displayed (in millivolts) and refresh constantly

   Add a weight of 8000kg (close to 80% of the maximum range Fr (Fr)) on the weighing platform. After the display is stable, press the SET key to save the gain mV value.

9. Weight Calibration:

   After saving the last parameter, the instrument displays the parameter symbol(cALP) "the weight display value corresponding to the gain calibration".

   Press the DISP key to enter this parameter, and modify the value to the weight of the gain calibration just now.

   Press the SET key to save the parameters.

10. Exit the calibration interface and clear the displayed value.

11. Add a weight of 8000kg to the weighing platform (close to 80% of the maximum range Fr (Fr)), after the display is stable, record the reading of 806kg, and calculate 800/806=0.99256.

12. Re-enter the calibration parameter interface, and adjust it by setting the full scale correction value 87Fi (Fi) to 0.99256.

■ 6.3.2 Calibration Note:

➡ mV display:

Under Calibration Parameters, when the parameters are (cAL0) and (cALP), the mV value measured by the real-time sensor is displayed. This value can be used to check whether the sensor works normally, detect the four-corner error of the force transmission mechanism, detect the linearity of the sensor, etc.:

◆ check if it works.normally:

When the mV changes with the loaded weight, it means that the sensor wiring is correct and the force transmission mechanism works normally;

When the mV number is oL (or -oL), it indicates that the AD measurement overflows, indicating that the pressure on the sensor is too large (or too small) at this time. If it is still -oL after treatment, it may be caused by the following reasons: a) Failure of the force transmission mechanism, please check and eliminate b) Sensor wiring error, please check and eliminate c)The sensor is damaged, please replace it.

◆ Detect the error of the four corners of the force transmission mechanism:

Load on the four corners of the weighing platform (or weighing bucket) and record the corresponding mV value. If there is an obvious error, please adjust the force transmission mechanism.

7. . Instructions on Functions & Parameters

7.1 Displays

In the second group of parameters setting display parameters

7.1.1Weighing unit and Decimal point

- in-d (in-d) —— Decimal Point Position

NO.	decimal places	parameter	decimal places
0	000000.	3	000.000
1	00000.0	4	00.0000
2	0000.00	5	0.00000

■ 7.1.2 Zero tracking , Nulling

➡ Zero tracking ,: The purpose is to overcome the temp effect on zero of the sensor.

If the measurement is within the zero tracking value setting ≥ 1 second, the reading will be tracked to zero.

➡ Nulling: Zero tracking range, in the unit of scale interval. If the measurement weight is within the zero tracking range ≥ 1 sec, the reading will be tracked to zero. If this parameter is set to 0, zero tracking function will be turned off

★ Dynamic Detection: When the change of the measured value within 1 second exceeds the set change detection threshold, the instrument considers that the force value is changing, and does not perform operations such as zero clearing and zero tracking at this time.

- tr-d (tr-d) —— Zero tracking range (unit: indexing), when set to 0, zero tracking is disabled.
- trs (trS) —— Zero tracking time (Unit: SEC)

Near the zero point, the total weight does not exceed the zero point tracking range (tr-d), and when the zero point time (trS) is stable, the automatic zero-clearing function is enabled.

Zror (Zror) ——Nulling range, (Unit: percentage).Set according to the percentage of the maximum range of the instrument. If the absolute value of the measured value is within the total weight clearing range, manually press the ZERO key (or external input, communication) to clear the total weight display value. Cleared and no memory after power-off. If the measured value is out of the total reset range, the reset operation cannot be performed by manually pressing the ZERO key (or external input), and when "ERROR2" is displayed, indicating that the invalid setting is 0, the reset is invalid.

When set to -99~1%, the clearing range is actually -1*(-99~-1%). At this time, the panel button reset is invalid, and the displays"error2", open-circuit input or communication can still be cleared, limited by the clearing range.

- SZOR (szor) —— Zero point save switch, the system automatically records the zero point value. After this switch is turned on, the previous zero value is automatically subtracted when the system is powered on. Due to the limited number of EEPROM writes, it is recommended to disable this feature for applications that frequently perform clear operations.
- NOTN (notn) —— Fluctuation detection threshold, (unit: minutes), within 1 second, if the change of the measured value exceeds this parameter, the measurement will fluctuate, and the zero-clearing and zero-point tracking functions will not be performed at this time. When set to 0, no fluctuation judgment is performed.

➡ display divisions: Displays the remarks of the partition, please refer to the [6. Calibration] section for details.

➡ Zero softkey, Valid for both gross and net worth.

➡ Zero tracking function, invalid for net value.

■ 7.1.3 Digital filtering and Sampling rate

- FLTR (FLtr) —— Digital filter time constant

The force measuring device is affected by its own natural frequency, and the conduction of external vibration will generate random vibration, which will make the display value of the instrument unstable. According to the frequency of its vibration, select an appropriate digital filter to make the display stable.

Select a smaller digital filter value when the vibration is small, and select a larger digital filter value when the vibration is large.

The larger the setting value, the stronger the filtering effect, but the slower the response to the change of the input signal. The optional range is 1~20, and the factory setting is 1.

Filtered display value=measured value×1/filter constant+previous value×(1-1/filter constant)

- ARMA (ArmA) —— moving averaging

Taken consecutive sample values as a queue, the queue length n is the value set by this parameter.

Each time a new data is sampled and placed at the end of the queue, the data at the head of the queue in the original queue is replaced (first-in, first-out principle), and the arithmetic average of all data in the queue is taken as the filtering result.

Sliding filtering are good suppression of periodic interference and high smoothness. The optional range is 1~10, and the factory setting is 1.

➡ Inside the instrument, the moving average filter (ArmA) is performed first, and then the digital filter (FLtr) is performed.

Moth (MotH) —— Measurement correcti on threshold

- Mov (Mov) —— Measurement correction value

If measured value < MotH, gross value = raw value

If measured value ≥ MotH, gross Value = raw value + Mov

- SPS (SPS) —— Sampling & output rate
- Measurement speed of instrument AD can be selected: 15、120、240、480、960、1920 time/sec
- DISP (disp) —— Power-on display content selection

0: GROSS (GroSS): GROSS

1: net (nEt): NET

2: PEAK (PEAK): PEAK

3: vALL (vALL): valley VALL

4: P-v (P-v): P-V

5tp (tP): Peak Process Volume tP

6: tv (tv): valley value process tv

- At (At) —— display refreshing rate

Indicates the rate at which the meter displays a 1-second update. 10 and 20 are optional, the factory setting is 10 (times/second).

➡Inside the instrument, moving average filtering (ArmA) is first performed to overcome the effects of periodic vibration variations, and then digital filtering (FLtr) is performed to overcome the effects of burst noise. If the display effect is not as expected and cannot meet the requirements of stable display, you can set the display update rate (At) moderately, the display update will be slower, and then average processing to obtain a better stable display

★ Not available for peak, valley or valley and process count displays.

★The control period of the comparison output is only controlled by the measurement speed selection parameter ( ), and has nothing to do with the display update rate.

■ 7.1.4 peak-to-valley

- MAT MAB MINT MINB (mAt/mAb/mint/minb) ——Peak, valley threshold and hysteresis, the instrument has peak, valley and peak-to-valley hold functions. The relevant parameters are as follows:

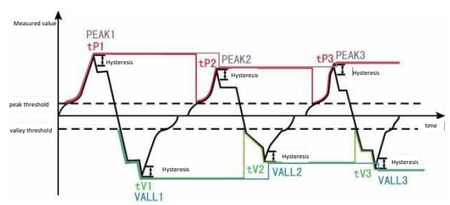
MAT (mAt): peak threshold: If the weight value exceeds the Peak value threshold, the peak value(mAb) detection is started

MAB (mAb): peak hysteresis: When the displayed value falls back to the set value of the peak hysteresis, the peak detection is stopped.

MINT (mint): valley threshold: If the weight value is lower than the Valley value threshold, the valley value detection is started

MINB (minb): valley hysteresis: When the displayed value falls back to the set value of the valley threshold, the valley detection is stopped.

Peak value and valley value detection



1.As shown in the figure above, when the measured value exceeds the "Peak Threshold", the instrument starts to detect the peak value; when the measured value falls back to exceed "Peak Hysteresis" (B1=PEAK1-"Peak Hysteresis" in the figure), the instrument completes the peak detection. Obtain peak PEAK1.

2.After a peak is detected, the peak detection process can only be restarted when the measurement falls back below the "Peak Threshold" and then exceeds the "Peak Threshold" again.

★ PEAKn and VALLn in the above figure are respectively the peak and valley values, and tPn and tVn are respectively the peak process value and the valley process value.

★ If the measured value does not exceed the "Peak Threshold", peak detection will not start.

★ After a peak is detected, peak detection is restarted only when the measurement falls back below the peak threshold, and then exceeds the peak threshold again, overwriting the previous peak.

★ Valley detection is similar to peak detection and will not be described separately.

Maximum and minimum detection:

When "Peak Threshold" (or "Valley Threshold") is set to -999999 (or 999999), the actual maximum (or minimum) of the peak (or valley) will keep increasing (or decreasing). It can only be cleared by resetting the peak-to-valley value or power cycle. Clear peaks/valleys manually:

Press and hold the UNIT key for 2 seconds to clear peak and valley values and process quantities.

- POC (Poc) —— Power-on reset, clear peak and valley function selection. When set to OFF, the meter will not automatically clear zero, clear peaks, clear valleys and process values when powered on; when set to ON, when the measured value is within the clearing range, it will automatically clear zero, clear peaks and valleys and process values when powered on.

■ 7.1.5 Switch Input Definition

- DIOF1/2 (diOF1/2) —— Switch Input function selection

Parameter value	Option	Remark
0	oFF	No modification allowed
1	on	Modification allowed

digital input function:

Parameter value	Option	Remark
0	nonE（nonE）	No function
1	ZERO（ZEro）	in the measurement state, when the measured value is within the clearing range, the displayed value, peak and valley value and process value can be cleared to zero
2	ALRM（ALrm）	After this function is enabled, the instrument will perform the normal comparison output function only when the digital input is valid. Otherwise, the compare output state is latched to the current output ★ When the comparison output is off, the unit indicator flashes to indicate
3	HOLDP（HOLDP）	Lock display: pulse trigger, single lock, double unlock, in the measurement state, the display can be locked
4	HOLD（HOLD）	Lock display: level trigger, input closed to lock, open to unlock. The display can be locked in the measurement state
5	CLPU（cLPu）	Peak-valley value clearing: When the switch value is valid, the peak-valley value and process value clearing function can be realized.

Nulling and Taring function

Nulling: In the measurement state, the instrument supports pressing the reset key (or through the switch) to reset. When the zero point of the force measuring device changes, use the clear function to clear the display. The reset function can be used only when the displayed value is within the range set by the reset range parameter.

Whether to keep reset after power failure is related to the zero parameter setting.

Recognition time of digital input

➡ Valid identification time of digital input:
digital input should be active for at least 10ms

7.2 Alarm outputs

Set in parameter group 1 (only the oA1 parameter is in parameter group 2).
For the instrument with communication function, when the ctD parameter (comparison output control right selection) is set to on, the comparison output state has nothing to do with the measured value.
Comparative output refers to the indicator light and output response of the instrument when the measured value exceeds the set range;

Each output point can independently set 6 parameters of comparison mode, set value, sensitivity, delay, deviation comparison value and comparison data source.

➢ AL1 ~AL2（AL1~ AL2）—— options of the alarm source

parameter value.	Option	Source
0	GROSS1（GroSS1）	Gross weight
1	NET1（nEt1）	Net weight
2	PEAk1（PEAK1）	Peak value
3	VALL1（vALL1）	Valley value
4	P-V1（P-v1）	Peak-Valley value
5	TP1（tP1）	Peak Process Volume tP
6	TV1（tv1）	Valley Process Volume tv
7	HOLD1（diSP1）	Display value

➢ ALo1 1 ~ALo2 2（ALo1~ ALo2）—— alarm mode

NO.	symbols	mode	Output active condition
0	-HH-（HH）	Upper limit alarm	weight value ＞ out
1	-LL-（LL）	Lower limit alarm	weight value ≤ out
2	-AA-（AA）	Upper alarm with deviation	（weight value—Av）＞ out
3	-BB-（BB）	Lower alarm with deviation	（weight value—Av）≤ out
4	HLPS（HLPS）	Absolute upper limit alarm with deviation	| weight value—Av |＞ out
5	n-HL（n-HL）	Absolute lower limit alarm with deviation	| weight value—Av |≤ out
6	-EE-（EE）	Upper limit alarm under armed state	
7	-FF-（FF）	Lower limit alarm under armed state	
8	-QQ-（QQ）	Upper limit alarm with deviation under armed state	
9	-RR-（RR）	Lower limit alarm with deviation under armed state	
10	BRERK	Wire break alarm function	When the sensor power supply or signal line is disconnected, an alarm output is generated.

There are 10 alarm modes mentioned above, which are divided into 6 basic types and 4 backup methods (when comparing the absolute value of deviation, the sensitivity parameter is invalid)

➡ Standby mode: When the meter is powered on, it will not output when the value of the comparison data source is within the output range. When the value of the comparison data source enters the non-output range, the standby condition is established, and then the output is normal.

➢ AL_NUM1/2(al_num1/2)—— Switch quantity setting channel number (the serial number set by the following parameters)

➢ OUT1/2（oUt1/2）—— alarm threshold

➢ HYA1/2 （HYA1/2）—— alarm hysteresis

➢ Sensitivity is the area in which the output recovery set expands as needed, preventing frequent ON/OFF of the output when the value of the comparison data source fluctuates around the comparison set value

➢ DLY1/2 （dLY1/2）—— alarm delay (second)

In order to prevent wrong output due to short-term signal fluctuation, causing wrong output action and safety interlock. The comparison delay for each comparison point can be set to 0~60 seconds delay triggering. After the comparison output is generated, the signal is in the output state within the continuously set seconds, and the output acts. Alarm recovery is not controlled by this function.

➢ Av1/2 （Av1/2）—— Deviation comparison value

➢ INU1/2 （INU1/2）—— Alarm point is normally open or closed (0 is open; 1 is closed)

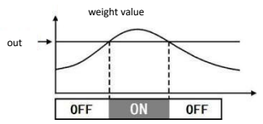
➢ CH 1/2 （CH1/2）——set analog channel number

➢ oA1（oA1）—— Alarm output password selection (this parameter is set in the second group of parameters)

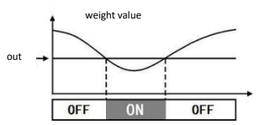
➢This parameter determines whether modification of each of the above comparison output parameters is allowed:

The alarm parameters (the first group of parameters) are only allowed to be modified when the oA1 parameter is set to on, otherwise "-lock-" will be prompted and the modification will be abandoned.

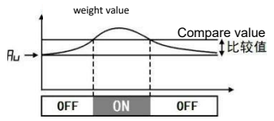
Upper limit alarm



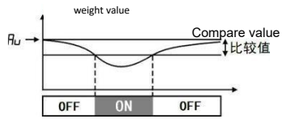
Lower limit alarm



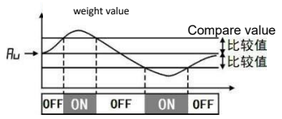
Upper alarm with deviation



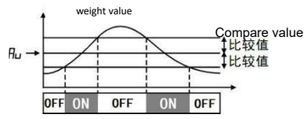
Lower alarm with deviation



Absolute upper limit alarm with deviation

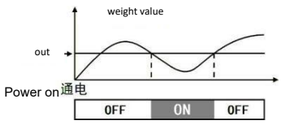


Absolute lower limit alarm with deviation



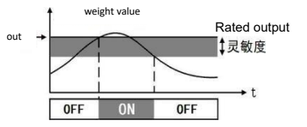
Upper limit alarm under armed state

-EE-



Hysteresis

upper output:



Control comparison output through digital input

The digital input can be set to the function of "Allow alarm output"
The switch is closed to judge the alarm output state.
When the switch is turned off, it is judged that the comparative output state is locked and remains unchanged. After closing the switch again, it is judged that the comparison output state lock is released, and the comparison output state is judged again. (For details, please refer to the content of switch quantity input function selection in [■ 6.1.4 Instrument Operation Mode].

7.3 Analog Output

This is an optional function.The analog output parameters are set in the third group of parameters.
The output form of the analog output function first depends on the order model (see [11. Model Remark]-Optional Specifications-Analog Output for details), and on the basis of the order specification, it is also controlled by the Aot parameters described below .

For an instrument with communication function, when the ctA (transmission output control authority selection) parameter is set to ON, the instrument does not perform transmission output processing.

AoS （AoS）—— analog output source
0/8: GroSS1/GroSS2 :Gross weight 1/9: nEt1/nEt2: Net weight
2/10: PEAk1/PEAK2 : Peak value 3/11: uALL1/vALL2: Valley value
4/12: P-v1/P-v2 : Peak-Valley value 5/13: tP1/ tP2 :Peak Process Volume
6/14: tv1/tv2 : Valley Process Volume 7/15: diSp1/diSP2: Display value

➢ Aot （Aot）—— analog Output type

➢ 0: 4 - 20 :(4~20)mA 1: 0- 10:(0~10)mA 2: 0- 20 :(0~20)mA
3: 1-5v: (1~5)V 4: 0- 5v :(0~5)V 5: Pn-u（Pn-u）: :(±5)V OR (±10)V

➢ AotH、AotL（AotH、AotL）—— Upper range and lower range of analog output。H:Upper、L :Lower

➡ The analog output signal needs to be specified when leaving the factory
For example: analog output, total weight 0~100000 kg. Corresponding to 4-20mA, or corresponding to 0-5V

parameter	Name	4~20mA set	0-5V set
30AOS	Analog output data source selection	Gross weight	Gross weight
31AOT	Analog output type selection	4- 20	0- 5v
32AOTH	upper limit analog output	100000	100000
33AOTL	lower limit analog output	0	0

7.4 Communication Interface

➡ This is an optional function.Communication parameters are in group 4 parameters.

➢ ADD （Add）—— Local communication address of this instrument.range: 0~99, Default setting is 1

➢ BAUD （bAud）——baudrate of communication.setting range: 0~6, which are 2400 / 4800 / 9600 / 19200 / 38400 /57600/115200/230400/500000/1M/1.5M/2M/3M(bps)

➢ o （oES）—— Parity option（for modbus only）
This parameter is only displayed when the communication protocol is selected as Modbus protocol.
0: n No parity（None） 1:ODD Odd parity（Odd） 2: EVEN Even parity（Even）

➢ CtD （ctd）—— Alarm output controlled externally
If it is set to OFF, alarm outputs are controlled by this instrument
Otherwise alarm outputs are controlled externally through communication command

➢ ctA（ctA）—— analog output controlled externally
If it is set to OFF, analog outputs is controlled by this instrument.
Otherwise analog output is controlled externally through communication command

➢ PRO（Pro）—— Communication protocol
0: Tc-ASc （TCASCII ） 1: MODBUS （Modbus-RTU ）

➢ Act （Act）—— active communication data source

➢ DLY （DLY）——Active send interval setting，Unit：ms。Sending speed is related to the AD sampling speed.

parameter	Option	Remark
0	nonE（nonE）	communication mode:slave mode
1/9	GROSS1/GROSS2（GroSS1/GroSS2）	Actively send: GROSS
2/10	NET1/NET2（nEt1/nEt2）	Actively send: NET
3/11	PEAK1/PEAK2（PEAK1/PEAK2）	Actively send: PEAK
4/12	VALL1/VALL2（vALL1/vALL2）	Actively send: VALL
5/13	P-V1/P-V2（P-v1/P-v2）	Actively send: P-V
6/14	TP1/TP2（tP1/tP2）	Actively send: tP
7/15	TV1/TV2（tv1/tv2）	Actively send: tv
8/16	DISP1/DISP2（diSP1/diSP2）	Actively send: DISP
9	G1AG2（G1AG2）	Actively send: sum(ch1 ch2)
10	CH-ALL（CH-ALL）	Send all channel data

communication mode:slave mode, The instrument receives the communication command from the host computer and responds. Each time it receives an command, it returns the corresponding data to the host computer.
If the instrument needs to send data to the host computer automatic and continuously continuously (no longer responding to receiving commands), The the Act (Act) parametercan be set to 1~8, corresponding to actively sending different data.

➡ Once the instrument is set to send automatically, it will no longer respond to receive commands. Press the button to set the Act (Act) parameter to nonE (nonE),the host computer sent the receive command will be respond

➡ The active sending data cycle is consistent with the instrument measurement cycle. The Modbus protocol does not support active sending mode, but only supports slave mode.

➡ For the detailed Remark of the communication command, please refer to the following

➢ SYS （SYS）—— MODBUS RTU , Date format selection
The date format of the Modbus RTU protocal read measurement value is related to the parameter sys setting. The specific correspondence is as follows:

SYS 0 point 0 0 0 1	When it's 0,the fuction code of the measured value of the meter is 04,and the fuction code of the read parameter is 03. When it's 1,the fuction code of the measured value of the meter is 03,and the fuction code of the read parameter is 04.
SYS 1st point 0 0 0 1	When it's 0,the date format of the meter reading measurement value is 32bit. When it's 1,the date format of the meter reading measured value is hexadecimal date,and the decimal point postion is ignored at this time(the specific postion has relevant parameters)
SYS 2nd point 0 0 0 1	When it's 0,the date format ofthe measured values of the meter are sent from high to low（ABCD） When it's 1,indicates the measurement value date high and low register swap（CDAB）
SYS 3rd point 0 0 0 1	When it's 0,each measurement takes 4 bytes（2 registers） When it's 0,each measurement takes 2 bytes（21register）and the date format must be forced to hexadecimal

7.5 Linearization Function

The Linearization Function are set in the 5th group of parameters.

When the input signal and display data increase nonlinearly, we can use this function (linearization) to modify it during calibration.

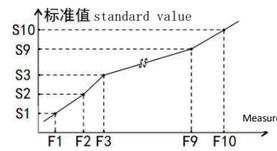
Monotonically increasing means that within the safe range of the input signal, as the input signal increases, the displayed data also increases. There is no situation where the input signal increases and the display data decreases.

➢ FNUM1/2 （FnUm1/2）——number of linearization points,default setting 0,means close this fuction.

➢ FMV1/2 （FmV1/2）—— physical quantity selection, When set to ON, it means non-linearity calibration for input mV and display value. Default setting:OFF

F1 ~ F10 （F1 ~F10 ）—— Measured value at each point

S1 1/2 ~S10 1/2 （F1 1/2~F10 1/2）—— Expected value at each point



For measured value less than F1, Linearization is performed according to the slope rate between F1~F2.
For measured value greater than F10, Linearization is performed according to the slope rate between F9~F10

Linearization calibration

Setting methods
- After base unit and calibration,this fuction will start.
- First, set FNUM to default (setting 0), and close the linearization operation function.
- After the instrument is connected to the input signal, increase the input signal from small to large, and record the measured value and standard value of each linearization point in the process.
- Set FNUM to the actual number of linearization point required, and set the measured value and standard value of each linearization point.

➡ The selection parameter of the number of linearization points must be > 3, otherwise the number of linearization points is too small and the algorithm is not work.

7.6 Parameters Backup and Restore

Parameters in the seventh group can be used to backup and restore all parameters

➡ The operation of backup:

1. Enter the password 2027, then enter Group 7 (User Parameters.
2. Press the SAVE key to enter the user backup parameter , modify it to ON, and press the SET key to Enter.
3. The instrument starts to back up. After the backup operation is completed, it will automatically exit the backup state.

★ In the backup process, do not touch any key ,do not power down

The operation of restore is nearly the same.

Enter the LoAd (LoAd) and deF (dEF) parameters respectively to operate.

TEOP:Read/write TEDS parameters into the chip

7.7 Measurement troubleshooting

➡ When the instrument is working normally, the value is normal.

➡ The measured value data is abnormal:
too high or too low input signal may result in A/D Converter overflowing.: A/D Converter positive overflowing, “ oL” will be displayed
A/D Converter negative overflowing, “ -oL” will be displayed When the measured value is greater the 1.05 × Fr, “ oL” will be displayed

➡ Error prompts error messages will be eliminated after re-calibration

➡ Warning prompt：The warning message can be dismissed after a delay of 3 seconds or by pressing any key:

- ERROR1，Clearing failed
- ERROR2 Gain calibration:calf<calo
- ERROR3 The meter's maximum range fr setting is not suitable
- ERROR4 Too low gain causes display instability or error, or sensitivity is too low
- ERROR5 Polyline parameters do not meet the requirements

8. Communication protocol

Warning

- It is allowed to connect multiple instruments in the RS485 network, please use the cable connection method.
- The shielded wire is used as the communication ground wire and cannot be connected to the protective ground of the device. When the transmission distance is long or the cable connection interference is large, a 120 terminal resistance should be added at both ends of the transmission trunk line, and the connection should be between 485+485-.
- When a computer is connected to multiple instruments, the network topology is a cable type, and each recorder is connected to the main line through a branch line. note: the terminal resistance should be connected to both ends of the communication trunk line, and the transmission line after the branch should be as short as possible to reduce interference.
- When the communication distance is long, the repeater module can be selected.
- Two communication protocols, TC ASCII and Modbus-RTU available, please specify when ordering.
- After entering the setting state , the instrument does not respond to communication commands. The purpose is to prevent the parameter modification value in the setting process from being misread to the upper computer.
- All connected instruments must be set to different Addr.
- When modifying the baud rate, all connected instruments and computers must be modified to the same baud rate.

8.1 TC ASCII

8.1.1 Commands

★ When the single-channel instrumentr is powered on, if G+ and G- are short-circuited, the instrument will use the default communication parameter: Addr. 1, MODBUS-RTU communication protocol, communication baud rate 115200bps, no parity, 1 stop bit. If you want to restore to the standard state, you need to disconnect G+ and G-, then power on again

Commands is composed by following parts :

『Delimiter』『Address』『Content』『Coefficient』『Data』『Checksum』『Terminator』

Delimiter: Every command should start with a delimiter. 3 delimiters available: #、$、%、&、' 'and " "

Address 2-digits destination address, expressed as “AA” in this manual.
Content: measurement channel/source or parameter address, expressed as “BB” in this manual
Coefficient command related, expressed as “DD” in this manual
Data command related, expressed as “data” in this manual.
Checksum 2-bytes of optional checksum, expressed as “CC” in this manual.
Terminator Every command should be ended with return character ( ) ODH.
Commands available in command volume:
#AABBCC Read relevant measurement value
BB=00/08 gross weight
BB=01/09 net weight
BB=02/10 peak value
BB=03/11 valley value
BB=04/12 peak-valley value
BB=05/13Peak Process Volume
BB=06/14 valley Process Volume
BB=07/15 display value
BB=16 Read analog Output
BB=17 Read digital input status
BB=18 Read alarm output status
$AABBCC or $'AA@@BBBBCC Read parameter name
%AABB(data)CC or %AA@@BBBBCC Set parameter value
%AA@@2302+00000.0CC The measured value 1 is cleared, and the peak-valley value 1 and the peak-valley value process quantity 1 are also cleared.
%AA@@2305+00000.0CC The measured value 2 is cleared, and the peak-valley value 2 and the peak-valley value process value 2 are also cleared.
%AA@@2304+00000.0CC Peak value 1, valley value 1, peak value process value 1, valley value process value 1 clear
%AA@@2307+00000.0CC Peak value 2, valley value 2, peak value process value 2, valley value process value 2 clear &AA(data)CC Set analog output
" "AABBCC Set alarm output
' 'AABBCC parameter symbols

CC in the above command represents an optional two-character checksum. Please refer to the usage method【8.1.2】

- Instrument Q&A:
➡ Two type ofdelimiter: =、!、>

delimiter command: # , delimiter response: =

delimiter command:' '、$、%, delimiter response: !

delimiter command: & delimiter response: >

➡No response in the following situation:

①. Valid not received delimiter or terminator

②. Address.: inconsistent

③. baud-rate: inconsistent

④. Calibration:inconsistent

➡ The instrument responds to the following conditions

①. command length is incorrect
②. Malformed command data.
③. Functions not supported by the operating instrument hardware
④. Read or set parameters not specified by the instrument
⑤. When the ctd and ctA parameters are oFF, the output command is executed

■ 8.1.2 CheckSum

Function: optional checksum can be used to detect error during communication. 2 characters checksum was added to character string of command and response. Transfer rate is not affected

Setting: The instrument will automatically judge whether there is a checksum in a received command. If Checksum is included in command, instrument will automatically add 2 characters of checksum to its response.

This means that the computer can apply a checksum to certain instruments in the network, or certain commands.

Format: checksum range: 00~FFH, using 2 bytes within 40H~4FH instead ASCⅡcode, Sent before the end character ( ) of a command or response.

The instrumentno response if the checksum in the command from the computer is incorrect.

- Calculation: The checksum of a command is equal to the sum of the ASCII values of all commands, and the remainder is preserved when out of range.
  The checksum of the response is equal to the sum of all the ASCII code values of the response plus the ASCII code value of the Addr.

Example: This example explains the calculating of checksum.:

Command: #0102NF

Response: =+123.5A@C

Checksum of command string is calculated as following:

Checksum=23H+30H+31H+30H+32H=E6H

#, 0, 1, 0, 2 these ASCⅡcode respectively: 23H, 30H, 31H, 30H, 32H.

These ASCⅡcode summarization is E6H, The 2-bytes 40~4FH ASCII expressions are 4EH, 46H, which are N, F

The checksum of the response character is calculated as following (Instrument address takes Add=01 in this example):

Checksum=3DH+2BH+31H+32H+33H+2EH+5H+41H+30H+31H=203H

=, +, 1, 2, 3, ●, 5, A ,these ASCⅡcode respectively: 3DH, 2BH, 31H, 32H, 33H, 2EH, 35H, 41H。

These ASCⅡcode sum and then add the instrument's Addr.ASCⅡcode 30H, 31H equal to 203H, remainder is 03H, The 2-bytes 40~4FH ASCII expressions are 40H, 43H, which are@、C

A in the response string indicates the alert status, Remark see【8.1.3】

Example: This command is used to read gross weight: Command: #01
Response: =+01234.5A

Response indicate: the measure value is +1234.5 , The first compare point corresponding to this value is in the output state

---

■ 8.1.4 Read other measured value

- Illustration This command is used to read other measurement value and corresponding alarm status
- Command: #AABB↵

#is the delimiter
AA (range 00~99) indicates the two-digit decimal Addr of the specified instrument. BB (range 00~07) indicates the type of measurement to be read

symbols	source	symbols	source
00	Gross weight	04	Peak-Vall value
01	Net weight	05	Peak Process Volume
02	Peak value	06	Vall Process Volume
03	Vall value	07	Disp value
08	Read Analog output	09	Read digital input
10	Digital output (Alarm output)		

↵ (0DH) is the terminator.

- Response: = (data) ↵

=is the delimiter

data it means to read analog output.

The measured value is composed of "+" or "-", "decimal point", 6-digit engineering value, and a total of 9 characters for alarm status

The characters range of the alarm status value is 40H~4FH, and the lower 2 bits D0~D1 represent the status of the 1st to 2nd alarm points related to the main measured value output respectively:

"1" it means to read alarm status.

"0" Means to read the non-alarm state.

↵ (0DH) is the terminator.

0	1	0	0	D3	D2	D1	D0

4 0~F

★ Note 1: It should be noted that the alarm points indicated by the alarm status byte are not the alarm points 1~2 on the hardware. Instead, it is associated with alarm points 1~2 of the type of measured value that needs to be read. It depends on what comparison data source is selected for each alarm point.

For example, if the comparison data source of the second alarm point set by an instrument is the net value NET (other alarm points have nothing to do with the net value NET), the D1 position of the alarm state read by this command indicates the second alarm point of this state.

Example: This command reads the net value NET of the instrument whose Addr. is 01:

Command: #0101 Response: =+01234.5B

Response indicate: Measured value:+1234.5 , The 2nd compare point corresponding to this value is in the output state

---

■ 8.1.5 Analog output command

■ Illustration: This command reads the measured value and comparison status of the specified instrument

- Command: #AABB↵

#= is the delimiter.

AA (Range: 00~99) means the 2-digits local address of destination instrument.

BB (08) indicates the type of measurement value to be read

↵ (0DH) is terminator.

Response: =(data) ↵

=is the delimiter.

data means analog output read percentage

The measured value is composed of "+" or "-", " decimal point", 4-digit engineering value, a total of 6 characters

↵ (0DH) is the terminator.

■ 8.1.6 Digital input

- Description: This command reads back the measured value and comparison status of the specified instrument
- Command: #AABB↵

#is the delimiter
AA (Range: 00~99) means the 2-digits local address of destination instrument.
BB (09) indicates the type of measurement to be read
↵ (0DH) is terminator.

- Response: =(data) ↵

=is the delimiter.

data" means digital input. It is represented by two 40H~4FH characters, only one switch state, the first character D0 means the 1-point switch state, and "1" means valid. ↵ (0DH) is terminator.

■ 8.1.7 Alarm output

- Description: This command reads back the measured value and comparison status of the specified instrument
- Command: #AABB↵

#is the delimiter
AA (Range: 00~99) means the 2-digits local address of destination instrument.
BB (10) indicates the type of measurement to be read
↵ (0DH) is terminator.
Response: =(data) ↵

=is the delimiter.

data" means digital input. It is represented by two 40H~4FH characters, only one switch state, the first character D0 means the 1-point switch state, and "1" means valid.
↵ (0DH) is terminator.

■ 8.1.8 Read parameter name

- Illustration: This command reads back the value of the specified parameter of the specified meter
- Command: $AABB ↵

$is the delimiter.

AA (Range: 00~99) means the 2-digits local address of destination instrument.

BB (range 01~6DH) Two-digit 16 decimal Addr representing the parameter., see【5. parameter list】
↵ (0DH) is terminator.

Response: ! (data) ↵

! is the delimiter.

data is parameter value

The parameter value consists of "+" or "-", "decimal point",

6-digit parameter value and a total of 8 characters

↵ (0DH) is terminator.

➡ the instrument parameters are related to the function. For functions that are not available when the instrument is ordered, the corresponding parameters are not opened. When reading unopened parameters, the response will be ?AA ↵

Example: This command reads the comparison set value parameter of comparison point 1 of the instrument whose address is 01, and the parameter address is 03H

Command: $0103 ↵

Response: !+01000.0 ↵

Response indicate: the parameter value is +10000.0

■ 8.1.9 set parametric command

- Illustration: This command is used to set the parameters of the instrument
  When setting parameters, you must first set the password parameter oA (oA) to the correct password value for the corresponding parameter group.
  After the setup work is complete, the password should be set to 0.
- Command: %AABB(data)CC ↵

%is the delimiter.

AA (Range: 00~99) means the 2-digits local address of destination instrument.

BB (range 01~6DH) Two-digit 16 decimal Addr representing the parameter., see【5. parameter list】

data is parameter value

The parameter value consists of "+" or "-", "decimal point", 6-digit parameter value and a total of 8 characters

↵ (0DH) is terminator.

Response: ! AA ↵

! is the delimiter.

AA the 2-digits local address of destination instrument..

↵ (0DH) is the delimiter.

limitations

★ Special Remark write parameters can be repeated up to 100,000 times, so pay special attention when programming! Do not write frequently!

Example: The first command in this example sets the password for the instrument whose Addr.x is 01 to 1111 and prepares command 2 and command 3

The 2nd command sets parameter at address 36H to 0020.

The 4th command sets the security code back to 0000.

Command: %0101+001111 Reaponse: ! 01 Command: %0136+000020 Response: ! 01

Command: %0101+000000 Response: ! 01

■ 8.1.10 Anology output command

- Illustrate: Only applicable to the instrument with analog output function, this command sends a value to the specified instrument, and the instrument receives the data and converts the value to analog output.

➡ Note:the control of the analog output should be transferred to the computer first by setting the parameter command.

- Command: &AA(data) ↵

&is the delimiter.

AA (Range: 00~99) means the 2-digits local address of destination instrument.
data output value: It consists of "+" or "-", a decimal point, and a 4-digit value with a total of 6 characters. The data format is percentage, ranging from 0% to 100%, and the absolute value of the output is determined by theinstrument.
↵ (0DH) is the terminator.

- Response: >AA ↵

>is the delimiter.

AA means the 2-digits local address of destination instrument..

↵ (0DH) is the terminator.

Example: Command: &01+0500 Response: >01

This command will send 50% value to the instrument with Addr. 01. If the output range of the instrument is 4-20mA, it will output 12mA after receiving this value (4mA+0.50×16mA=12mA)

Response indicates that the output is complete

■ 8.1.11 Digital input command

- Illastrate: Only applicable to instruments with digital output function, this command sets a single output
- channel or all output channels. Note that the switch output control power should be transferred to the
- computer first by setting the parameter command.
- Command: "AABB ↵

"is the delimiter.

AA (range 00~99) means the 2-digits local address of destination instrument. BB means alarm output value

"1" indicates alarm status

"0" indicates non-alarm status

0	1	0	0	D3	D2	D1	D0

4 0~F

↵ (0DH) is the terminator.

- Response: >AA

>is the delimiter.

AA means the 2-digits local address of destination instrument.

↵ (0DH) is the terminator.

Example: command: "0141 ↵

Response: >01

This command is to set the instrument channel 1 with Addr. as 01 to be ON, and other channels to be OFF. The response indicates that the output is completed.

■ 8.1.12 Read Symbols command

- Illustration: This command reads the symbols of the specified parameters of the specified instrument.
- Command: ''AABB ↵

''is the delimiter.

AA (Range: 00~99) means the 2-digits local address of destination instrument.

BB (range 01~6DH) means the 2-digits local address of 16 decimal instrument.see【5. parameter list】
↵ (0DH) is the terminator.

- Response: ! AA ↵

! is the delimiter.

(data)means parameter symbols, a total of 6 characters

↵ (0DH) is the terminator.

■ 8.1.13 Clear, clear peak-valley value and process command

- Illustration: This command is used to clear the measured value, peak value, valley value, and peak-valley value process value.
- Command: %AA@@2302(2305¹)+000000CC ↵ Clears the measured value, and also clears the peak-to-valley and peak-to-valley process values.
  %AA@@2304(2307²)+000000CC ↵ Peak, valley, peak process value, valley process value reset

%is the delimiter
AA (Range: 00~99), means the 2-digits local address of destination instrument @@2302(2305¹)+000000CC
Clears the measured value, and also clears the peak-to-valley and peak-to-valley process values @@2304(2307²)+000000CC
Peak, valley, peak process value, valley process value reset
↵ (0DH) is the terminator.

Response: ! AA

! is the delimiter.

AA means the 2-digits local address of destination instrument

↵ (0DH) is the terminator.

8.2 MODBUS-RTU

■ 8.2.1 RTU transfer mode

- data format: The format of each byte is: 1 start bit, 8 data bits, 1 parity bit, 1~2 stop bits.
- Modbus/RTU frame:

start	Addr.	function code	date	CRC verify	end
≥3.5 character	8 bit	8 bit	N×8 bit	16 bit	≥3.5 character

■ 8.2.2 Command set

The Modbus command set supported by this instrument is as follows:

Name	Modbus	Function (16 decimal)	StartAddr. (16 decimal)
GROSS1	read register output	04H (or03H)	0000H (or 8000H)
NET1			0002H (or 8002H)
PEAK1			00004H (or 8004H)
VALL1			0006H (or 8006H)
P-V1			0008H (or 8008H)
Peak Process Volume tP1			000AH (or 800AH)
Valley Process Volume tv1			000CH (or 800CH)
Read disply1			000EH (or 800EH)
GROSS2			0010H (or 8010H)
NET2			0012H (or 8012H)
PEAK2			00014H (or 8014H)
VALL2			0016H (or 8016H)
peak-valley P-V2			0018H (or 8018H)
Peak Process Volume tP2			001AH (or 801AH)
Valley Process Volume tv2			001CH (or 801CH)
Read disply2			001EH (or 801EH)
Read digital input state	read discrete output	02H	0000H
Read digital output state	read coil	01H	0000H
Read anology output percent	Read multiple holding registers	03H	4402H
Read instrument parameter value	Read multiple holding registers	03H	『5. parameter list』 Addr.×2
Modify instrument parameter value	Wirte multiple holding registers	10H	
Set analog output	Wirte multiple holding registers	10H	4402H
Measured value, peak value, valley value and process value reset	Wirte multiple holding registers	10H	0A00/4604
Peak value, valley value and process value reset	Wirte multiple holding registers	10H	0A00/4608
output single switch	Write single coil	05H	
Output multiple switches	Wirte multiple coil	0FH	

when the function code is 03H、04H、10H , Modbus The data format of communication is 32-bit floating point number (IEEE-754)

■ 8.2.3 Command case: Read measured value

- sent BBBB: 0000 / 0002 / 0004 / 0006 / 0008 / 000A / 000C / 000E

AA	04	BBBB	0002	CCCC
postal Addr.	function code	start Addr.	register number	CRC checksum value

- Response

AA	04	04	Data	CCCC
postal Addr.	function code	Measured value bytes	Measured value	CRC checksum value

Note: the above content is in hexadecimal

Example: read Addr.01 of instrument Gross weight Command: 01 04 0000 0002 71CB

Response: 01 04 04 42F6CCCD 5A9B

Response gross weight: 42F6CCCDH, which is 123.4

■ 8.2.4 Command case: Read Read parameter value, read analog output percent

AA	03	BBBB	0002	CCCC
postal Addr.	function code	start Addr.	register number	CRC checksum value

- Response

AA	03	04	Data	CCCC
postal Addr.	function code	Measured value bytes	Measured value	CRC checksum value

■ 8.2.5 Command case: read digital output state

- sent BBBB: 『5. parameter list』 Addr.×2

AA	10	BBBB	0002	04	Data	CCCC
postal Addr.	function code	start Addr.	modify register number	parameter bytes	write parameter value	CRC checksum value

- response

AA	10	BBBB	0002	CCCC
postal Addr.	function code	startAddr.	modify register number	CRC checksum value

■ 8.2.6 Command case: Zero

■ sent BBBB: BBBB is 4604 (hexadecimal) (measured value, peak-valley value and process variable reset) or 4606 (hexadecimal) (peak-valley value and process variable reset), 460C (clear all channels), Data is 00000000

AA	10	BBBB	0002	Data	CCCC
postal Addr.	function code	startAddr.	Measured value bytes	Measured value	CRC checksum value

- Response

AA	10	BBBB	0002	CCCC
postal Addr.	function code	startAddr.	modify register number	CRC checksum value

■ Input specifications

Item	specification
sensor excitation power supply	DC 5V±2%，100mA（MAX） 100mA (MAX) can be orderd
Input impedance	＞10MΩ
Zero adjustment range	－10～12 mV
Gain input range	1～12 mV
ADC converter type	Sigma－Delta
Speed	15、120、240、480、960、1920 times/second （set by parameter）
Accuracy	5 / 1000
Input signal	Proportional measurement with 4-wire strain sensor
contact input:	1 point external switch quantity input, which can be used for clearing, tareing, allowing comparison output, etc.