XK3101+ Weighing Transducer

User Manual

March 2009 version

Keli Electric Manufacturing (Ningbo) Co.,Ltd.

Index

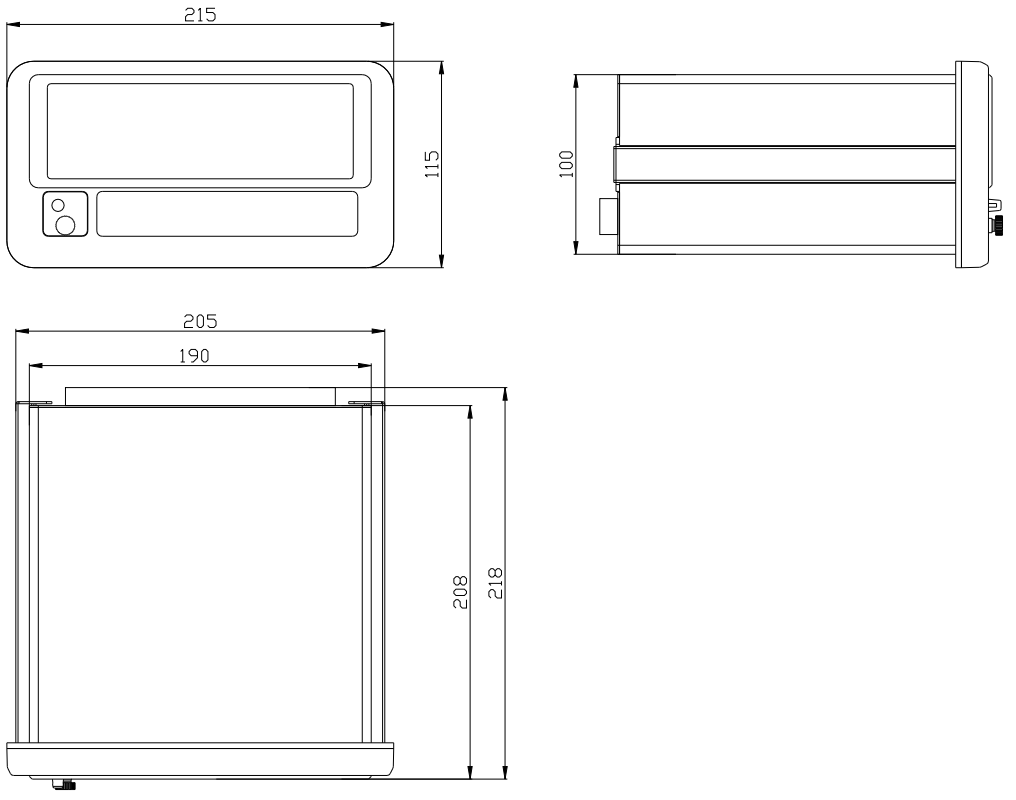
1 Product Structure

1.1 General description

XK3101+ is a weighing transducer applies for industrial control fields, which has several serial communication interfaces such as Modbus and Profibus, interfaces for switching value input and output and extendible analog. Switching value output can deploy four methods that can be used in some applications such as batching, feeding fixed value, upper and lower limits checking and so on. Those communication interfaces can directly connect with DCS. Aluminum housing can be easily embedded in control cabinet.

1.2 Dimension and Installation

Dimension is as following:



It requires to open holes on the panel of cabinet when install it, dimension is 101mm x 191mm, the depth of control cabinet should not be less than 250mm.

2 Main Specification

※7 bits VFD display

※ Standard RS232/RS485 communication interface isolation
※ Standard 10-way (optical coupling isolation)switching value (4-way input 6-way OC output)
※ Locking keyboard
※ Extendible Profibus interface (optional)
※ Extendible interface for 4-20mA/0-10V analog output (optional, accuracy:0.2%)
※ Built-in assisted DC12V/300mA power output(can drive relay output)
※ Switch value output setting—batching mode (dual-rate double materials or single-rate four materials),fixing value mode and upper and lower limits mode

3 Technical Specification

3.1 Analog part

Excitation: 5V DC, ≥120mA (drive 8pcs load cell with 350 ohms each)
ADC conversion speed: 7.5/15/25/50Hz
Output range: 0～±39mV
Input sensitivity: ≥1.5uV/e
Division range: （ 1,2,5）$\times 10^{k}$ k=(-3,-2,-1,0,1)

3.2 Outer input and output

Outer 4-way isolated input to Zero, Tare, Clear (tare weighing and alarming signal) and Drive or Stop.

Outer output: 6-way OC output, include 4-way preset points output, error indication, drive or stop indication and so on.

Furthermore, the indicator also offer a group of independent DC 12V/300mA power supply, which can drive outer relay.

3.3 Serial Communication Interface

Standard RS232 and RS485 interface isolation, which can support two communication protocols: send or order modes as continuous.
Order mode supports MODBUS protocol (RTU mode)
It can set communicating parameters as Baud rate, frame format, etc.

3.4 PROFIBUS Interface (optional)

Support complete PROFIBUS-DP protocol.

Max transmission speed of bus :12M bit/s, baud rate adapting.
Support synchronization and frozen modes.

3.5 Analog output module (optional)

Analog output module includes 0-10V voltage output and 4-20mA current output, but they can not be used at same time. Voltage output requires loading resistance not less than 100 kΩ, current output requires loading resistance not more than 500Ω.

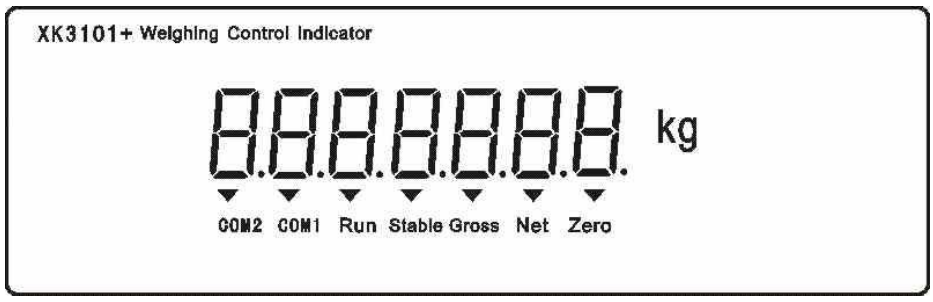
3.6 Environment condition

Power supply: AC $220V^{+10\%}_{-15\%}$, Frequency: 49～51Hz
Power consumption:≤20W
Working temperature: 0℃～40℃, Humidity: 10～90% RH
Storage temperature: -10℃～60℃, Humidity: 10～90% RH
Indicator requires good ground lead, and can not use the same power supply with motor, AC contactor, heater and other settings that easily cause power noise!

4 Instruction

4.1 Display

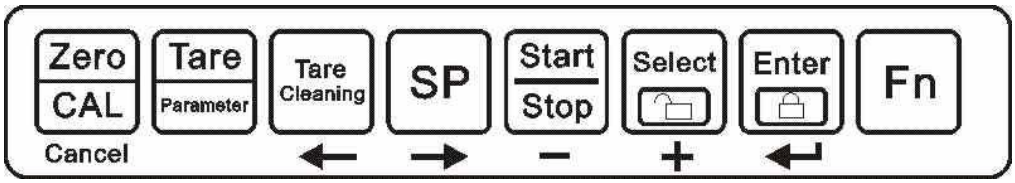
:
This indicator adapts 7 bits VFD display, can display 7 digits with a triangle symbol under every digit, the function of each indicator is as follows:



Cursor	Function
Zero	This cursor is lighting when the gross weight is zero
Gross	This cursor is lighting when the scale display gross weight
Net	This cursor is lighting when the scale display net weight
Stable	This cursor is lighting when the scale is stable
Run	This cursor is lighting means batching is processing, it is lighting under fixed value and upper and lower limits modes.

COM1	Communicating indication of serial communication interface 1 (MODBUS compatible mode, continuous sending mode 1/2) ;
COM2	Communicating indication of serial communication interface 2 (Profibus interface)
Low-order bits '12'	This cursor is lighting means the key was locked, buzzer will continuously call three times when you press any key before unlocking the key

4.2 Keys



Keys	Functions
【Zero】	1 Press this key to zero the present weight under the condition that weight is in allowed zero range and also the weight is stable. Otherwise there will be error 2 Used together with function key to enter into calibration 3) Exit on the status of calibration and parameter setting
【Tare】	Under the status of gross weight and the weight is stable, press this key will temporary save the weighing as tare weight, indicator display net weight as zero
【Tare Cleaning】	Press this key to clear tare weight under net weigh mode, the indicator will show value of present gross weight; Moving one digit left when enter figure;
【Start/ Stop】	Start or stop batching (effective only under batching mode) Subtract 1 while entering figures;
【SP】	Input parameter of each preset point, move one digit right when enter figure;
【Select】	Plus 1 while entering figures, or used to select given parameters
【Enter】	Enter menu or receive selected parameters
【Fn】	Extendible function key, there is different definition as per different products

4.3 Basic operation

4.3.1 Power on

Indicator will do a series of self-checking when it is power on, if everything is normal, it will return to normal displaying state. During the process of self-checking, indicator will show communication baud rate, communication bus, analog output type and other information. Note: select Modbus, it will show baud rate and method to connect the bus, see parameters group Group3.5; after set up the analog output, it will show analog output type, see parameters group Group5.1.

If there is any mistake during self-checking, please refer to chapter 7.1 and solve it as per error sign.

4.3.2 Zero Setting

If empty scale does not show zero value while weighing, press key Zero. You can not finish resetting under conditions as follows:

※ Indication over reset range(reset range is set up under set mode), the error symbol is“_no_”

※ Scale is in dynamic state, the error symbol is “E--2”

※ Indicator set with tare weight, the error symbol is“E--2”;

※ Under Batching state, the error symbol is “E--2”

4.3.3 Tare

It can save present weight as tare weight when the indicator displays gross weight, the indicator displays net weight at same time. You can not finish taring under following situations:

※ Scale is in dynamic state, the error symbol is “E--2”;

※ Indicator presently shows net weight, the error symbol is “E--2”;

※ When gross weight is minus, the error symbol is “E--2”;

※ Under batching state, the error symbol is “E--3”

4.3.4 Clear Tare weight

Press key ‘Tare Cleaning’ when indicator show net weight, then it will show gross weight. You can not finish clearing under following situation:

※ Under batching state, the error symbol is “E--3”

4.3.5 Lock the key

Press key ‘Fn’ and key ‘Enter’ at same time when the indicator is under normal working state, digits 1 and 2 appear in the first figure on the right side of indicator, which means the key is locked. Indicator will not have action when you press any key before unlocking the key; And the buzzer will continuously call three times under locking state.

You can not lock the key while setting the parameters or batching.

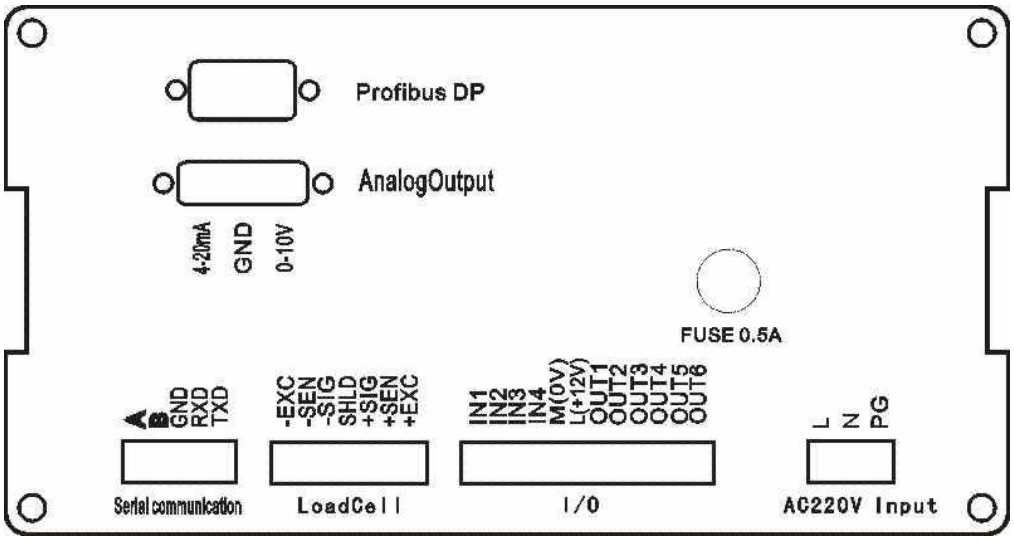
4.3.6 Unlock the key

Press key ‘ Fn’ and key ‘Select’ at same time, digits 1 and 2 appear in the first figure on the right side of indicator, which means the key is unlocked.

5 Installation and Debugging

5.1 Electric connection

5.1.1 Sketch for terminals on back side



5.1.2 Analog load cells connection

This indicator can drive 8pcs analog load cells with 350 ohms each.

Definitions for pins:

Mark	Signal
+ EXC	**Excitation +**
+ SEN	**Sense +**
+SIG	**Signal +**
SHLD	Shield
-SIG	**Signal -**
- SEN	**Sense-**
- EXC	**Excitation -**

If using 4-core signal wire, it`s must make + SEN and +Exc be short-circuit, -SEN and –Exc be short-circuit.

6-core signal wire was recommended, the length of signal wire from indicator to junction box will not over 50M.

5.1.3 Serial interface

Serial interface of indicator include RS232 and RS485. Pins assignment are as follow:

Mark	Signal
A	**RS485 A port**
B	**RS485 B port**
GND	Grounding
TXD	**RS232 data send**
RXD	**RS232 data receiving**

5.1.4 Input and output：

Input / output connector is used to receive input signal and output controlling signal from out side to outer equipment, this indicator has 4-way input and 6-way output, both of input and output are isolated. Pins assignment are as following table:

PCB marking	Pins
OUT1	1
OUT2	2
OUT3	3
OUT4	4
OUT5	5
OUT6	6
L Auxiliary power output +	7
M（0V） Auxiliary power output-	8
IN1(Start/Stop)	9
IN2(Clear)	10
IN3(Tare)	11
IN4(Zero)	12

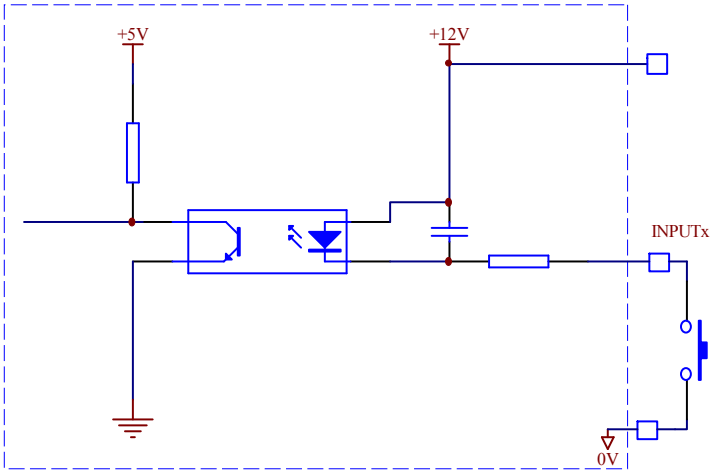
5.1.4 .1 Input

Each input port and auxiliary power 0V are short-circuit, which means input is

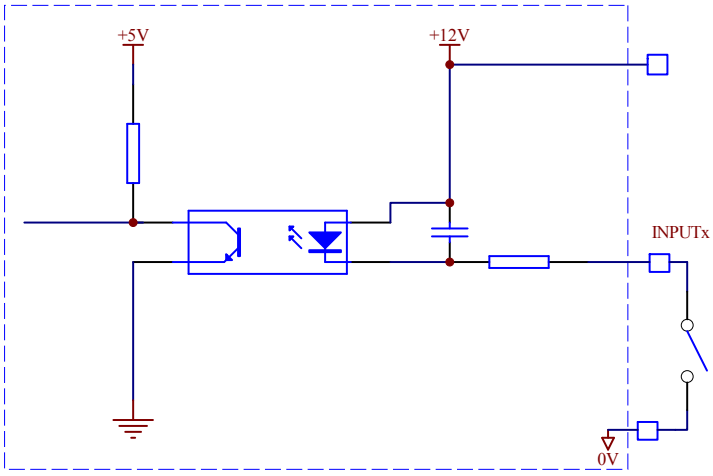
effective, duration of signal short-circuit is at least 50MS. Switch, relay or transistor can be used in outer input circuit. Input current is about 3mA, leakage current of input device can not over 100 microampere. The distance of connecting pins between input interface and outer equipment can not over 10M, we do not suggest to near AC power line and power line.

Equivalent circuit of input signal.

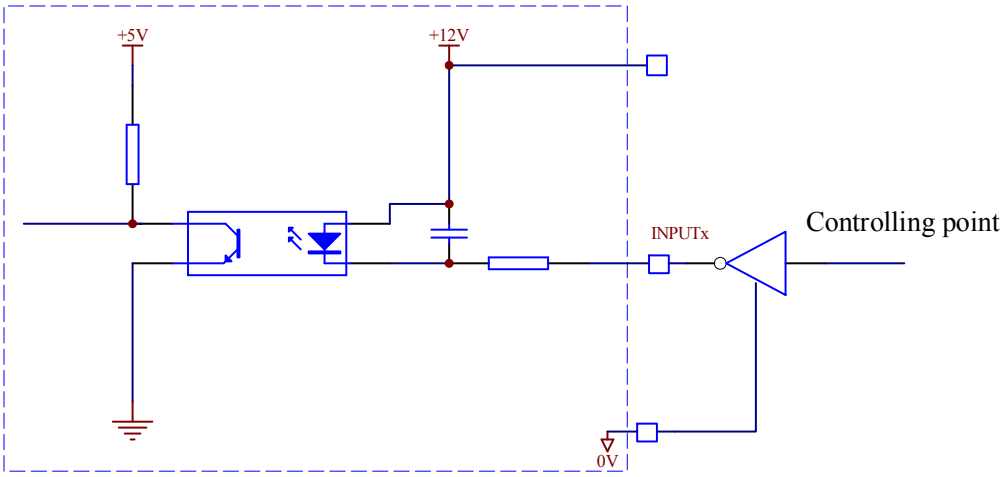
a Switch



b Relay point



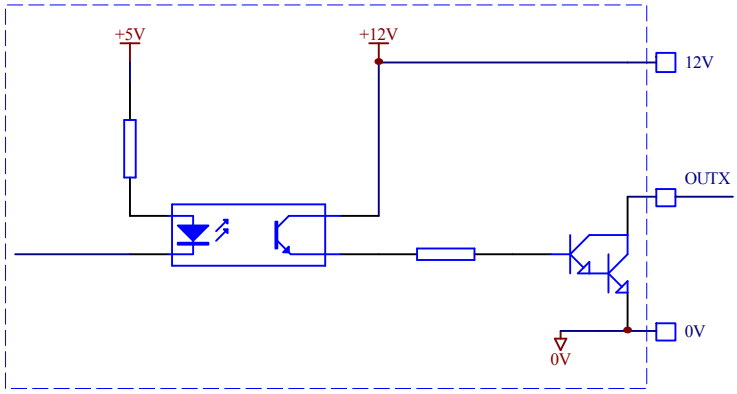
c Transistor or TTL input



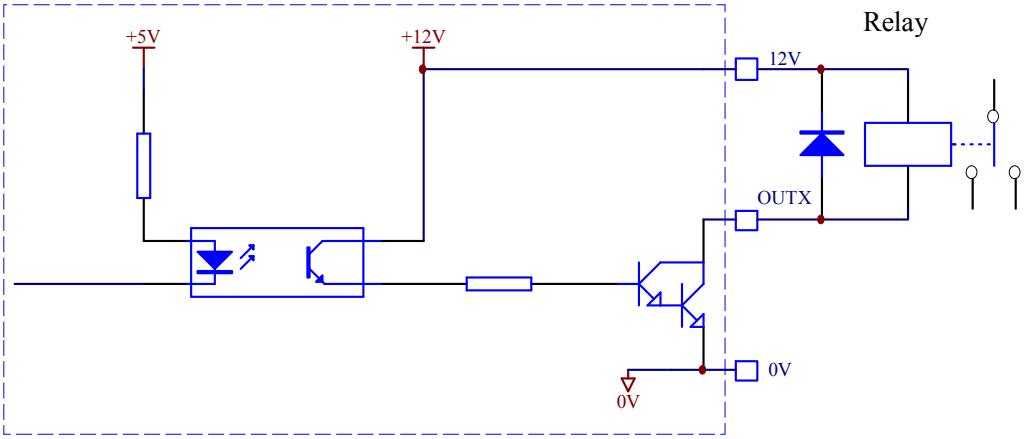
Input is effective when the controlling port is logic 1

5.1.4 .2 output

output circuit of indicator adapts transistor OC type, the transistor turns on when output is effective,, max absorbed current of the output circuit is 50mA , outer driving voltage can not be over DC30V, equivalent circuit of each output is as follows:



in general, switch output is relay, indicator offers a group of auxiliary power output DC12V, which can be directly used to drive outer relay. Real circuit is as follows:



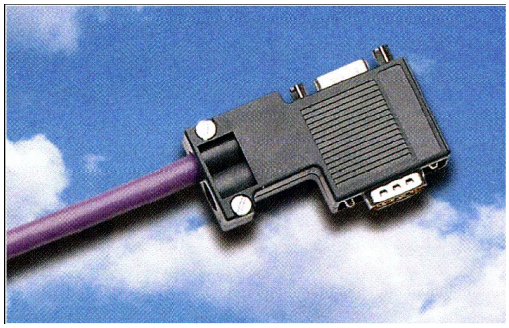
5.1.5 Expansion of analog output

There are two kinds of analog output as 4~20mA and DC0~10V. Both they are can be calibrated separately, but can not be used together, you can select one type by setting parameters. The max loading resistance is 500Ωwhen the output is 4~20mA, DC 0~10V output requires minimum loading resistance is 100 kΩ.The connector for analog output is 3-pin terminal as follows:

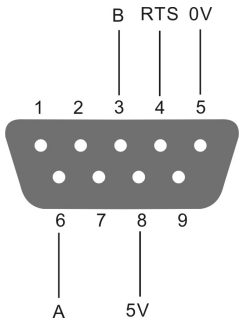
mark	Signal
4~20mA()	**Current output**
GND	Analog output
0~10V()	**Voltage output**

5.1.6 Expansion of PROFIBUS-DP interface

Connecting to PROFIBUS are required to use standard PROFIBUS plug and cable. Following pictures are standard plug and cable for your reference.



Definition of PROFIBUS signal for D type plug is as follows:



5.2 Scale calibration

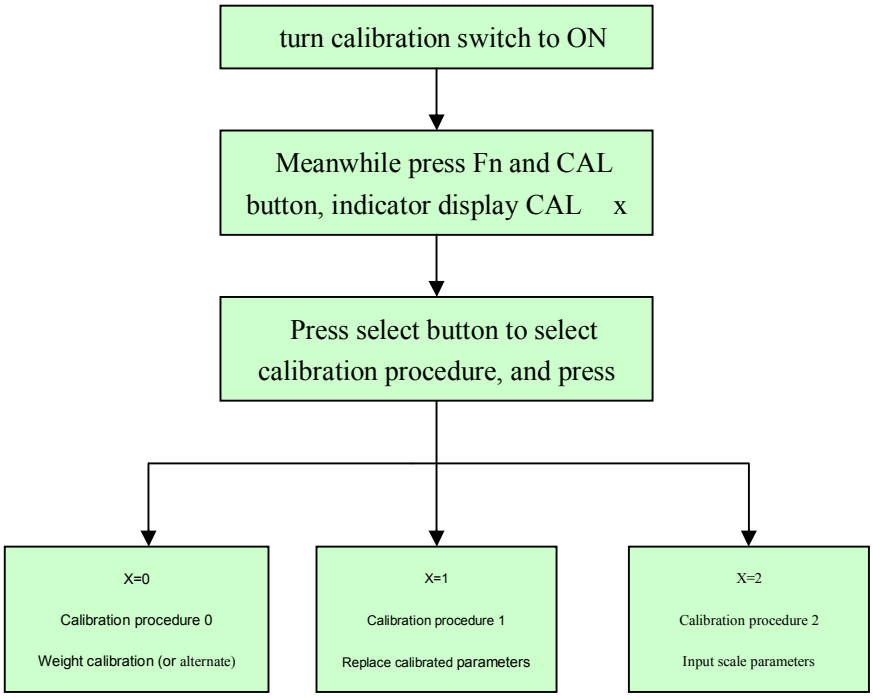
New installed or maintained scale shall be calibrated before using, indicator has three kinds of calibration procedures, they are weight (or alternate) calibration、replace calibrated parameters and input scale parameters three methods. Weight (or alternate) calibration is recommended for new installed scales, if loading weight (or alternate) on spot is not convenient, can use the other two calibration methods, but please note, their calibration error usually is bigger than weight (or alternate) calibration.

Notes: calibration switch shall be put on ON place when calibrating; calibration switch is located at lower left corner of indicator front panel, spin the lead sealing screw at anticlockwise direction to open.

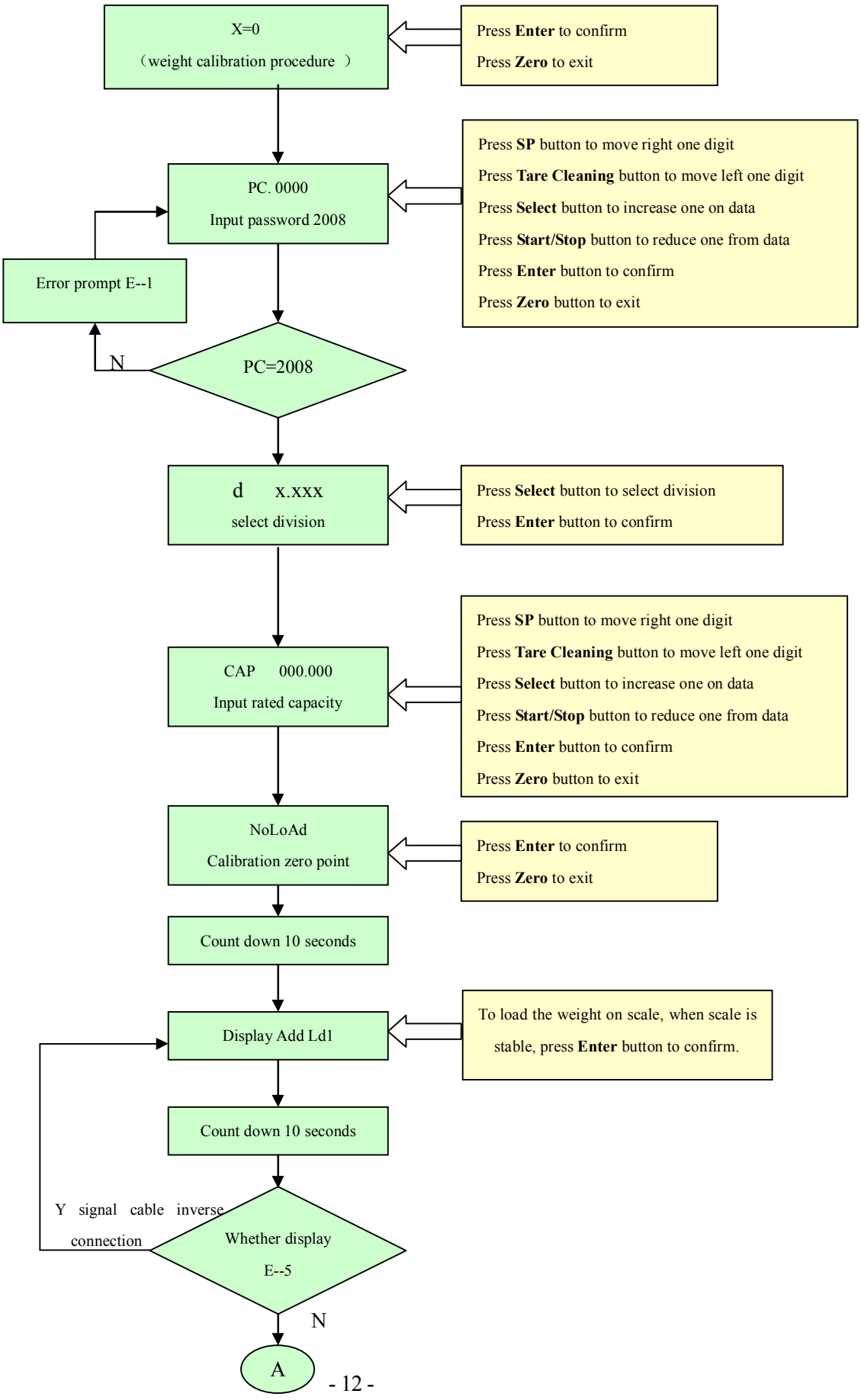
ON: facing to display panel, turn the DIP switch to right, means calibration allowed.

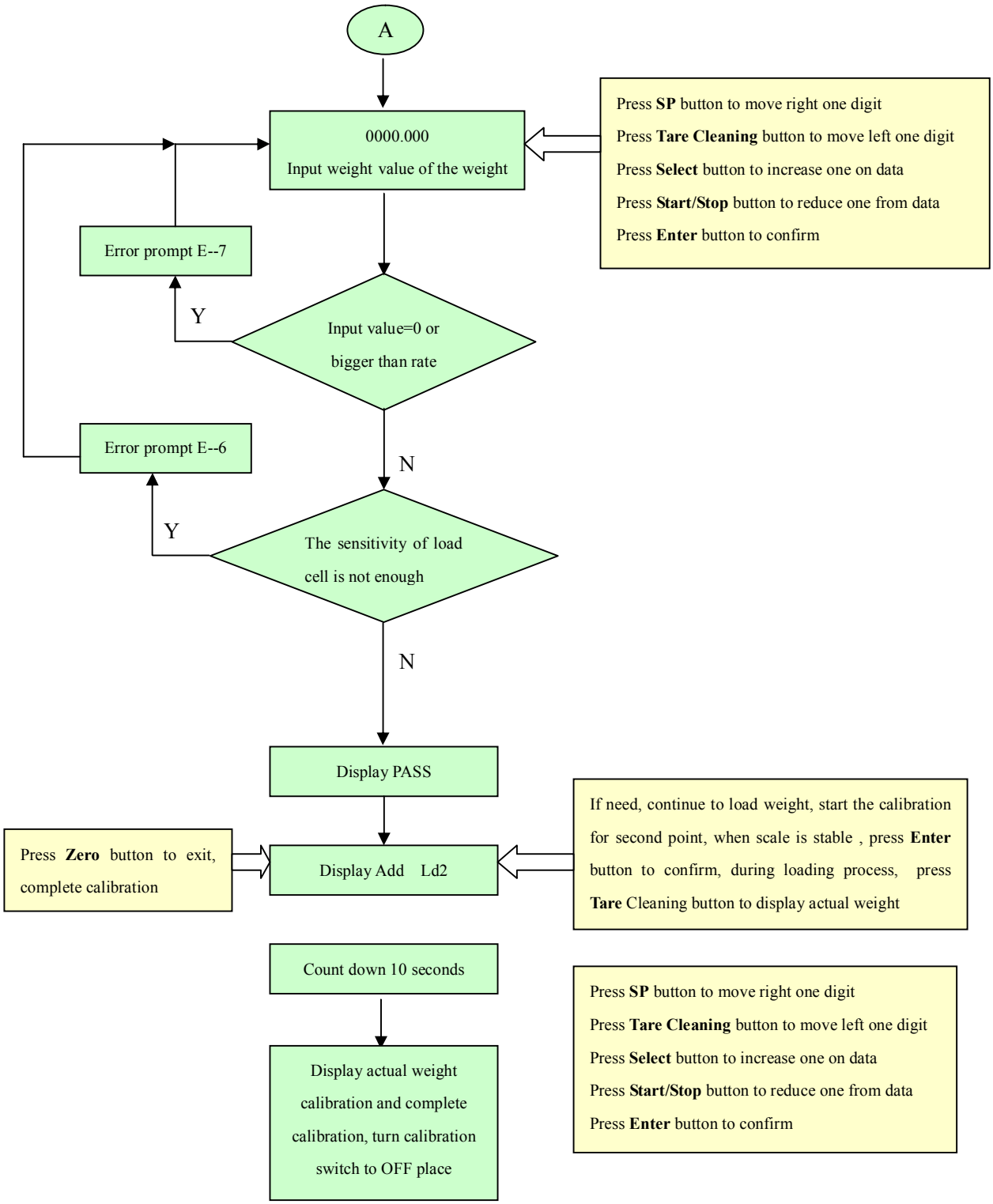
OFF: turn the DIP switch to left, means calibration forbidden.

5.2.1 Scale calibration flow chart

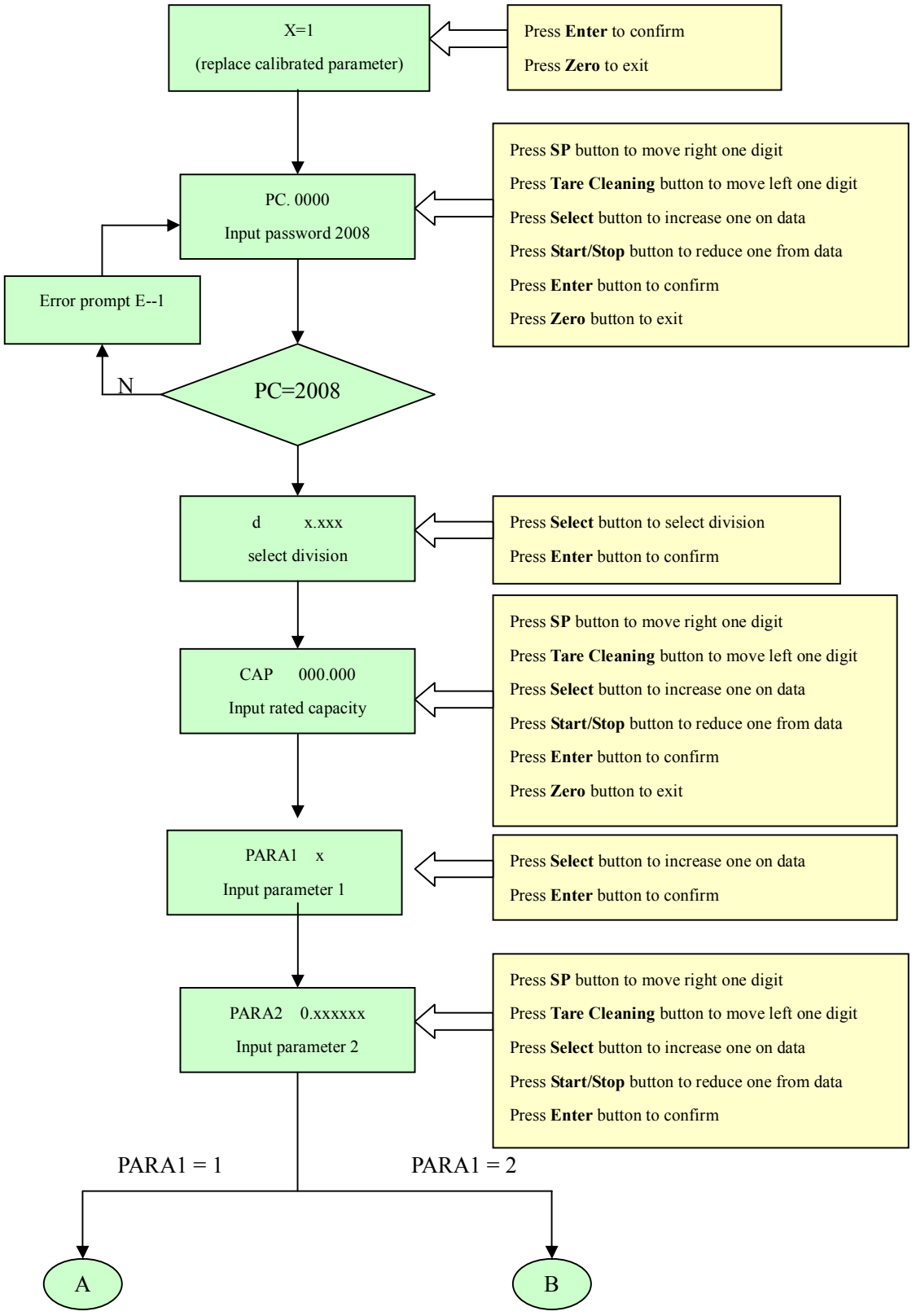


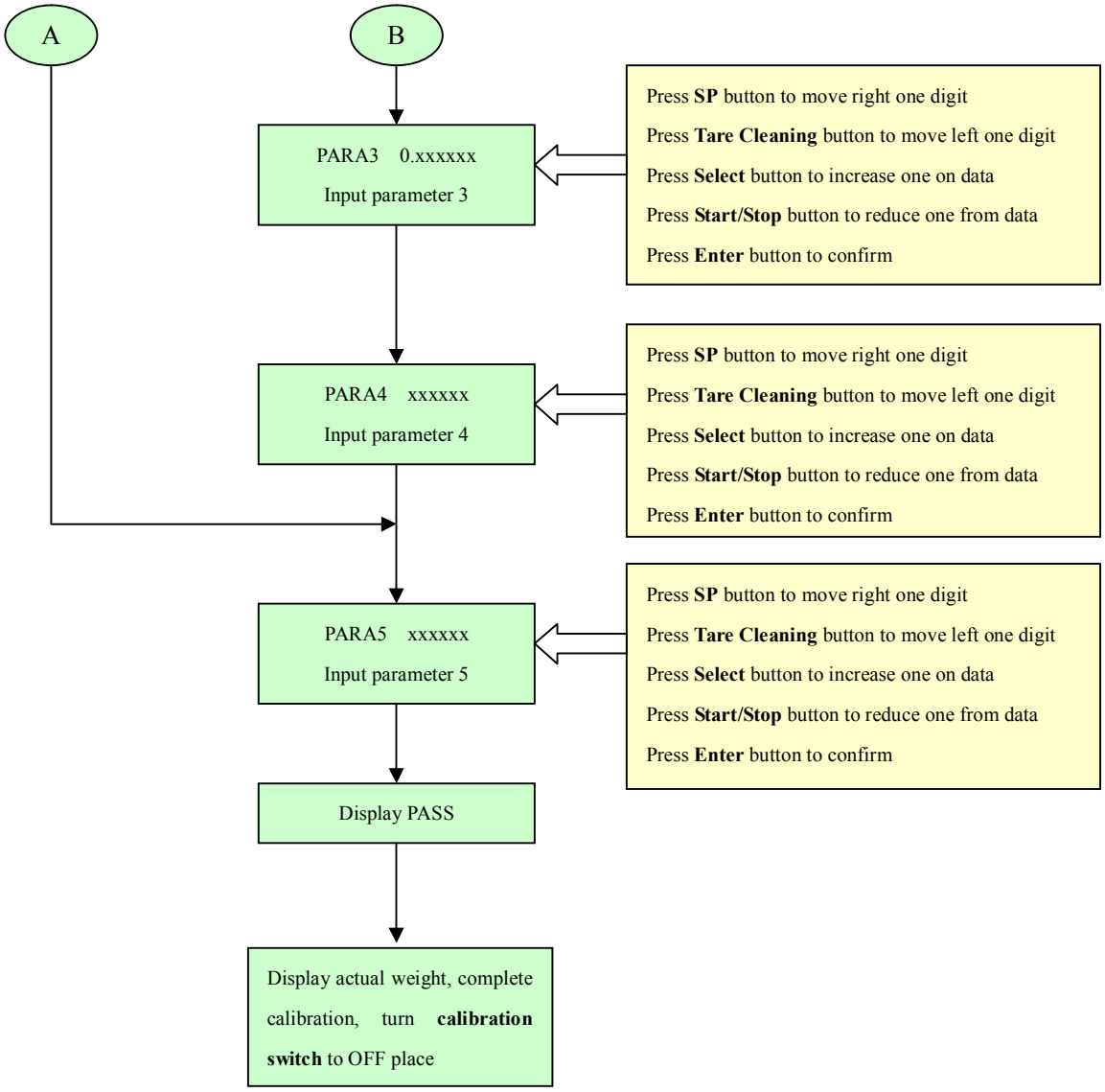
5.3 calibration procedure 0: weight calibration(or alternate)



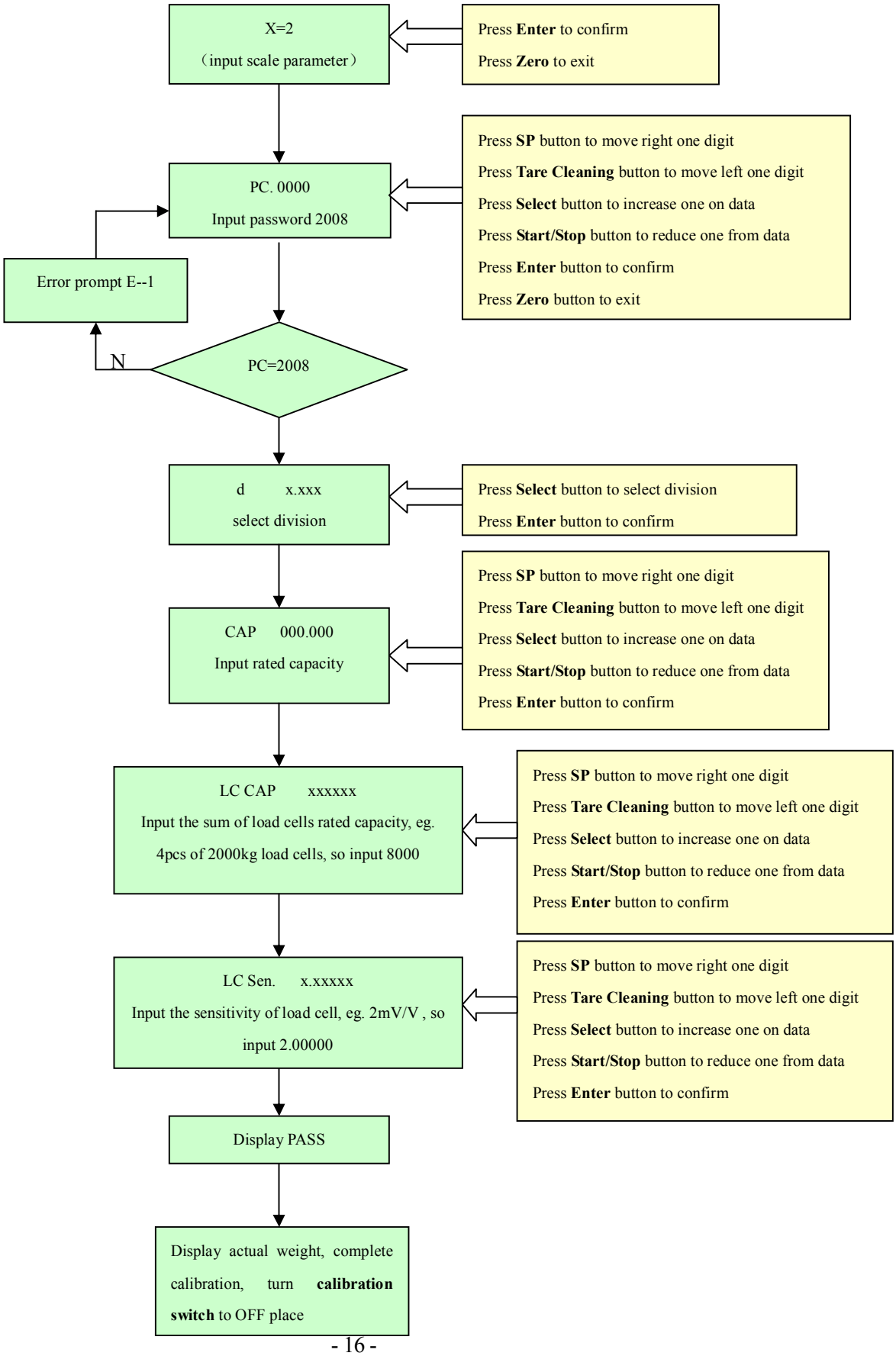

A
0000.000
Input weight value of the weight
Press SP button to move right one digit
Press Tare Cleaning button to move left one digit
Press Select button to increase one on data
Press Start/Stop button to reduce one from data
Press Enter button to confirm
Error prompt E--7
Y
Input value=0 or bigger than rate
Error prompt E--6
N
Y
The sensitivity of load cell is not enough
N
Display PASS
Press Zero button to exit, complete calibration
Display Add Ld2
If need, continue to load weight, start the calibration for second point, when scale is stable , press Enter button to confirm, during loading process, press Tare Cleaning button to display actual weight
Count down 10 seconds
Press SP button to move right one digit
Press Tare Cleaning button to move left one digit
Press Select button to increase one on data
Press Start/Stop button to reduce one from data
Press Enter button to confirm
Display actual weight calibration and complete calibration, turn calibration switch to OFF place

5.4 Calibration procedure 1：replace calibrated parameter




A
B
PARA3 0.xxxxxx
Input parameter 3
Press SP button to move right one digit
Press Tare Cleaning button to move left one digit
Press Select button to increase one on data
Press Start/Stop button to reduce one from data
Press Enter button to confirm
PARA4 xxxxxx
Input parameter 4
Press SP button to move right one digit
Press Tare Cleaning button to move left one digit
Press Select button to increase one on data
Press Start/Stop button to reduce one from data
Press Enter button to confirm
PARA5 xxxxxx
Input parameter 5
Press SP button to move right one digit
Press Tare Cleaning button to move left one digit
Press Select button to increase one on data
Press Start/Stop button to reduce one from data
Press Enter button to confirm
Display PASS
Display actual weight, complete calibration, turn calibration switch to OFF place

5.5 calibration procedure 2: input scale parameter



5.6 Special explanation for calibration procedure

If separately calibrate zero point, may select weight calibration procedure, when display Add Ld1, press Zero button to exit.

If use input scale parameter calibration procedure to calibrate, scale self-weight can be to clear by separately calibrating zero point; or use input calibrated parameter procedure to modify PARA5, modify zero point by manual. This method might need many times modification to meet the requirement, observe the displaying value after each modification, when weight is close to zero, press Zero button to clear the scale self-weight.

After finishing calibration, turn calibration switch back to its original position.

5.7 Look over calibrated parameter

After each calibration, may get into parameter group GROUP 1 to look over and record in enclosed form for future review.

The looking method

a. at the same time press Fn and Parameter button, indicator display GROUP 1

b. press Enter button, display PARA1 x，x is equal to 1 or 2

c. press Enter button, display PARA2, then display its parameter value X.XXXXXXX

d. press Enter button, display PARA3, then display its parameter value X.XXXXXX

e. press Enter button, display PARA4, then display its parameter value XXXXXXX

f. press Enter button, display PARA5, then display its parameter value XXXXXXX

g. press Enter button, display PARA6, then display its parameter value XX

h. press Enter button, display PARA7, then display its parameter value XX

i. press Enter button, display PARA8, then display its parameter value XX

The meanings of related parameter

PARA1：1 means one time loading calibration，2 means twice loading calibration

PARA2：calibrated coefficient of first section

PARA3：calibrated coefficient of second section

PARA4：ISN of first loading point

PARA5：ISN at Zero point

The PARA6~8 are internal parameter, when PARA1=1, PARA3 and PARA4 are meaningless.

6 Parameter setting

Parameter setting includes the following: GROUP2(using environment

parameter)、GROUP3(serial communication parameter)、GROUP4(on-off output parameter)、GROUP5(analogy output parameter)

The functions of related button when setting parameters are shown as following:

Zero: exit button, back to upper parameter setting;

Tare Cleaning: move left button, move modified data to left on digit;

SP: move right button, move modified data to right one digit;

Select: select parameter list, increase one on data when inputting data;

Start/Stop: select parameter list, reduce one on data when inputting data

Enter: confirm the inputted data

Press Fn and Parameter button at the same time, get into parameter setting. Press Select button to select parameter group, press Enter button to get into related parameter group.

6.1 Using environment parameter（GROUP2）

[GROUP 2]

21 select ADC convert speed rate(Hz)

[21 x]

x＝7.5\15\25\50；

22 button to get rid of tare

[22 x]

x＝0 forbid；

x＝1 allow , the range of getting rid of tare is 100%FS;

23 button to clear

[23 x]

x=0 forbid；

x=4 zero setting range is ±4%FS

x=10 zero setting range is ±10%FS

x=20 zero setting range is ±20%FS

24 automatic zero tracking range setting

[24 x]

x=0 forbid；

x=0.5 automatic zero tracking 0.5d/sec

x=1 automatic zero tracking 1d/sec

x=3 automatic zero tracking 3d/sec

25 dynamic checking

[25 x]

x＝0 dynamic checking is forbidden

x＝1 allow, the sensitivity of dynamic checking is 0.5d

x＝2 allow, the sensitivity of dynamic checking is 1d

x＝3 allow, the sensitivity of dynamic checking is 3d

26 digital filter option

[26 x]

x=0~7；

the number stands for filter intensity, the bigger the value is , the stronger the filtering ability is , so related stable time also become longer.

27 automatic clear zero range when turning on

[27 x]

x=0 forbid

x=4 range ±4%FS

x=10 range ±10%FS

x=20 range ±20%FS

6.2 Serial communication parameter（GROUP3）

[GROUP 3]

31 baud rate

[31] select baud rate

Optional baud rate：1200，2400，4800，9600 ；

32 data digit

[32 x] select data digit

x = 7 data digit is 7 bits

x = 8 data digit is 8 bits

33 calibration digit

[33 x] select calibration digit

x = 0 None calibration

x = 1 Odd calibration

x = 2 Even calibration

34 calibration sum

[34 x] select the character of calibration sum

x = 0 not sending the character of calibration sum

x = 1 sending the character of calibration sum (under the mode of continuous output type 1)

calibration sum is sum all characters before the symbol of calibration and then

select the complement of the sum data, that is calibration sum character.

35 output mode

[35 x] output mode

x = 0 modbus compatible mode (see appendix C: modbus compatible communication mode)

x = 1 continuous output mode 1 (see appendix A: continuous output mode1)

x = 2 continuous output mode 2 (see appendix B: continuous output mode 2)

36 Indicator communication address

[36 x] setup address

Setup communication address, optional address range is 0~99

37 Profibus-DP interface

[37 x] setup Profibus-DP interface

x=0 close Profibus-DP interface

x=1 open Profibus-DP interface

38 Select Modbus bus

[38 x]

x=232 RS232 bus

x=485 RS485 bus

6.3 On-off output parameter （GROUP4）

[GROUP 4]

4 1 on-off output parameter mode setting

[41 x]

x=0 ingredient mode, two materials double-speed adding

x=1 ingredient mode, four materials single-speed adding

x=2 fixed value mode

x=3 upper and lower limit mode

[42 x] ingredient display setting

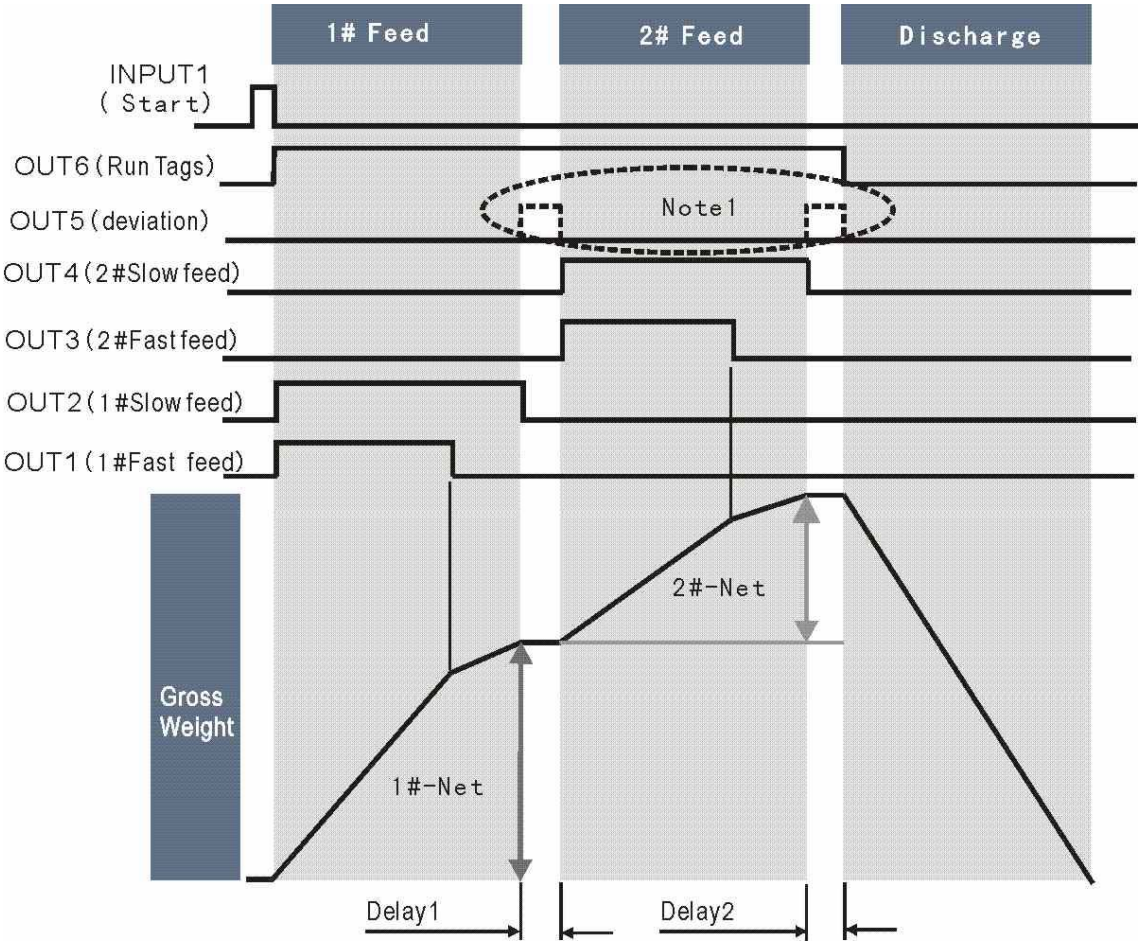
x=0 display total weight during ingredient process

x=1 display net weight of single material during ingredient process

This term only appears under the ingredient mode.

6.3.1 Each pattern state on-off output corresponding:

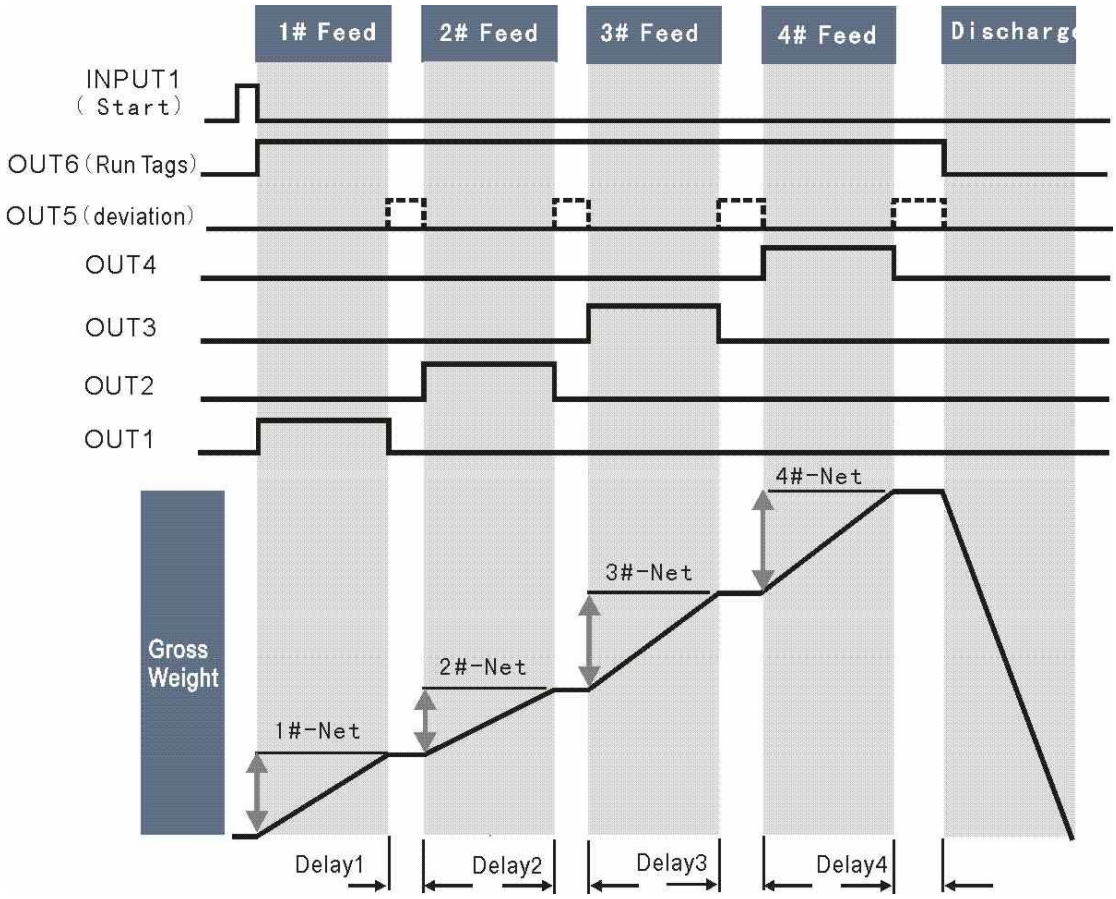
a. Two material dual-rate feeding X=0



During matching state, indicator display N.W of feeding material. Press “Start/Stop” button or “INPUT1” to pause present matching process, repress “Start/Stop” button to run new matching process.

Note 1: Material over status dealing, “OUT5” will output, screen glittering display the different value, press “Enter” button or input “IN2” order to manual release, matching status go on. Cancel the over status warning output, when the tolerance set 0.

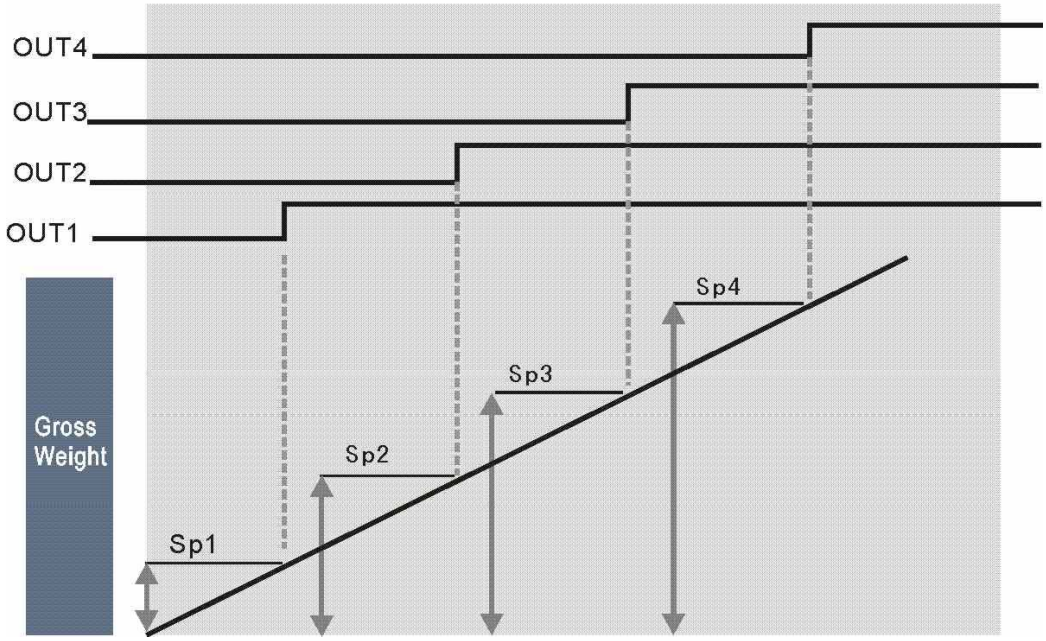
b. Four materials single speed feeding X=1:



During matching state, indicator display N.W of feeding material, Press “Start/Stop” button or “INPUT1” to pause present matching process, repress “Start/Stop” button to run new matching process.

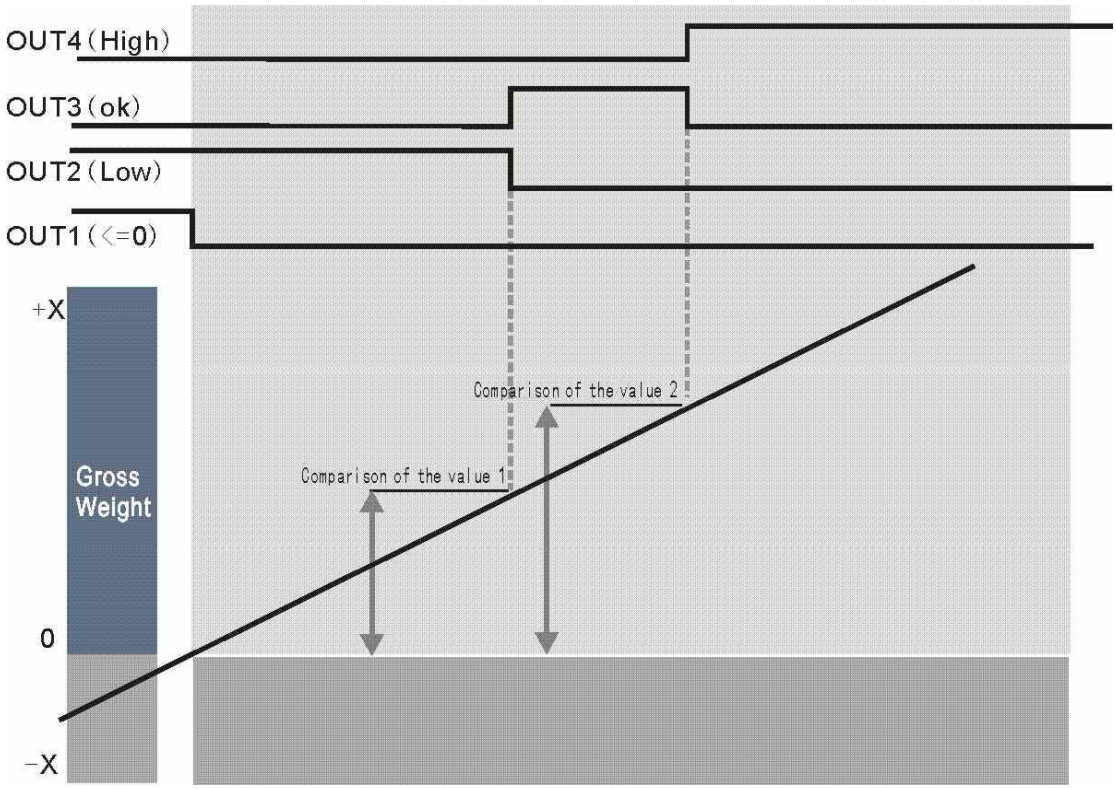
Note 1: material over status dealing “OUT5” will output (as up diagram indicate), screen glittering display simultaneity the different value, press “Enter” button or manual input “IN2” order to release, matching status go on. Cancel the over status warning output, when the tolerance set 0.

c. Fixed value pattern X=2



Fixed value pattern “OUT5” and “OUT6” is not open.

d. Up/down limit pattern X=3:

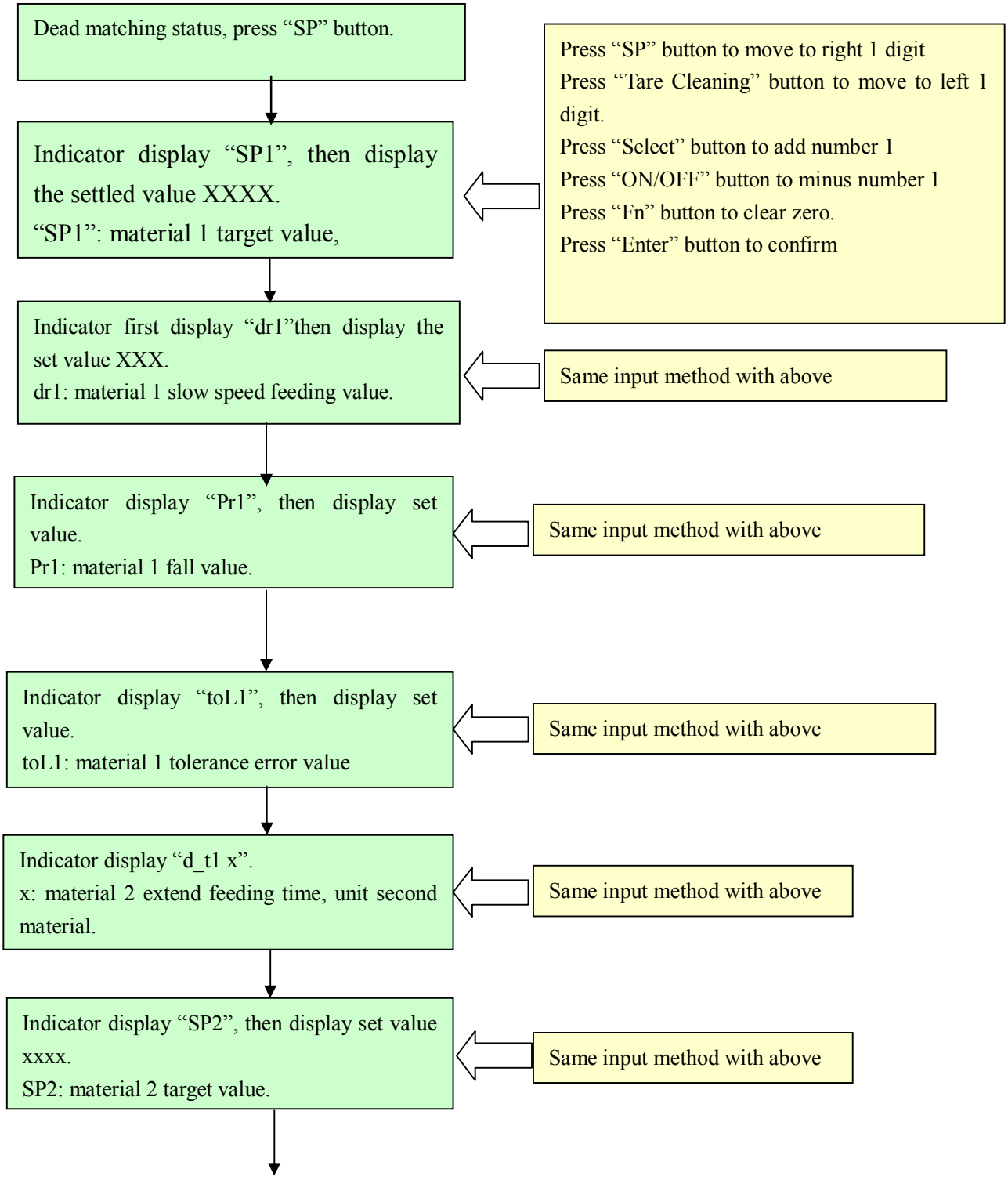


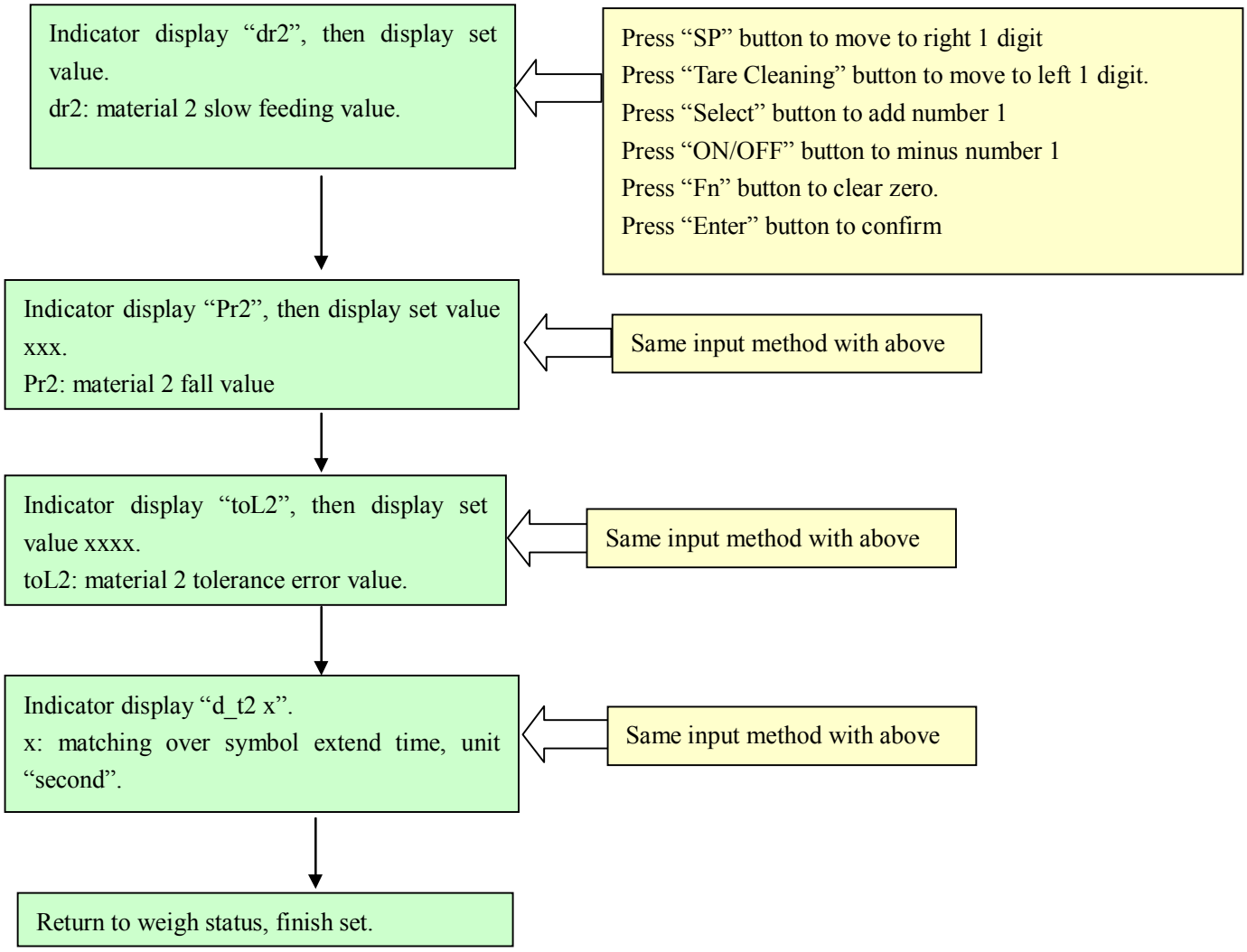
Up/Down limit pattern, “OUT5” and “OUT6” is not open.

6.3.2 “Preset Point” setting instruction

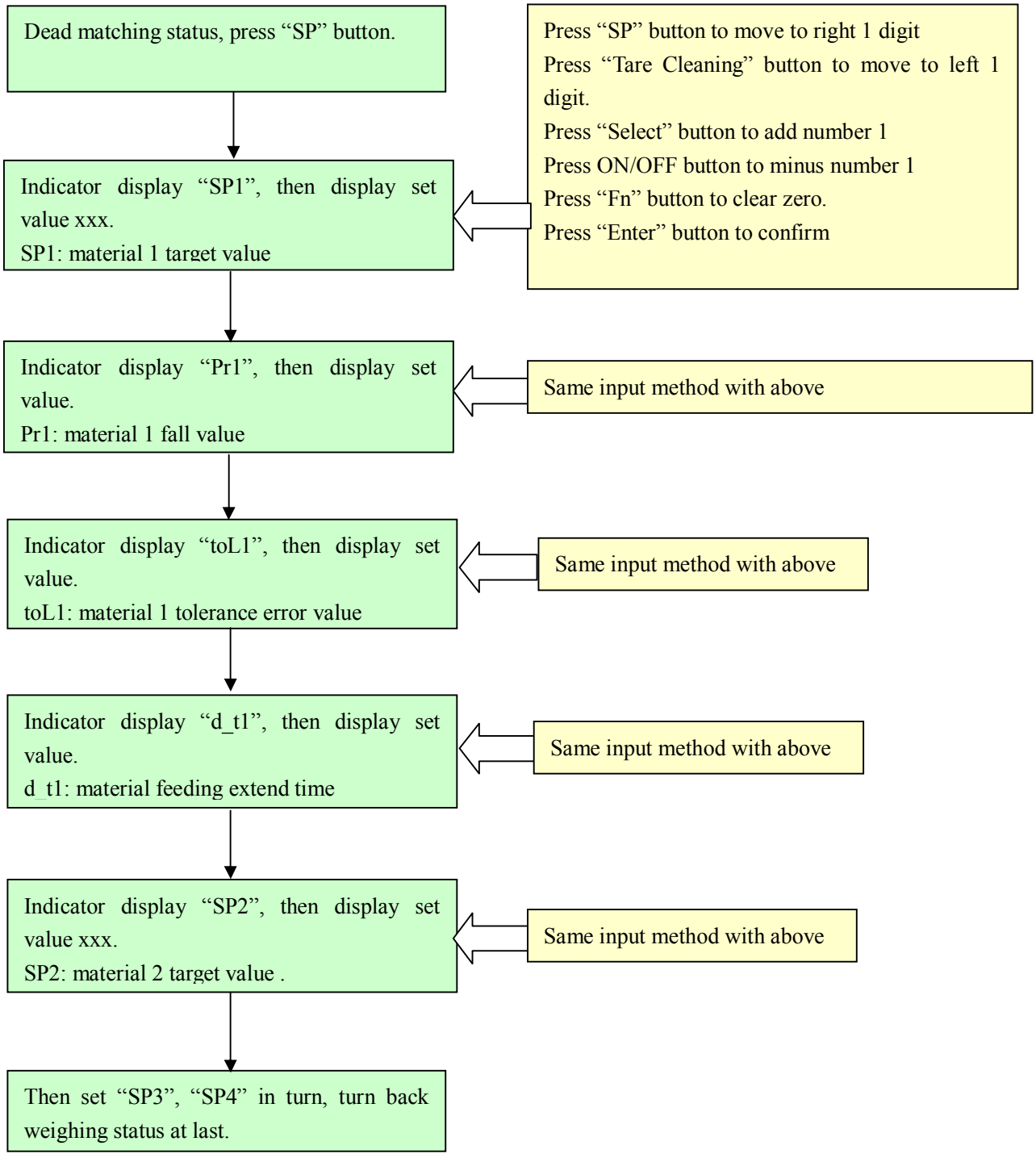
Each output pattern, the setting of Preset Point is different. Beneath display the details of setting flow.

a. Two materials and two speed feeding X=0:

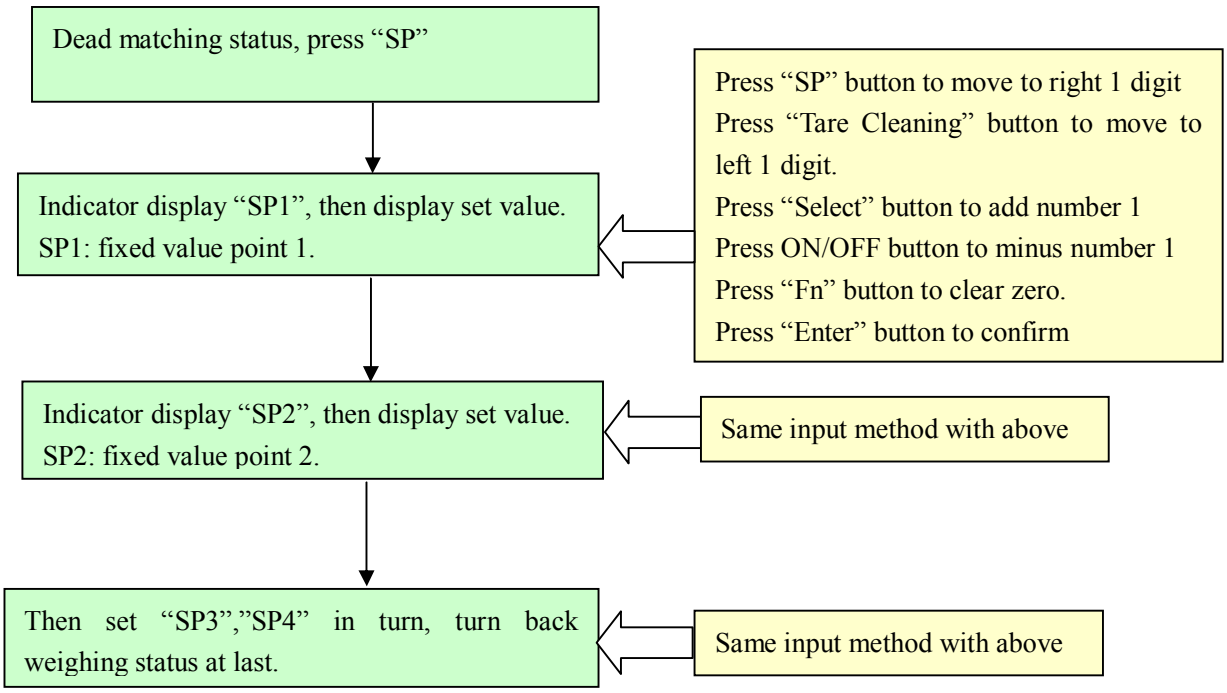



Indicator display “dr2”, then display set value.
dr2: material 2 slow feeding value.
Press “SP” button to move to right 1 digit
Press “Tare Cleaning” button to move to left 1 digit.
Press “Select” button to add number 1
Press “ON/OFF” button to minus number 1
Press “Fn” button to clear zero.
Press “Enter” button to confirm
Indicator display “Pr2”, then display set value xxx.
Pr2: material 2 fall value
Same input method with above
Indicator display “toL2”, then display set value xxxx.
toL2: material 2 tolerance error value.
Same input method with above
Indicator display “d_t2 x”.
x: matching over symbol extend time, unit “second”.
Same input method with above
Return to weigh status, finish set.

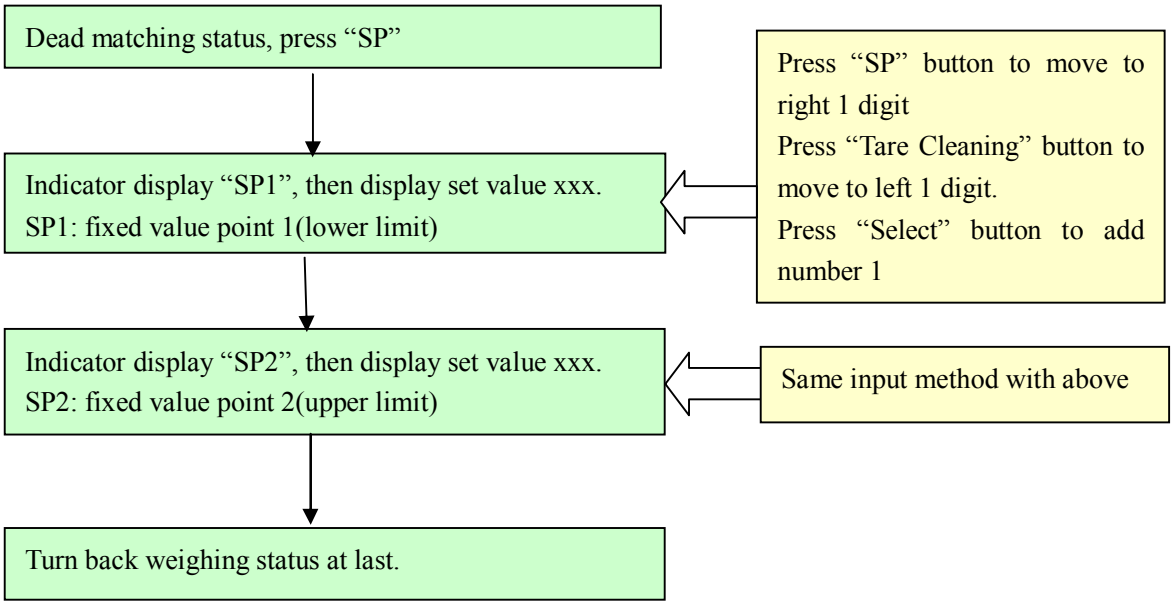
b. Four material single speed feeding X=1



c. Fixed value pattern X=2



d. Up/down limited value pattern X=3.



6.4 Simulation value output parameter (GROUP5)

[GROUP 5]

[5.1 x] Simulation value output optional unit configure.

x=0 No simulation value output optional unit.

x=4-20 Circuit output 0-20mA.

x=0-10 （DC0~10V）;

[5.2 x] Simulation value output optional

x=0 Simulation value output optional corresponding G.W.

x=1 Simulation value output optional corresponding N.W.

[0 FAS] Zero glancing adjustment.

Press “Select” button to add up simulation output value.

Press “Start/Stop” button to reduce simulation output value.

Press “Zero” button to exit and return to 5.2.

Press “Enter” button to enter zero adjustment precise adjustment.

[0 SLO] Zero precise adjustment

Press “Select” button to add up simulation output value.

Press “Start/Stop” button to reduce simulation output value.

Press “Zero” button to exit and return to zero glancing adjustment.

Press “Enter” button to enter into full capacity glancing adjustment.

[S FAS] Full capacity glancing adjustment:

Press “Select” button to add up simulation output value.

Press “Start/ Stop” button to reduce simulation output value.

Press “Zero” button to exit and return to zero adjustment precise adjustment.

Press “Enter” button to enter into full capacity precise adjustment.

[S SLO] Full capacity precise adjustment

Press “Select” button to add up simulation output value

Press “Tare Cleaning” button to reduce simulation output value.

Press “Tare” button to exit and return to full capacity glancing adjustment.

Press “Enter” button to finish adjustment status.

7 Malfunction information and settlement

7.1 Error indicator symbol

Item	Display	Possible reason	Solution
1	**E - - 1**	Calibration code error	
2	**E - - 2**	Wrong operation as: Forbidden clear zero or dynamic tare function or tare function forbidden status to press TARE button.	
3	**E - - 3**	Under matching 3 status, forbidden running tare function.	
4	**E - - 4**	Profibus interface initialization error	Change Profibus interface module
5	**E - - 5**	Signal wire cable wrong connect	Check load cell cable, this symbol display only under calibration process.
6	**E - - 6**	Load cell sensitivity is not enough	Check load cell selection whether reasonable and the shield wire connect or not.
7	**E - - 7**	Data input error.	This symbol is only appeared only under calibration, input value mare than 0 and less than rating capacity.
8	**- n o-**	Exceed zero clearance range.	
9	**o v e r**	Over load	
10	ADC-Err	Modulus conversion parts malfunction	Change Mainboard.

7.2 Other possible malfunction phenomena

(1) Display weighing result none disciplinarian enlarging or lessening.

Reason analysis

a. Load cell cable fall off or broken, check the cable emphases.

b. Serious electromagnetism interfere around, or hi-power frequency conversion equipment influence.

(2) The weighing result is twinkling in a range.

Possible reason

a. Junction box or indicator is affected with damp.

b. Scale body shake (not stable).

c. Load cell sensitivity on the low side

(3) Buzzer noise when power on, but no display.

Possible reason:

a. Display module malfunction.

b. Cable between the mainboard and display module broken or poor wire connection.

(4) Weighing result display correct, but button no reaction.

Possible reason:

Cable between button and display module (press button examination and display module together) broken or poor wire connection.

(5) No result after indicator power on.

Possible reason:

a. Power cable broken or poor wire connection.

b. Power board fuse broken.

(6) Bad parameter display of weighing linearity, repeatance, indicator no return to zero.

Possible reason:

a. Corner difference without adjustment.

b. Friction exists between scale body and position limited unit.

8 Daily cleaning and maintenance

Soft cotton with neuter scour scrub away indicator housing. Forbidden use industrial impregnant clean keyboard button or screen board or jet the impregnant directly to the indicator. Suggest professional person inspect and make recorder in fixed period.

9 Optional device

Indicator optional beneath 2 kinds of device:

□ Simulation output module. Code： **XK3101+-OP1**

□ Profibus general cable interface module Code： **XK3101+-OP2**

Appendix A. Continuous output mode 1

Continuous output mode is 18 bytes

The data simultaneously appear on bus line of RS232 and RS485.

Continuous output mode 1																	
STX	A	B	C	X	X	X	X	X	X	X	X	X	X	X	X	CR	CKS
1	2			3						4						5	6

In which ：

1. <STX> ASCII initialflag (02H);
2. Status words A, B, C;
3. Display weight, maybe gross weight or maybe net weight, 6 numbers without any symbol or decimal point;
4. Tare, 6 numbers without any symbol or decimal point;
5. <CR> ASCII carriage-return character (ODH);
6. <CKS> optional Checksum;

Status Word A			
Bits 0 , 1 , 2			
0	1	2	Position of Decimal Point
0	1	0	0
1	1	0	0.0
0	0	1	0.00
1	0	1	0.000
Bits 3 , 4			
3	4		Division Value Factor
1	0		X1
0	1		X2
1	1		X5
Bit 5			Constant Value 1
Bit 6			Constant Value 0

Status Word B	
Bits	Function
Bit 0	G.W.=0, N.W.=1
Bit 1	Symbol: Plus=0, Minus=1
Bit 2	Overloading (or less than zero) = 1
Bit 3	Dynamic = 1
Bit 4	Constant Value 1
Bit 5	Constant Value 1
Bit 6	

Status Word C	
Bit 0	Constant Value 0
Bit 1	Constant Value 1
Bit 2	Constant Value 0
Bit 3	Constant Value 0
Bit 4	Constant Value 0
Bit 5	Constant Value 1
Bit 6	Constant Value 0

Appendix B Continuous Output Mode 2

The data simultaneously appear on bus line of RS232 and RS485. The data are the same as the weight displayed on indicator. Every set of data includes 8 frames, the first frame is data initial frame "=", following is 7 frames; high bit of zero is filled with "0". If displayed value is minus, highest bit of data frame transmits "—".

Initial Character	Symbol	Weight					
=	0 or —	high bit					low bit

For example:

Indicator display: "12345"， serial port transmits data "＝0012345"；

Initial Character	Symbol	Weight					
=	0	0	1	2	3	4	5

Indicator display: "1234.5"， serial port transmits data "＝01234.5"；

Initial Character	Symbol	Weight					
=	0	1	2	3	4	.	5

Indicator display: "-1234.5"， serial port send data "＝－1234.5"。

Initial Character	Symbol	Weight					
=	—	1	2	3	4	.	5

Appendix C Modbus Compatible Communication Mode

When parameter is [3.5 = 0], to select Modbus compatible communication mode, and bus line can select RS232 or RS485 only by jumper (Jmp 1) of circuit board. At this time the serial port data fix 8 data bits, no checkout, 1 stop bit, and baud rate can be selected.

MODBUS is a master-slave style internet communication protocol, the weighing terminal as a slave station in the internet is invocated by former system, and data format is RTU mode, support 03 and 06 functions.

Hold register 40001, data address in the information is register 0000. Function code region is the operation stipulated by hold register types.
Thus, "4XXXX" is default address type.

For example: hold register 40001, address of addressable register is 0000 hex (+ Ary 0); hold register 40027, address of addressable register is 001A hex (+ Ary 16)

Using 03 function can read 4 continuous interior register at most for one time.

Weight data mapping address in modbus:

Address	Description	Remarks
40001	Gross Weight	Read only
40002	Tare	Read only
40003	Net Weight	Read only
40004	Division Value	Read only
40005	Position of Decimal Point	Read only, remark 1
40006	Gross Weight (denote by indexing number)	Read only, remark 2
40007	Tare (denote by indexing number)	Read only, remark 2
40008	Net Weight (denote by indexing number)	Read only, remark 2
40009	SP1 (preset point 1, denote by indexing number)	Can read and write
40010	SP2 (preset point 1, denote by indexing number)	Can read and write
40011	SP3 (preset point 1, denote by indexing number)	Can read and write
40012	SP4 (preset point 1, denote by indexing	Can read and write

		number)	
40013		DR1 (denote by indexing number)	Can read and write
40014		DR2 (denote by indexing number)	Can read and write
40015		PR1 (denote by indexing number)	Can read and write
40016		PR2 (denote by indexing number)	Can read and write
40017		PR3 (denote by indexing number)	Can read and write
40018		PR4 (denote by indexing number)	Can read and write
40019		TOL1 (denote by indexing number)	Can read and write
40020		TOL2 (denote by indexing number)	Can read and write
40021		TOL3 (denote by indexing number)	Can read and write
40022		TOL4 (denote by indexing number)	Can read and write
40023		D_T1 (0-9 second)	Can read and write
40024		D_T2 (0-9 second)	Can read and write
40025		D_T3 (0-9 second)	Can read and write
40026		D_T4 (0-9 second)	Can read and write
40027	bit 0	Zero clear (1 available)	Write only
	bit 1	Tare (1 available)	Write only
	bit 2	Clear (1 available)	Write only
	bit 3	Start (1 available)	Write only
	bit 4	Stop (1 available)	Write only
	bit 5		
	bit 6		
	others not used		

Remarks 1:

The value may be 0, 1, 2 or 3.

The read weight data multiply 10^{-x} then it is the real weight.

Remarks 2:

When weight data includes decimal point or exceeds range of integer data（＞32767）, it can read indexing number. Indexing number shows as Weight divides Indexing Number, and then multiplies Decimal Factor 10^{-x} to get the weight.

For example, the current weight is 876.8kg, division value is 0.2kg, thus the read indexing number is 876.8/0.2=4384； division value is 2, decimal point is 1, it means one decimal. So the algorithm of weight is $4384\times2\times10^{-1}$=876.8kg.

Appendix D Profibus-DP interface (optional)

Indicator can only be slave station.

Take master station as basis.

Input 8 bytes — gross weight 4 bytes, tare 4 bytes

Output 2 bytes

Input Mode (Indicator to Master Station):

Byte	1(high bit)	2	3	4 (low bit)	5 (high bit)	6	7	8 (low bit)
Meanings	Gross Weight				Tare			

Data is denoted with long shaping format. If weight includes decimal point, then the result should multiply decimal factor.

Output (master station to indicator control byte).

Byte	Bit	Contents and Definition
Byte 1	0	0->1 Zero set-up, jumping from 0 to 1 is available
	1	0->1 Tare, jumping from 0 to 1 is available
	2	Clear, jumping from 0 to 1 is available
	3	0->1 Start, jumping from 0 to 1 is available
	4	0->1 Stop, jumping from 0 to 1 is available
	5	Undefined
	6	Undefined
	7	Undefined
Byte 2		Undefined

Appendix E Calibration Parameters Record List

Date		Date	
Operator		Operator	
Check		Check	
Calibrate Process	□Weight Calibrate □Parameter input □Scale parameter	Calibrate Process	□Weight Calibrate □Parameter input □Scale parameter
PARA1		**PARA1**	
PARA2		**PARA2**	
PARA3		**PARA3**	
PARA4		**PARA4**	
PARA5		**PARA5**	
PARA6		**PARA6**	
PARA7		**PARA7**	
PARA8		**PARA8**	

Appendix F Default Parameter before Leaving Factory

GROUP 2	Application environment	Default parameter
21	ADC conversion rate	7.5
22	Tare operation	1 permission
23	Range of zero clearance by keying	20%
24	Auto zero following	0.5d
25	Dynamic Inspection	3d
26	Digital filtering	2
27	Range of auto zero clearance after start	4%
GROUP 3	Serial port set-up	
31	Baud rate	9600
32	Data bit	8
33	Checking bit	0(no checking)
34	Checksum	0 (no transmission)
35	Output Mode	2 (continuous transmission mode 2)
36	Address	2
37	Profibus interface	0 (nothing)
38	Communication bus line	485
GROUP 4	Switch signal output set-up	
41	Switch signal output mode	2 (fixed value mode)
42	Display mode	1 (display net weight of single material when batching)
GROUP 5	Analog output set-up	
51	Output type	without accessory of analog interface: 0 with accessory of analog interface: 4-20
52	Output mode	0 (corresponding to gross weight data)

Shipping List of XK3101+Weighing Indicator

No.	Name	Spec.	Qty	Remarks
1	Indicator	XK3101+ □**XK3101+-OP1** □**XK3101+-OP2** Profibus XK3101+ □**XK3101+-OP1 Analog module** □**XK3101+-OP2** Profibus bus line interface module	1pc	Analog module, Profibus bus line interface module are optional accessories
2	User Manual		1pc	
3	Eligible Certificate		1pc	
4	Wiring terminal	MC1.5/7-ST-3.81	1pc	Connecting load cell
5	Wiring terminal	MC1.5/5-ST-3.81	1pc	Connecting serial port
6	Wiring terminal	MC1.5/12-ST-3.81	1pc	Connecting switch signal
7	Wiring terminal	MC1.5/3-ST1-5.08	1pc	Connecting power supply

Keli Electric Manufacturing (Ningbo) Co., Ltd
Address: No.199 Changxing Road, Jiangbei District, Ningbo 315033
Service Hotline: 400-887-4165 800-857-4165
Fax: 0574-87562201
Website: http://www.kelichina.com
E-mail: keli@kelichina.com