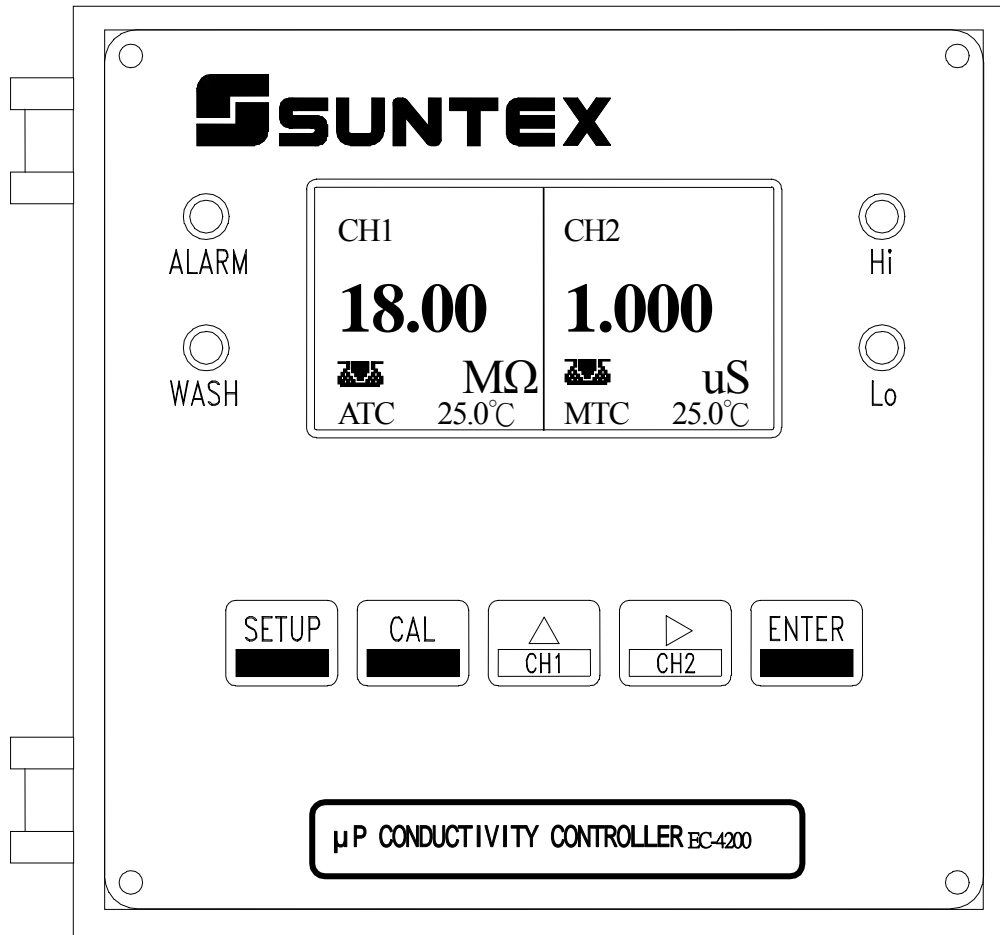


# Dual Channel Conductivity Controller EC-4200 Operational Manual



<b>1</b>	<b>Specifications</b>
<b>2</b>	<b>Assembly and installation</b>
2.1	Precautions for installation
2.2	Installation of controller
2.3	Cut out dimension
<b>3</b>	<b>Block diagram and rear panel</b>
3.1	Rear panel
3.2	Function block diagram
3.3	Descriptions of rear panel
3.4	Connection diagram of electrode
3.4.1	Wiring of electrode
3.4.2	Circuit of electrode
3.5	Electrical connection diagram
<b>4</b>	<b>Illustration of function on front panel</b>
4.1	Front panel
4.2	Descriptions of LCD screen
4.3	Functions of LCD screen
4.4	Descriptions of buttons
4.5	LED indicators
<b>5</b>	<b>Measurement</b>
5.1	Overview flow chart of measurement mode
5.2	Access setup mode
5.3	Access calibration mode
5.4	Restore default setup parameters
5.5	Restore default calibration parameters
5.6	Screen switch
5.6.1	Operating mode screen swapping
<b>6</b>	<b>Setup</b>
6.1	Overview flow chart of setup mode
6.2	Access setup mode
6.3	Select measuring mode
6.3.1	Double display without Rejection display
6.3.2	Single display or with one CH as Rejection display
6.4	Washing time setup
6.5	Calibration Interval
6.6	Frequency
6.7	Current alarm setting
6.8	Current output
6.9	Set Lo point
6.10	Set Hi point
6.11	Temperature Compensation
6.11.1	Non linear temperature compensation
6.11.2	Linear temperature compensation
6.12	Temperature measuring
6.12.1	Temperature probe connecting
6.12.2	Manual temperature setup
<b>7</b>	<b>Calibration</b>
7.1	$\Omega$ -CM Calibration mode
7.1.1	Cell constant input
7.1.2	User buffer solution calibration

- 7.2 S/CM and rejection calibration mode
  - 7.2.1 Cell constant input
  - 7.2.2 User buffer solution calibration
  - 7.2.3 Calibrate electrode by 0.1KNCL solution
  - 7.2.4 Calibrate electrode by 0.01N KCL solution
- 8 **Error message**
  - 8.1 Calibration error
  - 8.2 Measuring error

## 1. SPECIFICATIONS

MODEL		EC4200		
Measuring mode	Resistivity	Conductivity	TEMP.	Rejection
Measuring Ranges	0.00 M .cm~ 20.00 M .cm	0.05 uS/cm~ 200.0 mS/cm	0.0~100.0	0.0~100.0 %
Resolution	0.01 M	0.01uS	0.1	0.1 %
Accuracy	±1 % (±1Digit)	±1 % (±1Digit)	±0.1 % (±0.5 )	±0.01 (±1Digit)
Temp compensation	Auto with PT1000/NTC30 or manual			
Temp Coefficient	Linear compensation from 0.00 % ~ 5.00 % or non-linear for natural water		_____	
Amb Temp	0~50°C			
Display	screen	Graphic LCD display		
	method	Dual channel simultaneous display, or CH1/CH2 single display		
Signal Output	Isolated current DC 4~20mA, Max. load 500Ω			
Set points	Contact	240VAC 2A max.		
	Control	Independent Hi/Lo ON/OFF RELAY contact		
Alarm Output	Single ON/OFF RELAY output , 240VAC 2A max.			
Wash	Contact	Single ON/OFF RELAY output , 240VAC 2A max. (Only with the mode of % Rejection)		
	Time	ON : 0~9999mins OFF ; 0~9999mins		
Calibration Interval	0~999 hours			
Electrode status	Yes			
Power supply	115V or 230VAC±15% , 50/60Hz			
Installation	Panel Mounting			
Dimensions	144X144X195mm(H×W×D)			
Cut out dimensions	135X135(H×W)			
Weight	1.9Kg			

## 2. Assembly and installation

### 2.1 Precautions for installation

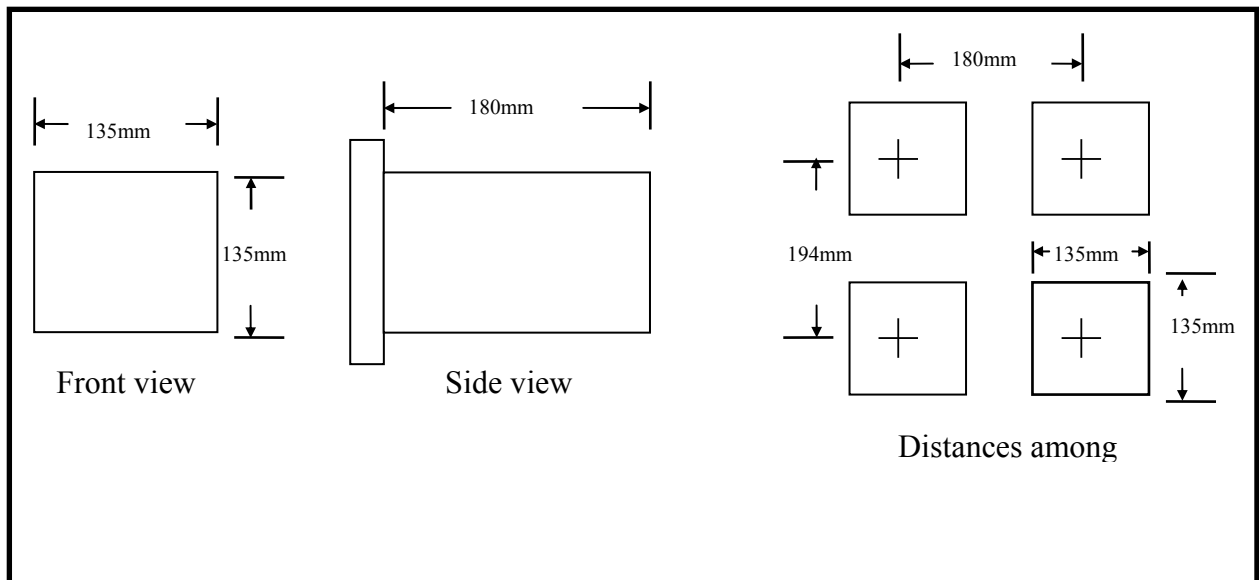
**Wrong wiring will lead to breakdown of the instrument or electrical shock, please read the operating manual clearly before installation.**

- Make sure to remove AC power to the controller before wiring input and output connections, and before opening the controller housing.
- The installation site of the controller should be well ventilated and avoid direct sunlight.
- Relay contacts are subjected to electrical erosion. Do not connect relay contacts directly to heavy loads, connect a magnetic switch instead. Especially with inductive and capacitive loads, the service life of the contacts will be reduced.
- For suppression of sparks and arcing, components such as RC combinations, nonlinear resistors, series resistors, diodes and varistors are used.

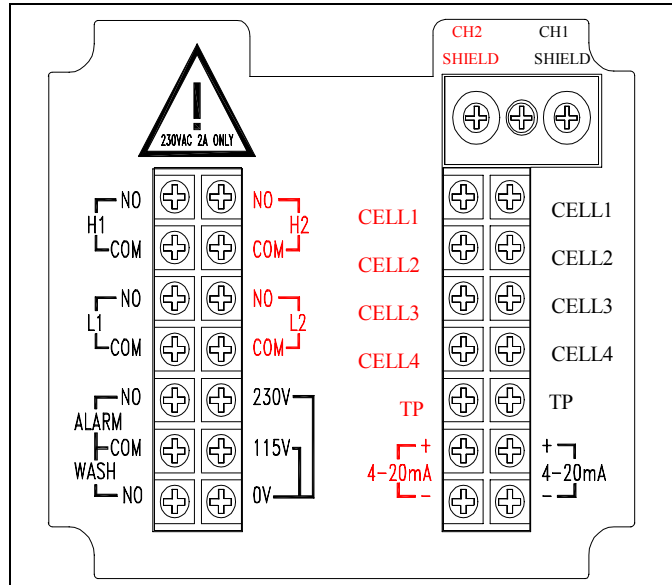
### 2.2 Installation of controller

Reserve a 135x 135mm hole on the front panel of the wall mount chassis and insert the controller from the front of the chassis, fasten the fixed support to fix the controller.

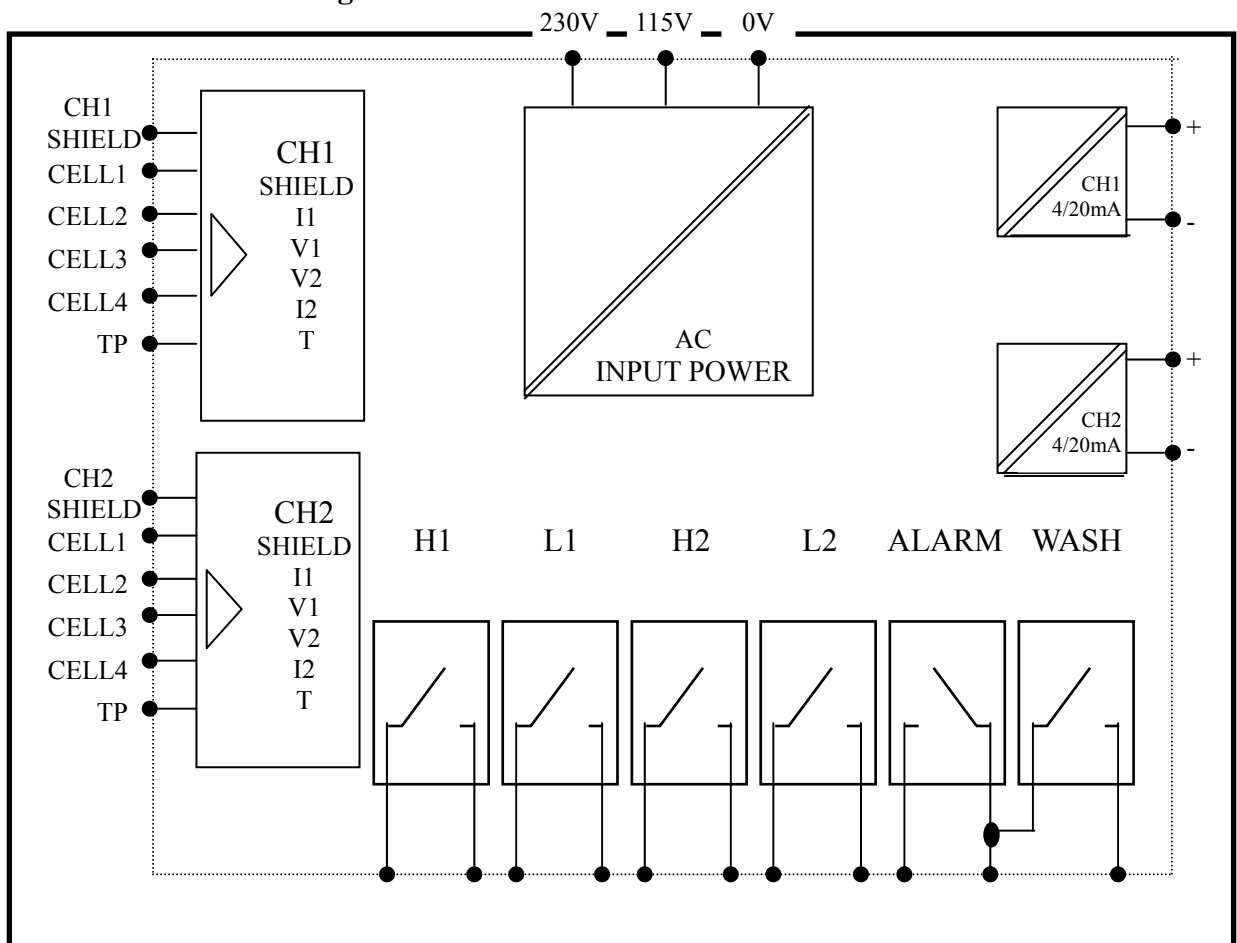
### 2.3 Cut out dimension



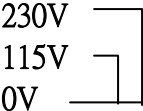
### 3. Block diagram and rear panel



### 3.2 Function block diagram



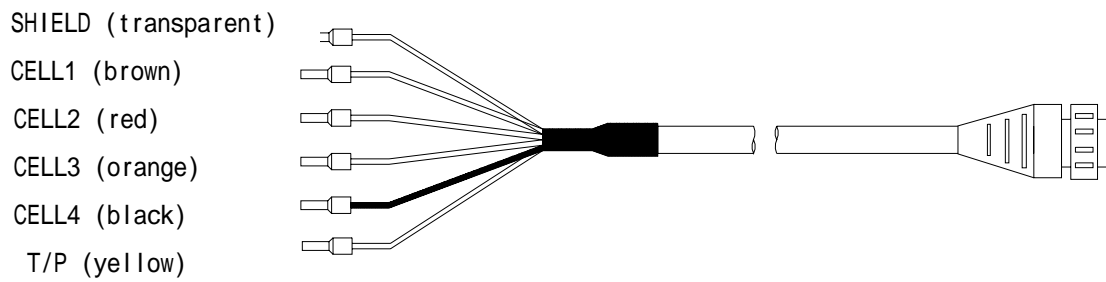
### 3.3 Descriptions of rear panel

CH1	<b>SHIELD</b>	: <b>Connecting to the net wire of CH1 CELL</b>
CH1	CELL 1	: Apply an ion plate between CH1 CELL 1 and CH1 CELL2,
CH1	CELL 2	: connected to the transparent wire of the CH1 CELL
CH1	CELL 3	: Apply an ion plate between CH1 CELL 3 and CH1 CELL4,
CH1	CELL 4	: connected to the green wire of the conductivity. Or connecting to the white wire of the resistivity.
CH1	TP	: Connected to the red wire of the conductivity CELL. Or connecting to the yellow wire of the resistivity CELL.
CH1	4-20mA	: CH1 current output for recorder or PLC connection.
CH2	<b>SHIELD</b>	: <b>Connecting to the central net wire of CH2 CELL</b>
CH2	CELL 1	: Apply an ion plate to short circuit CH2 CELL 1 and CH2 CELL 2,
CH2	CELL 2	: connected to the transparent wire of the CH2 CELL.
CH2	CELL 3	: Apply an ion plate to short circuit CH2 CELL 3 and CH2 CELL 4,
CH2	CELL 4	: connect to the green wire of conductivity; Or connecting to white wire of the resistivity.
CH2	TP	: connect to the red wire of conductivity CELL; Or connecting to yellow wire of the resistivity CELL.
CH2	4-20mA	: CH2 current output for recorder or PLC connection.
H1:	NO&COM	: CH1 High relay contact. It will be closed when contact is ON, open when OFF.
L1:	NO&COM	: CH1 Low relay contact. It will be closed when contact is ON, open when OFF.
H2:	NO&COM	: CH2 High relay contact. It will be closed when contact is ON, open when OFF.
L2:	NO&COM	: CH2 Low relay contacts. It will be closed when contact is ON, open when OFF.
ALARM	NO	: ALARM relay contact. This terminal will be open with <b>ALARM/WASH COM</b> when controller AC power is removed or ALARM is OFF; closed when Alarm is ON.
WASH	NO	: Wash relay contact. This terminal will be open with <b>ALARM/WASH COM</b> when controller AC power is removed or WASH is OFF; closed when WASH is ON.
ALARM/WASH	COM	: Apply with ALARM NO or WASH NO.
230V		: AC power of the controller ( AC115V or 230V )



### 3.4 Connection diagram of electrode

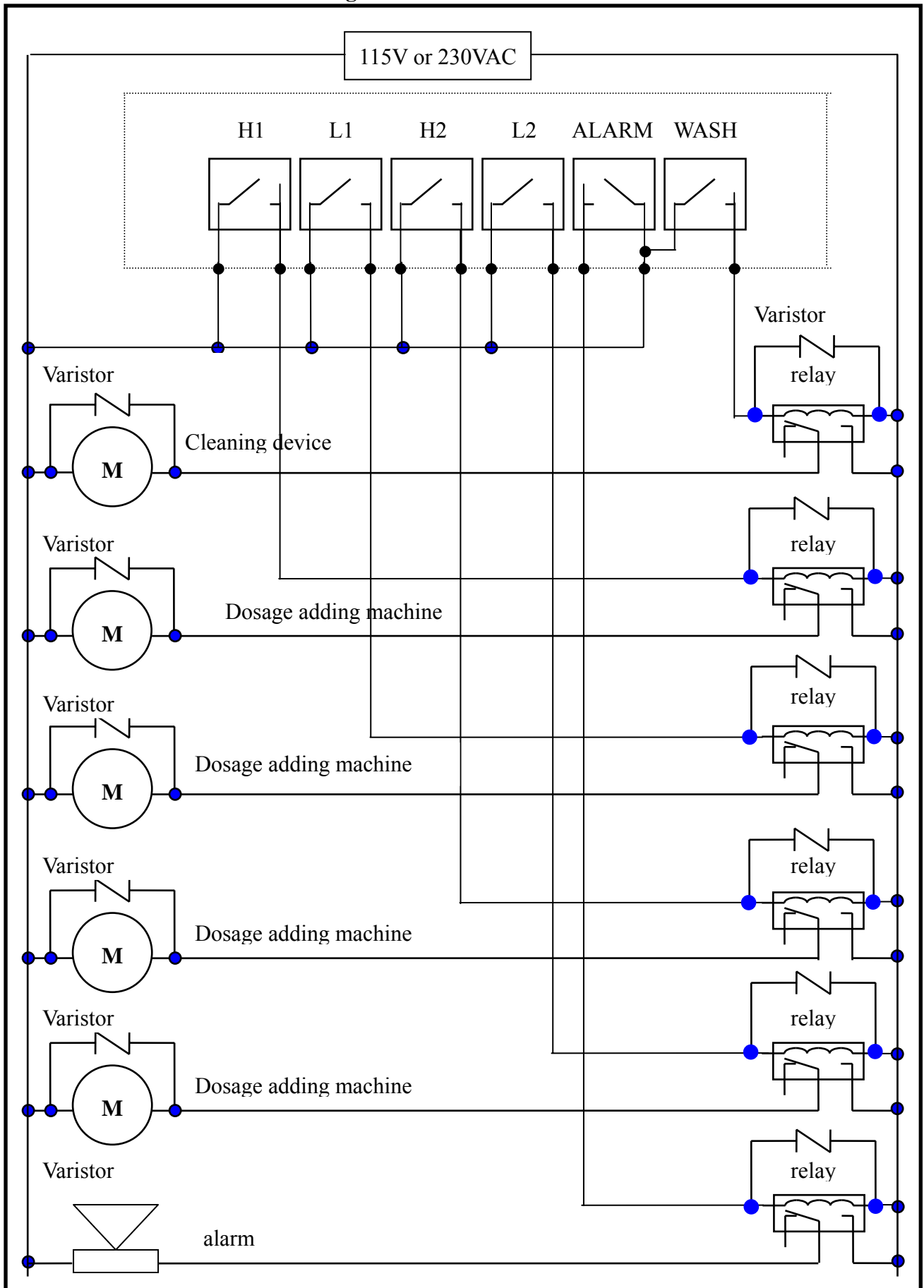
#### 3.4.1 Wiring of electrode



#### 3.4.2 Circuit of electrode

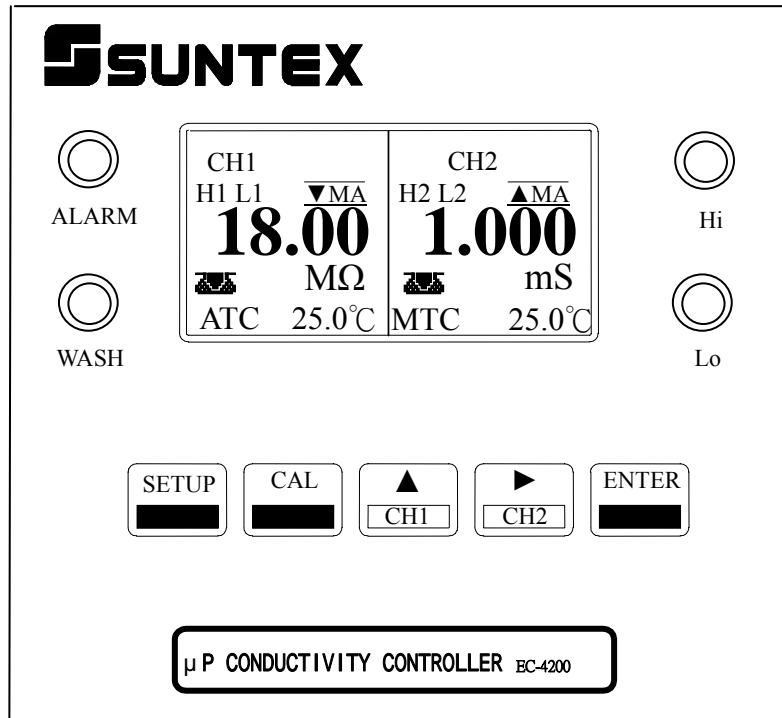
	Suntex electrode			Others
<b>Controller rear panel</b>	2E electrode 8-221 / 8-222 4E electrode 8-241 wiring	8-11-3 wiring	8-12-6 wiring	Please read the description of electrode
<b>SHIELD</b>	Transparent line	Net line	Net line	SHIELD
<b>CELL 1</b>	Brown line	Short with ion plate, connected to the transparent line	Short with ion plate, connected to the transparent line	CELL1
<b>CELL 2</b>	Red line			CELL2
<b>CELL 3</b>	Orange line	Short with ion plate, connected to the white line	Short with ion plate, connected to the green line	CELL3
<b>CELL 4</b>	Black line			CELL4
<b>T / P</b>	Yellow line	Yellow line	Red line	T / P (other wire connect to CELL4)

### 3.5 Electrical connection diagram




## 4.Introduction

### 4.1 Front panel



#### 4.2 Descriptions of LCD screen:


1. Wash relay indicator

 **ON** Activates wash relay, when wash on time is up.


 **OFF**


Activates wash relay, when wash on time is off.

2. Calibration prompter

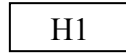
 Reminding user that it is time to calibrate electrode. It will start blinking when time ticks to 80% of CAL INTERVAL TIME, steadily appears when CAL INTERVAL TIME is up.


3. Current output status:

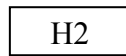
 output current over than 20MA

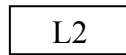
 output current lower than 4MA

4. High and low point relay indicators

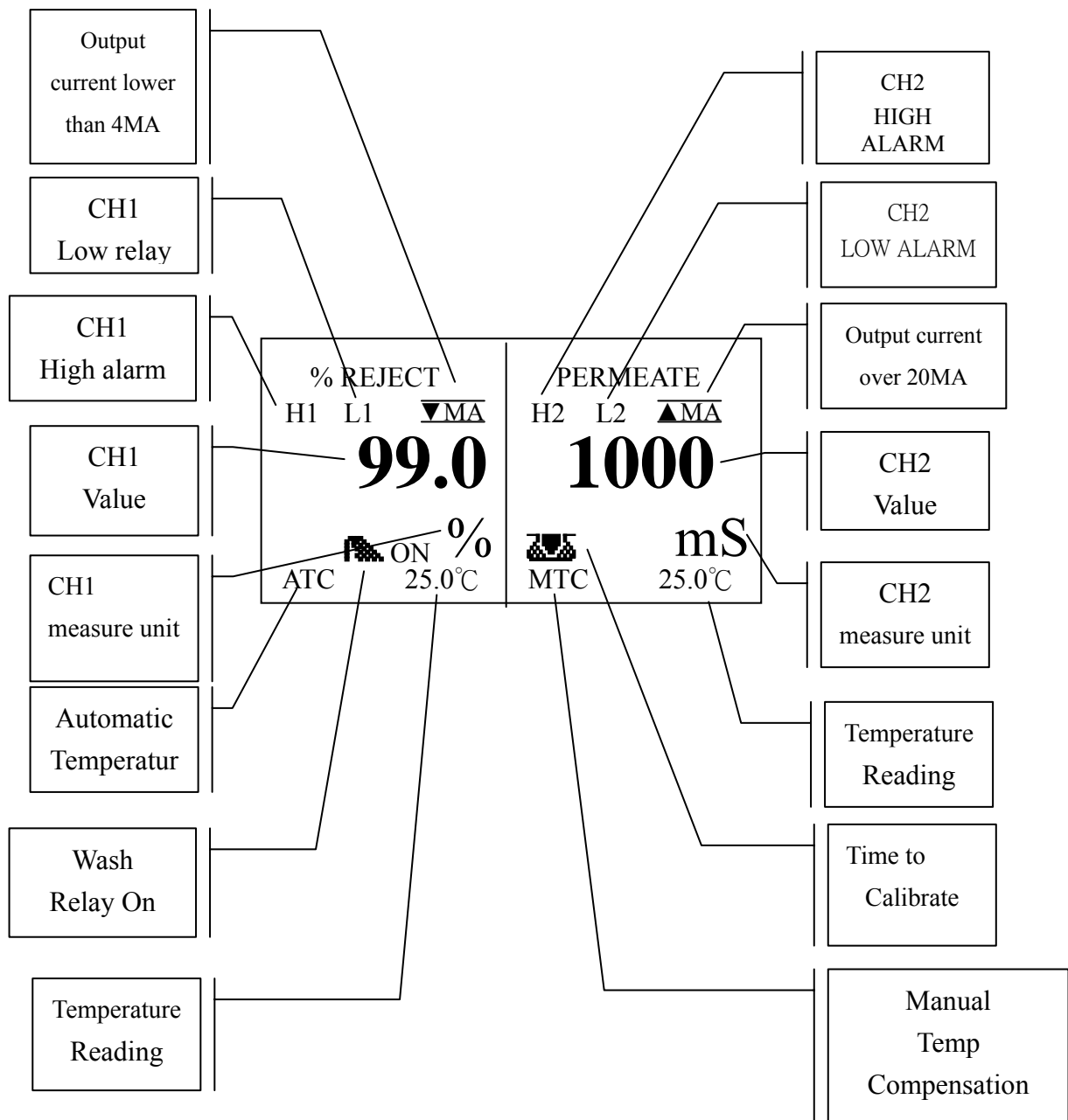
 CH1 high point relay on.

 CH1 low point relay on.

 CH2 high point relay on.


 CH2 low point relay on.

### 4.3 Functions of LCD screen





#### 4.4 Descriptions of buttons


The unit provides multi-key to prevent people from unauthorized access, as the following:

 : **Setup access key.**

In measurement mode:


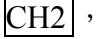
To coordinate  or  , it allows you to access CH1 or CH2 parameter setup mode.

In parameter setup mode:


Press  to exit setup mode and return to measurement mode.



 : **Calibration access key.**

In measurement mode:

To coordinate  or  , it allows you to access CH1 or CH2 calibration mode.


In setup mode:




Press  to exit calibration mode and return to measurement mode.



 : **Up or  key.**

Up key:

- Allows you to Increase numeric values.
- Move cursor up within menu.
- Toggle parameters.

 : In measurement mode.

- To coordinate  or  allows you to access setup mode or calibration mode of channel 1.
- To coordinate  allows you switch to CH1 screen.




 : **Right/Down or  key.**


Right key:


- Shift cursor to next right.
- Left or right selection on the menu.

Down key:

Allows you to decrease numerical values or move menu cursor down. °

 : ① In measurement mode, to coordinated  or  allows you to access CH2 parameter setup mode or calibration mode CH2.



② coordinated  allows you to switch to CH2 screen.

 : **Enter key.**

In parameter setup or calibration mode:

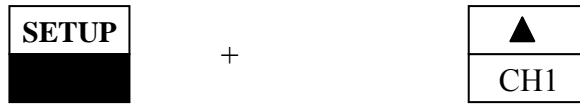
- Select items within menu.
- Store input data in the setup mode.

In measuring mode:

coordinated  or  to switch screen.

**Review of multi-key:**

Access channel CH1 setup mode.



Access channel CH2 setup mode.



Access channel CH1 calibration mode.



Access channel CH2 calibration mode.



Switch channel CH1 to full screen.



Switch channel CH2 to full screen.



Split screen into dual channel.



#### 4.5 LED indicators

The unit has 4 kinds of LED indicators they are ALARM, WASH, Hi and Lo. Both ALARM and WASH indicators are red LEDs, Hi and Lo indicators are triple colored (red, green and orange) LEDs.

##### ALARM LED

The following conditions will lead to an alarm warning.

1. Resistivity over range.
2. Current output exceeds 4~20mA
3. Temperature over range.

**WASH LED** indicates wash relay activated or not. (Only for rejection function)

**Hi LED** indicates H1/2 relay activated or not.

##### Colors of Hi LED:

- Red**      • CH1 activated.  
**Green**    • CH2 activated.  
**Orange**   • Both CH1 and CH2 activated.

Condition of activating H1 relay

$$\text{Measuring value} \geq \text{Threshold(TH)}$$

Condition of de-activating H1 relay

$$\text{Measuring value} \leq [\text{Threshold} - \text{Dead Band(DB)}]$$

**Lo LED** indicates L1/2 relay activated or not.

##### Colors of Lo LED:

- Red**      • CH1 activated.  
**Green**    • CH2 activated.  
**Orange**   • Both CH1 and CH2 activated.

Condition of activating L1 relay

$$\text{Measuring value} \leq \text{Threshold (TH)}$$

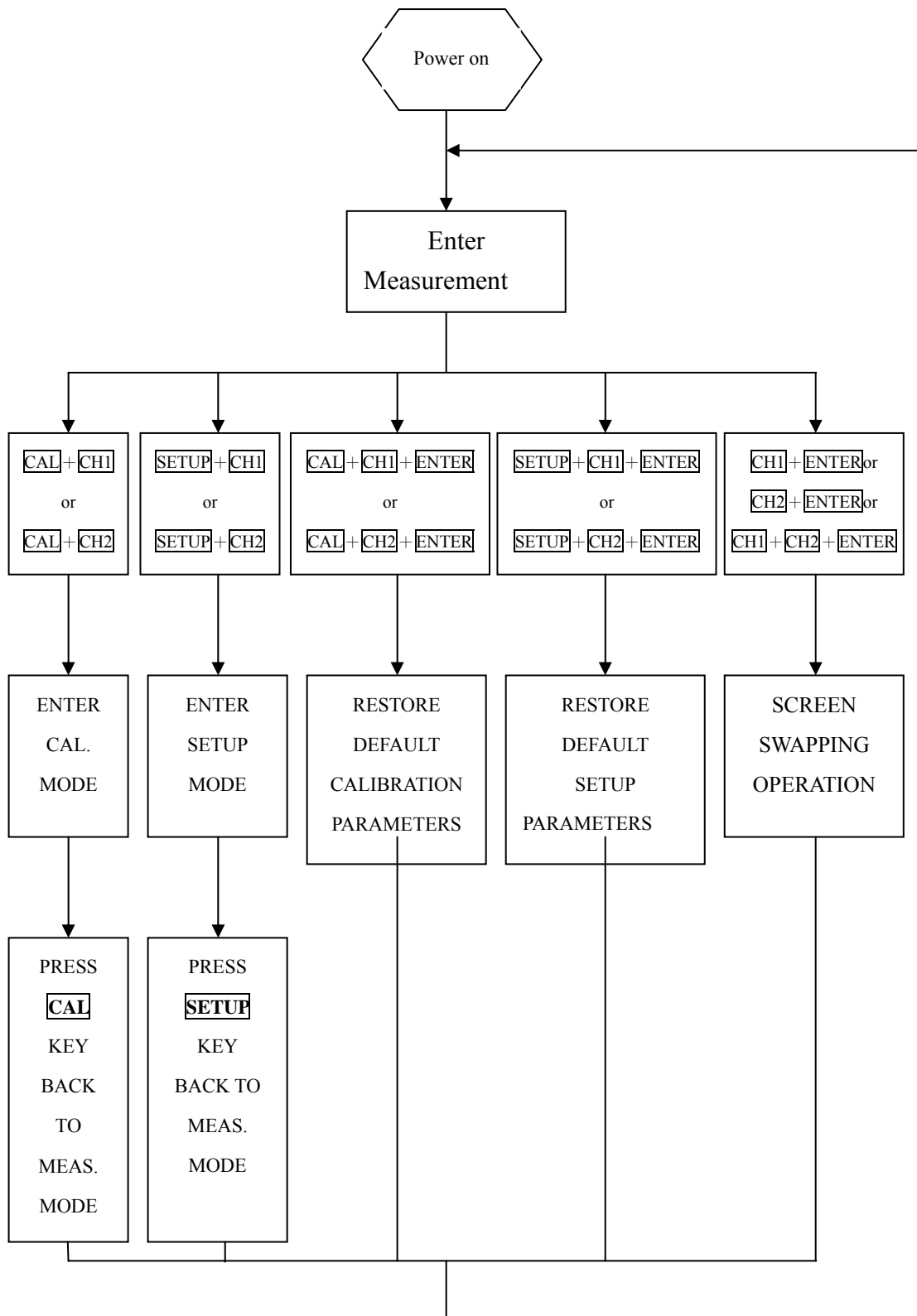
Condition of activating L1 relay

$$\text{Measuring value} \geq [\text{Threshold} + \text{Dead Band (DB)}]$$



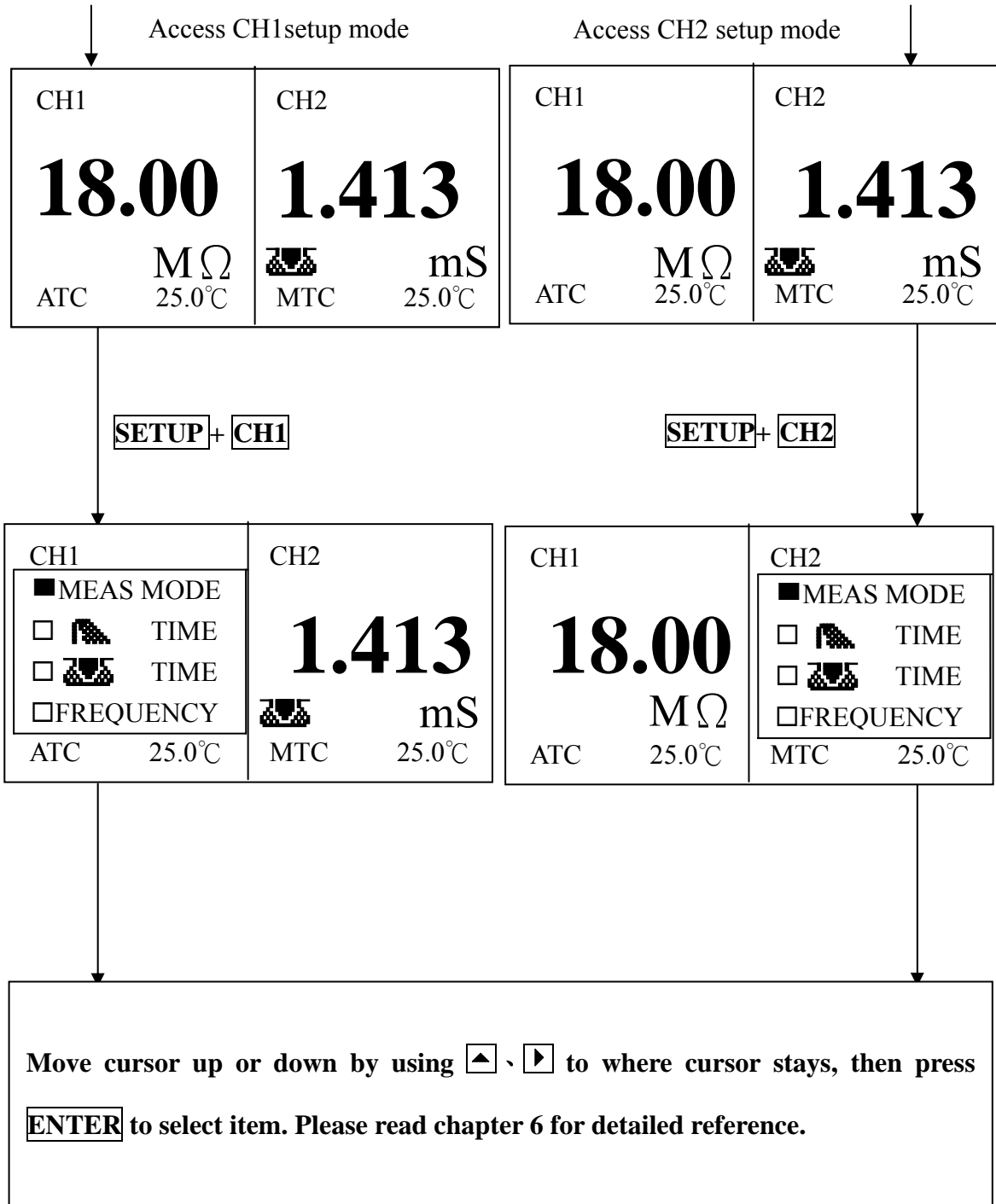
## 5 Measurement mode

### 5.1 Overview flow chart of measurement mode



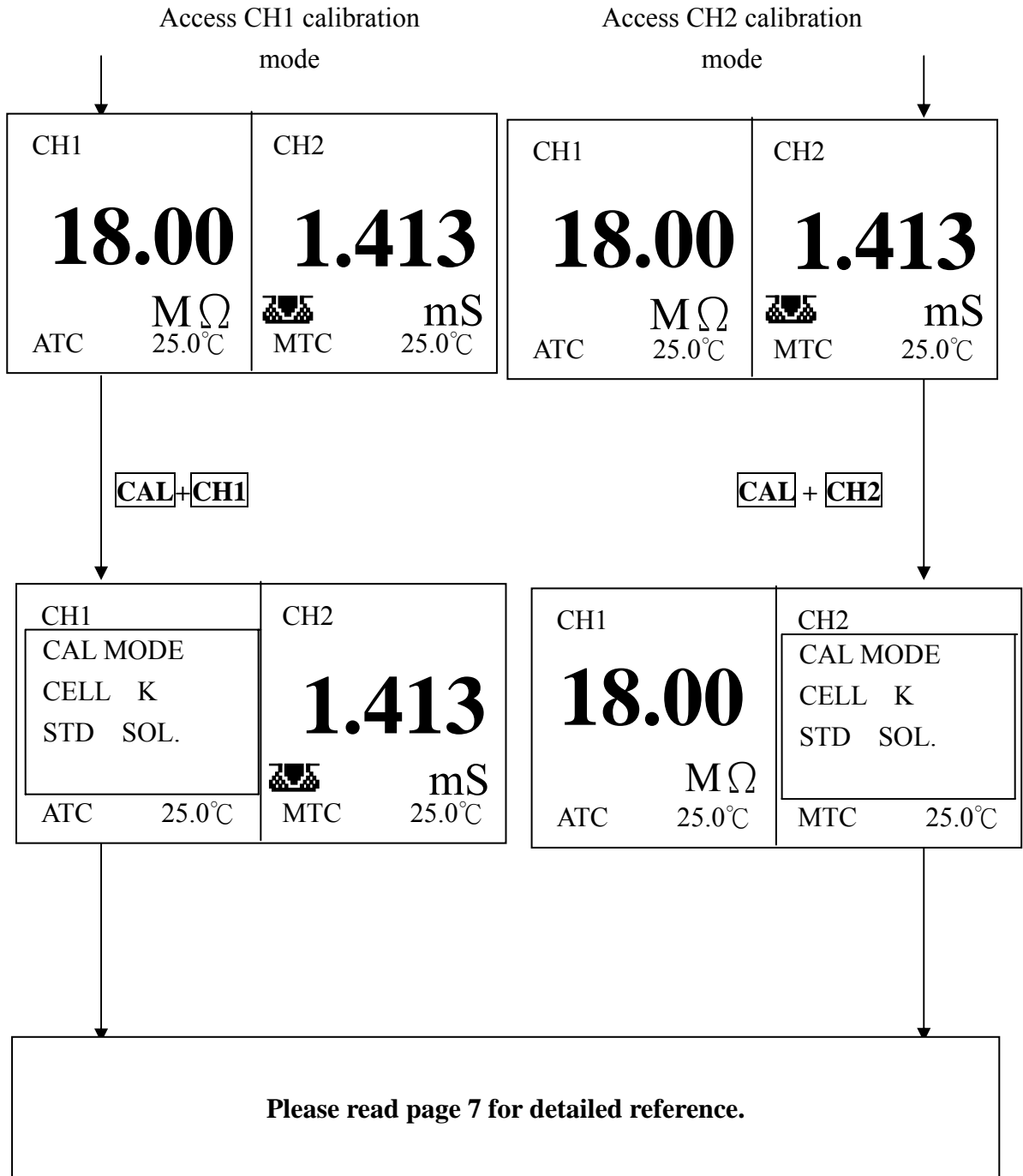
## 5.2 Access setup mode

Operating flow chart



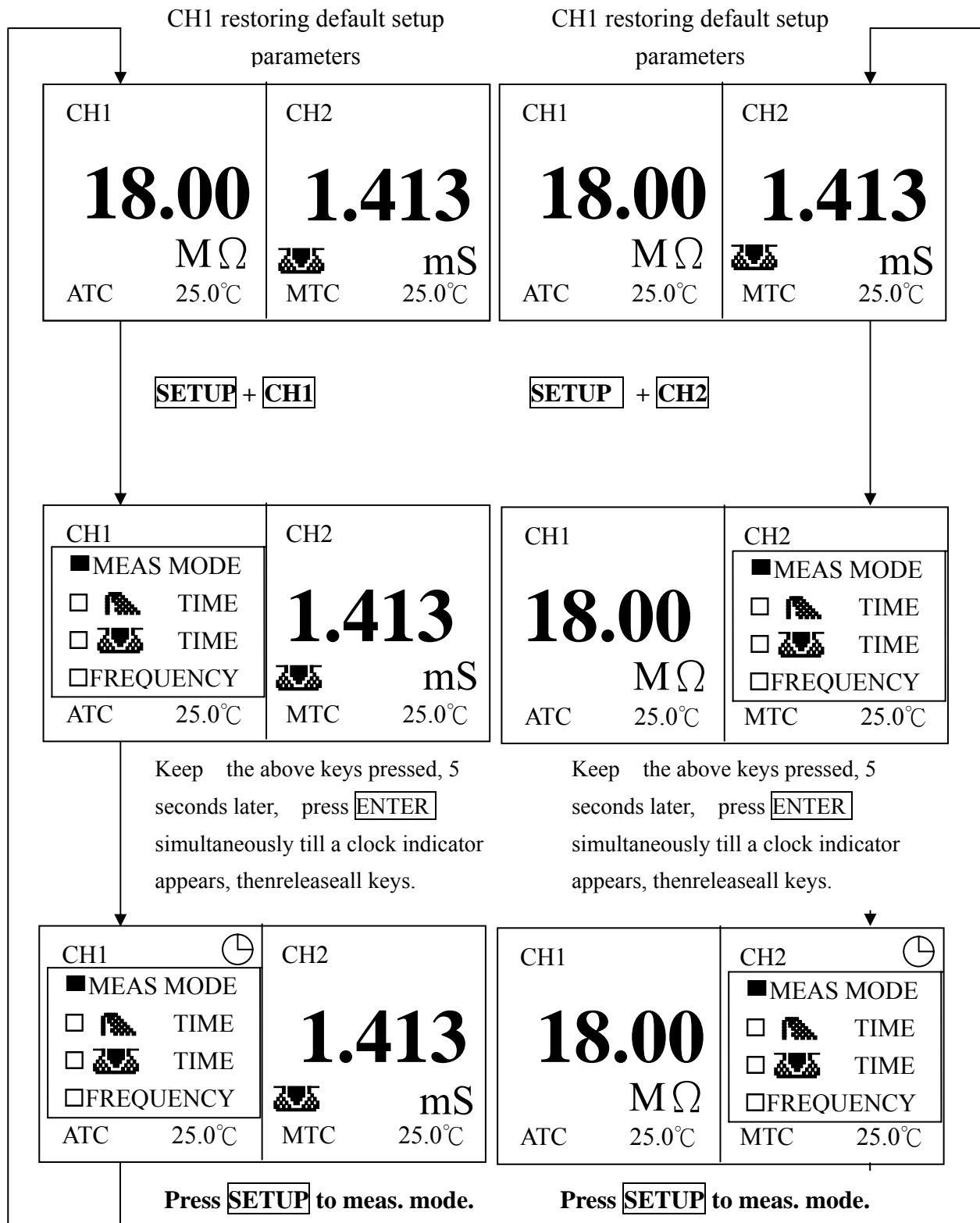
### 5.3 Access calibration mode

Operating flow chart



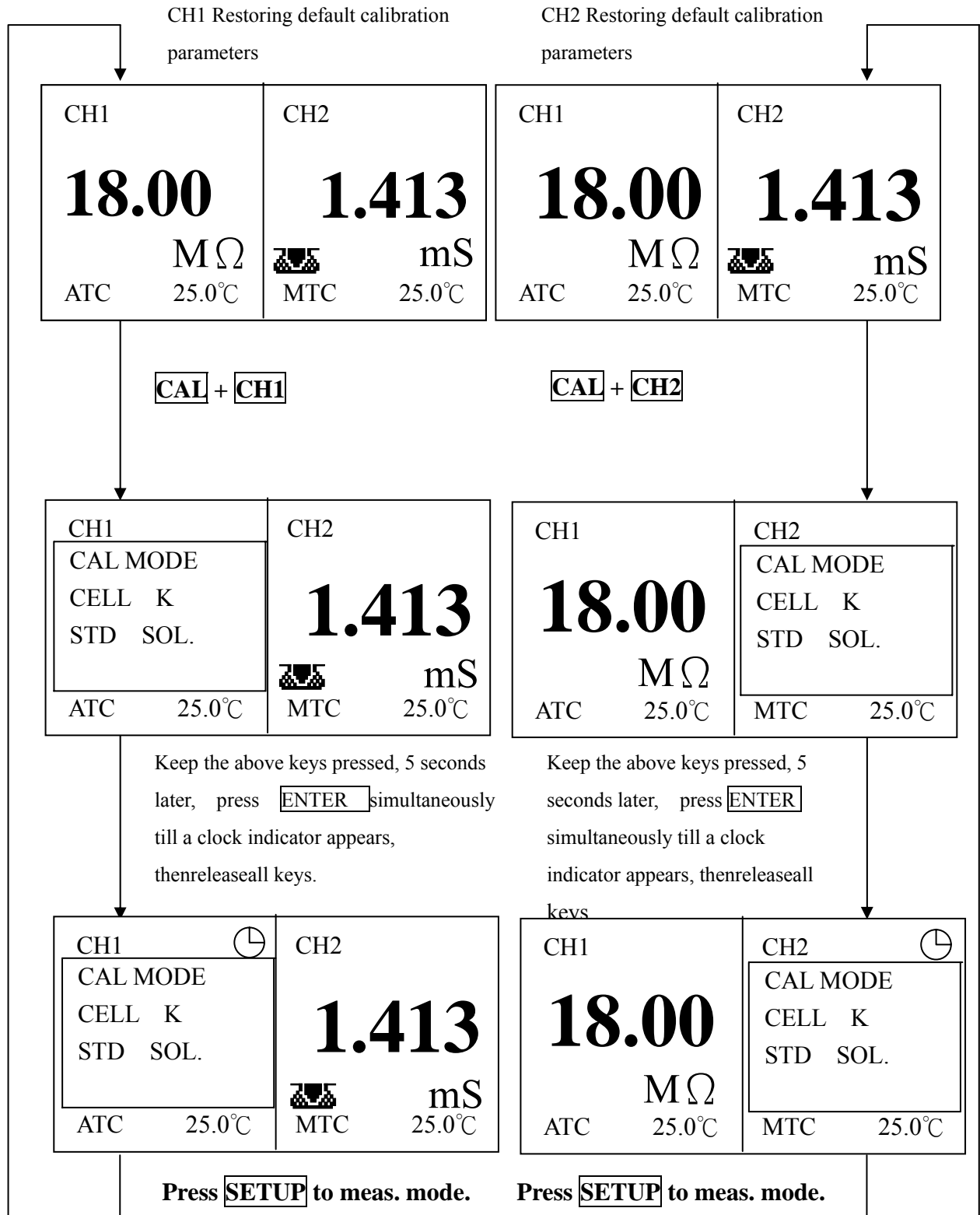
## 5.4 Restoring default setup parameters

Operating flow chart



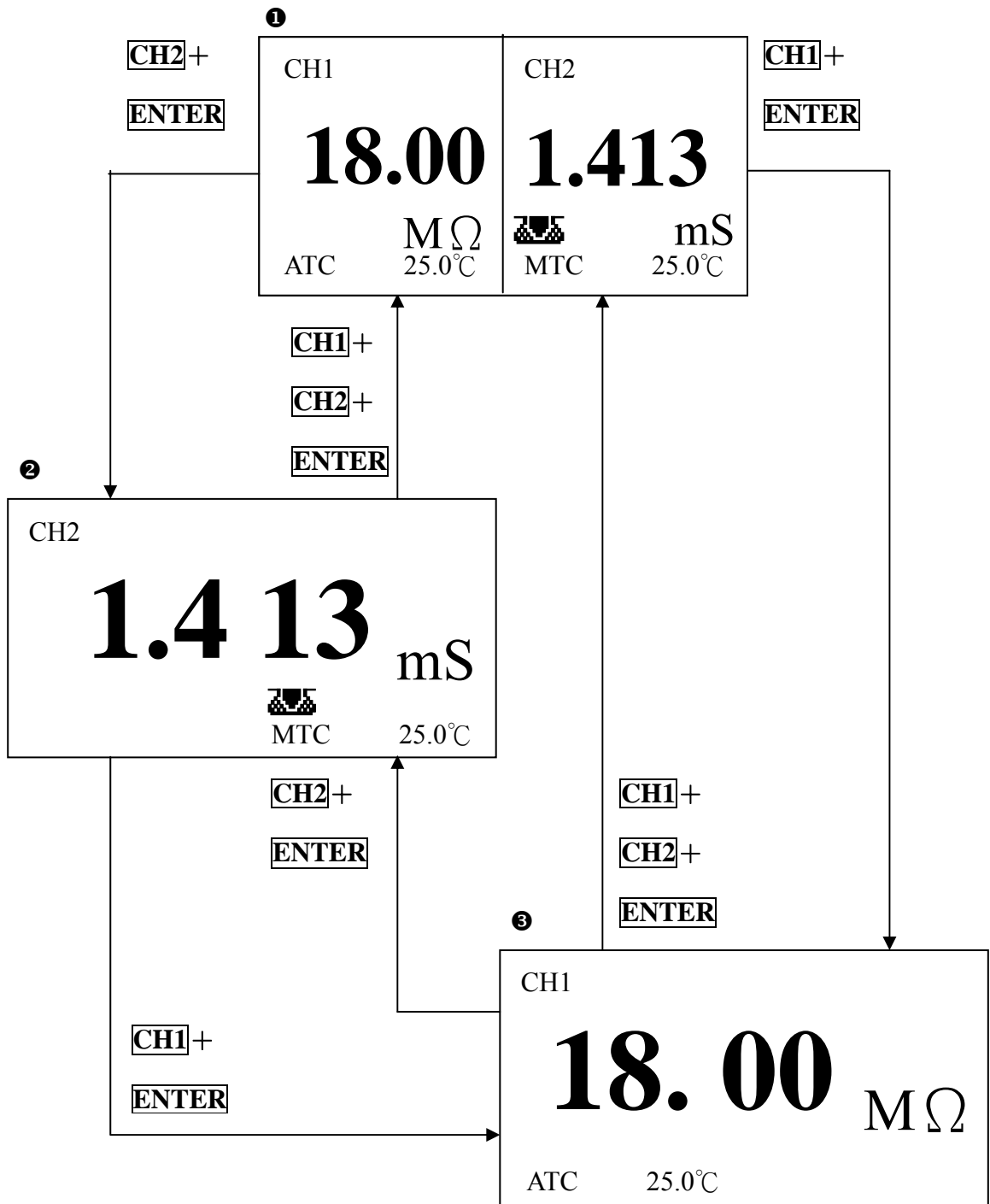
## 5.5 Restoring default calibration parameters

Operating flow chart



## 5.6 Screen switch

Operating flow chart



### 5.6.1 Operating mode screen swapping

In measurement mode, EC4200 allows you to monitor two different or the same types of Resistivity/Conductivity. If you just measure one channel only, you can enlarge the screen for the best view. Details as the following:

1. Spilt screen -> enlarged CH1 only **1 3** (like the picture above)

**CH1** + **ENTER**

2. Spilt screen -> enlarged CH2 only **1 2** (like the picture above)

**CH2** + **ENTER**

3. Enlarged CH1 only -> spilt screen **3 1** (like the picture above)

**CH1** + **CH2** + **ENTER**

4. Enlarged CH2 only -> spilt screen **2 1**(like the picture above)

**CH1** + **CH2** + **ENTER**

5. Enlarged CH1 only -> Enlarged CH2 only **3 2**(like the picture above)

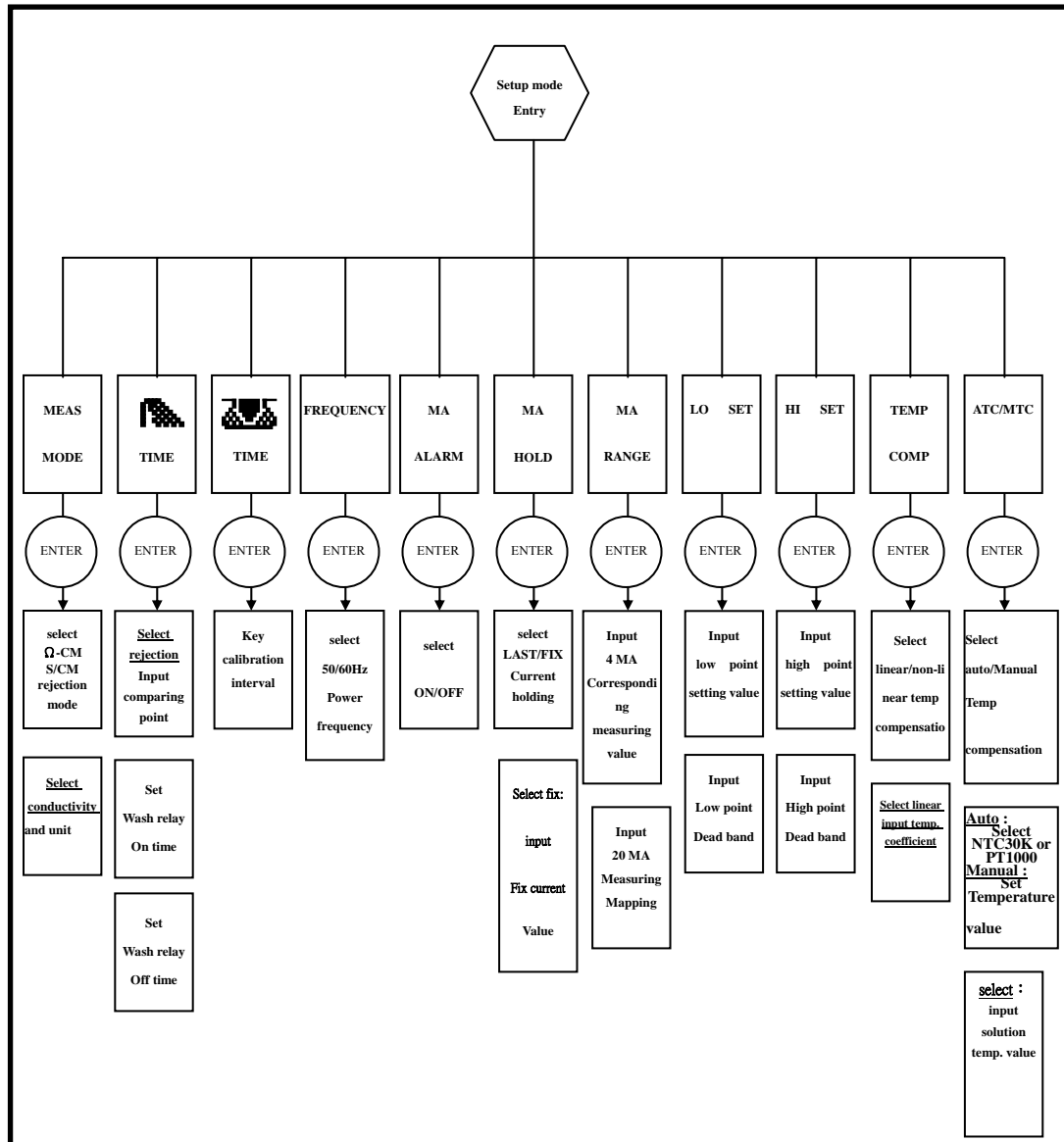
**CH2** + **ENTER**

6. Enlarged CH2 only-> Enlarged CH1 only **2 3** (like the picture above)

**CH1** + **ENTER**

## 6 Setup

### 6.1 Overview flow chart of setup mode





## 6.2 Access parameter setup mode

Access channel CH1 setup mode.

Press **SETUP** + **CH1**

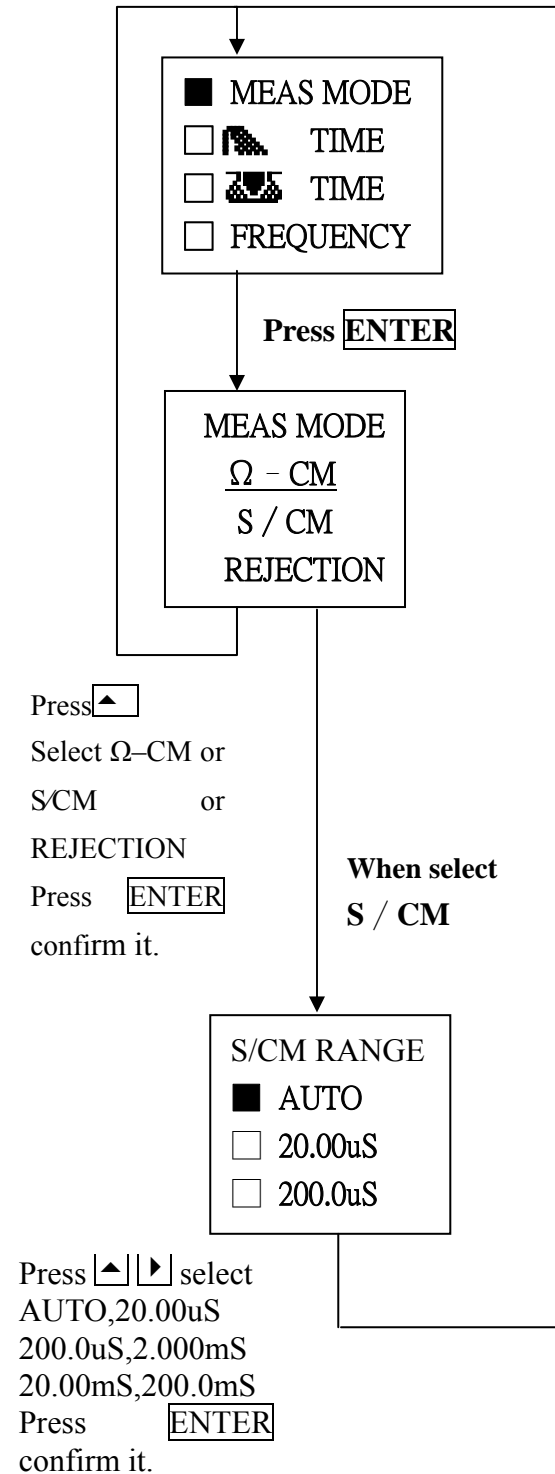
Access channel CH2 setup mode.

Press **SETUP** + **CH2**

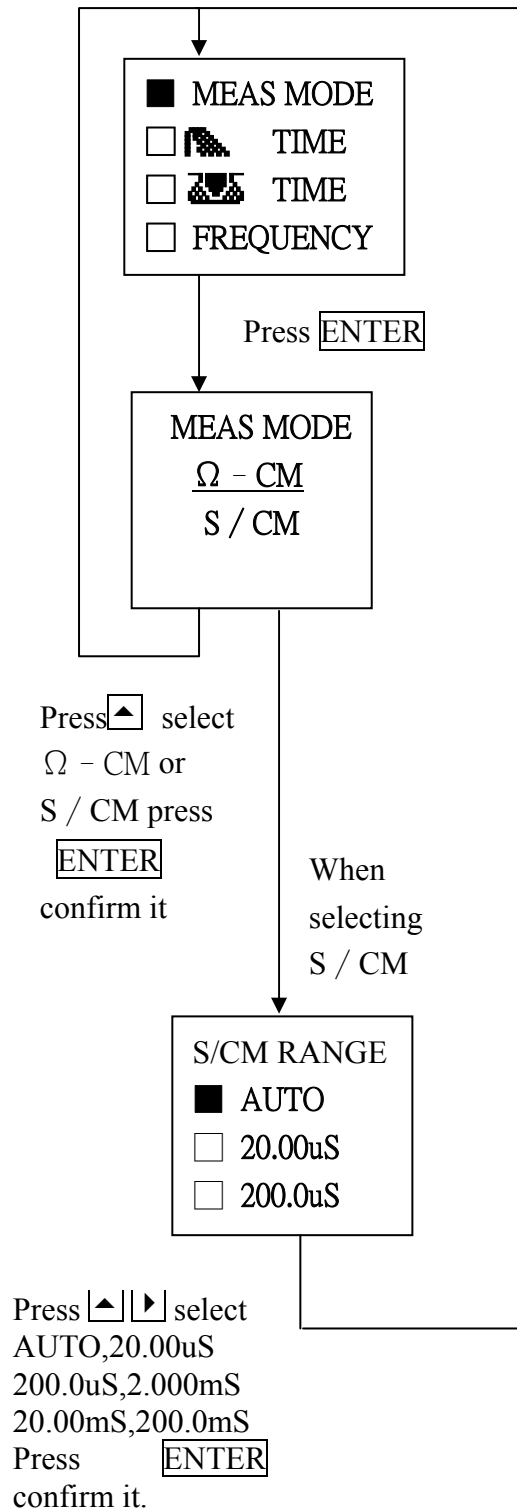
## 6.3 Select measuring mode

Select  $\Omega$ -CM or S/CM or REJECTION display.

### 6.3.1 double display without % rejection

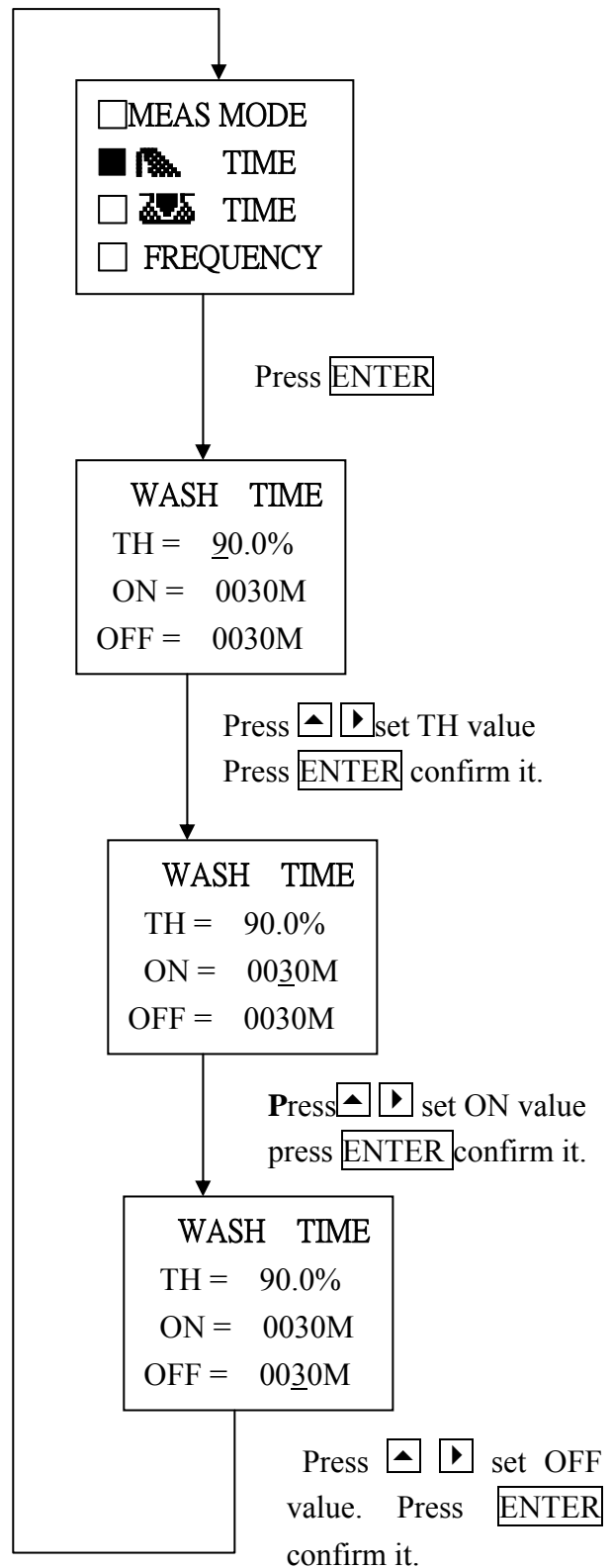


### 6.3.2 Single display or with one CH as rejection display



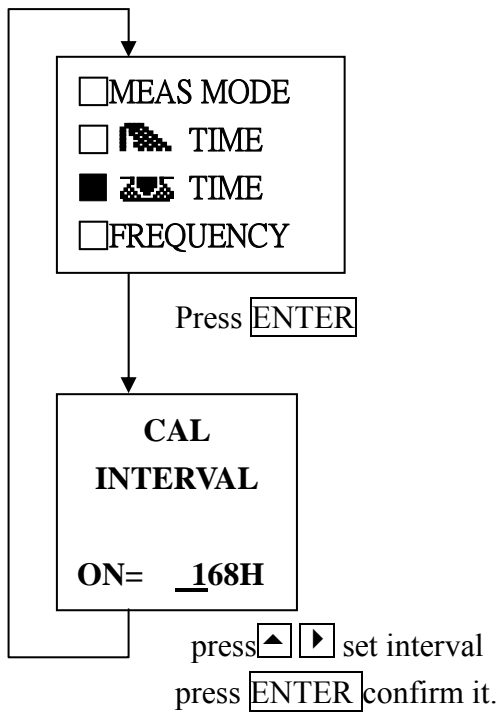
### 6.4 Washing time setup

Can only be accessed when CH is rejection display.



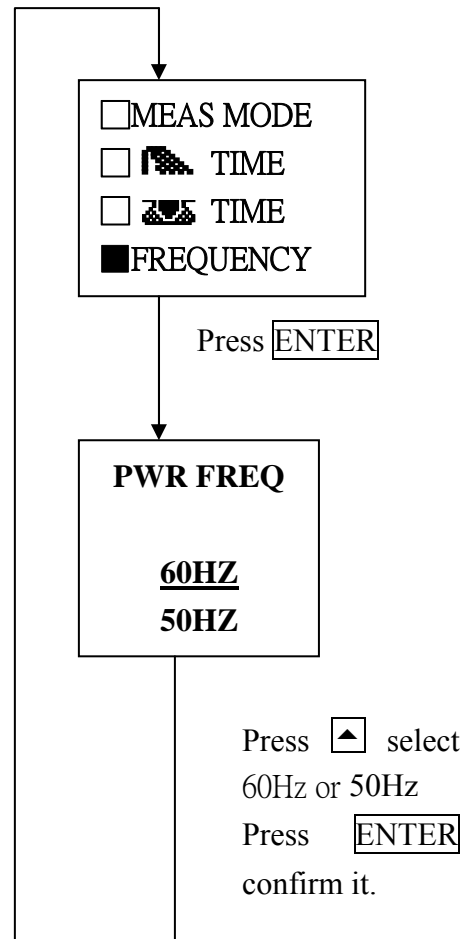
### 6.5 Calibration interval

If the value is zero, then stop this function.



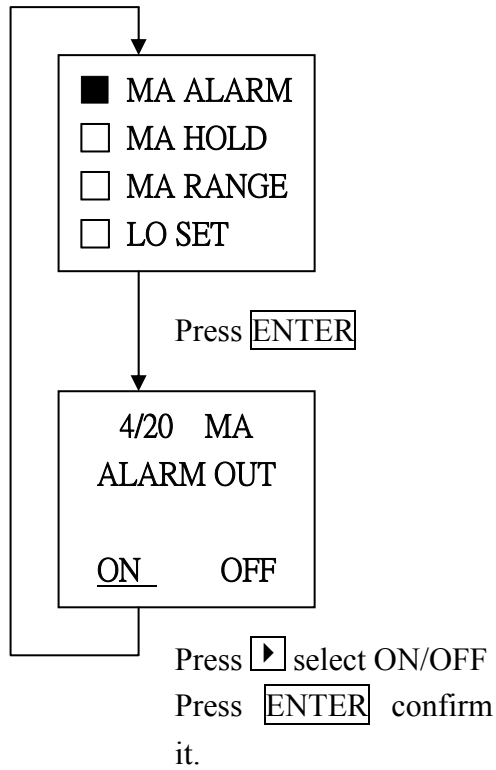
### 6.6 Frequency

Set 50Hz or 60Hz power frequency.



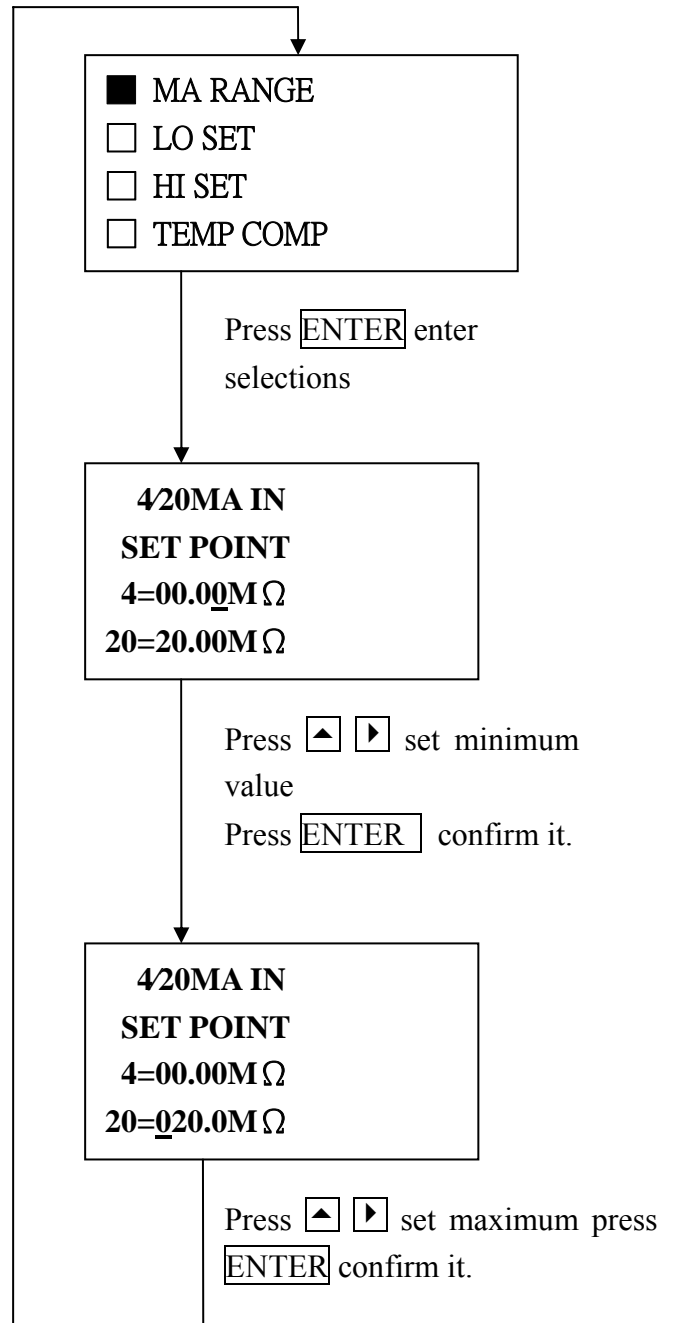
### 6.7 Current alarm setting

when the current is exceeded 4-20mA , select on or off.



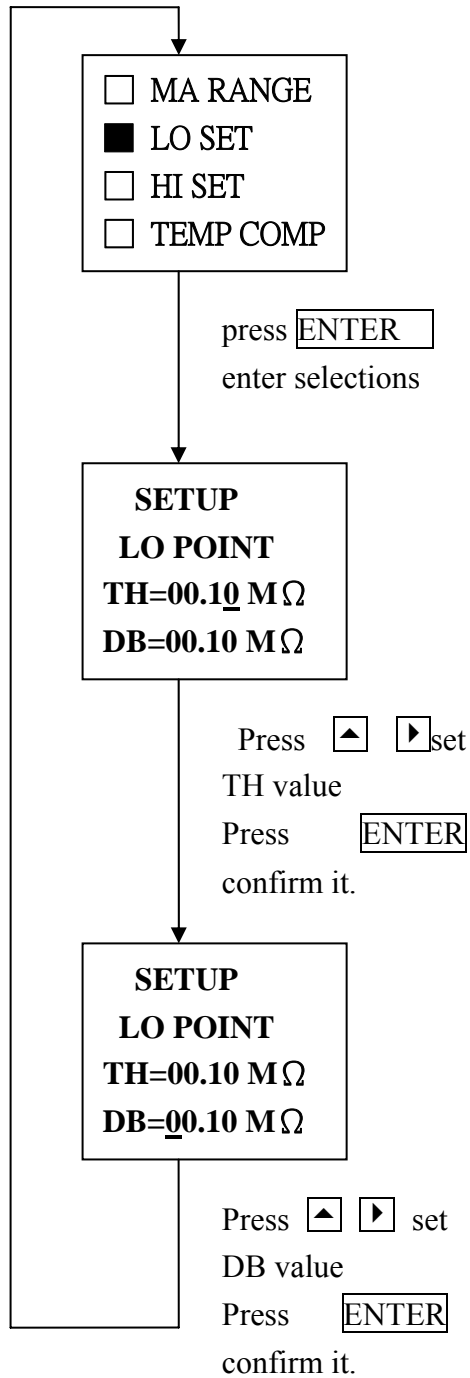
### 6.8 Current output

Set current output corresponding to measuring range.



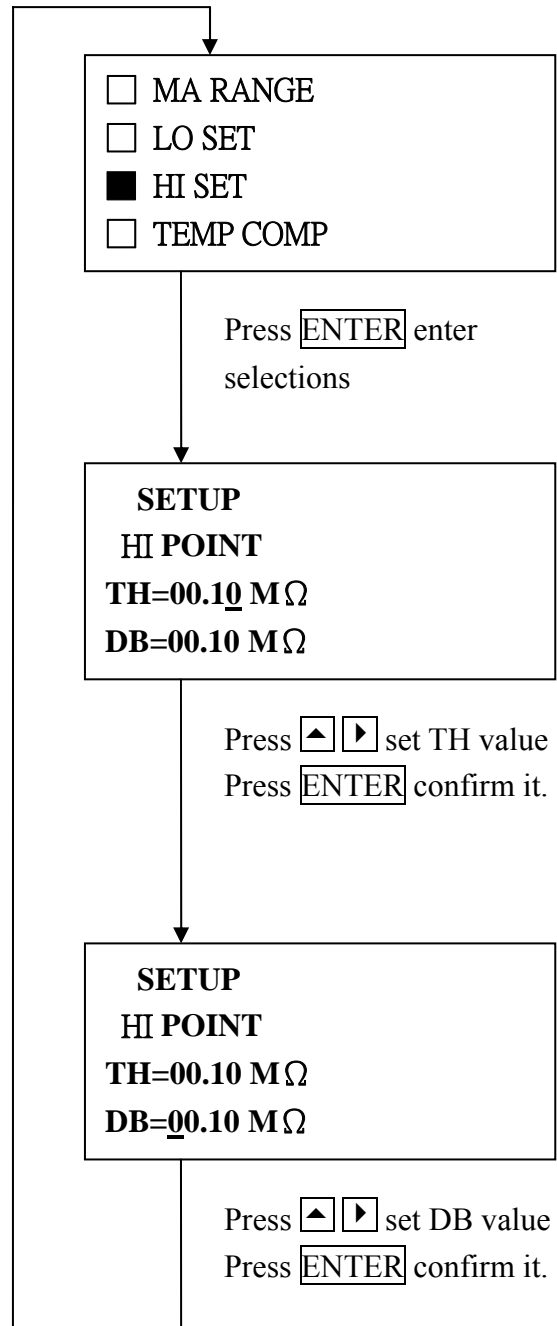
### 6.9 Set low point

Set low threshold and dead band. The range of threshold is  $0.00\text{M}\Omega \sim 20.00\text{M}\Omega$ 、 $0.00\mu\text{S} \sim 200.0\text{MS}$ 、 $0.0\% \sim 100.0\%$



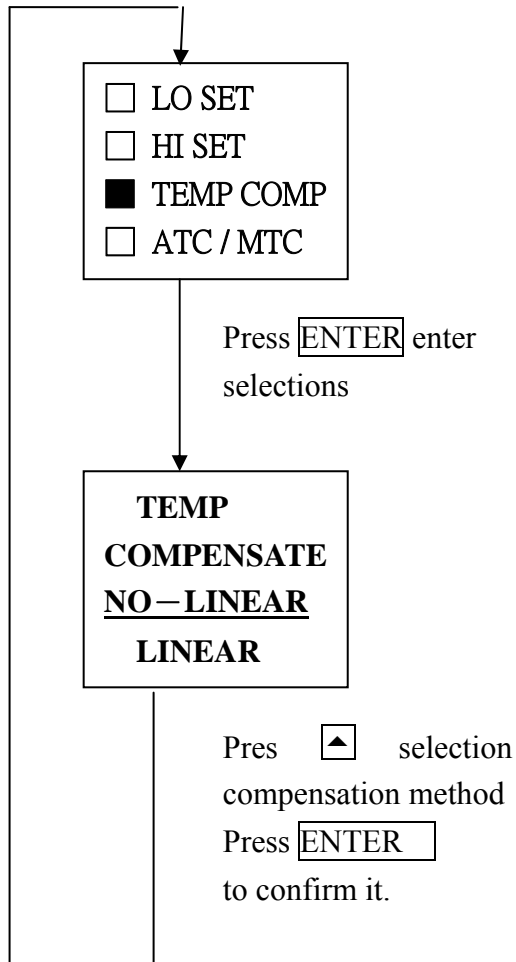
### 6.10 Set high point

Set high threshold and dead band. The range of threshold is  $0.00\text{M}\Omega \sim 20.00\text{M}\Omega$ 、 $0.00\mu\text{S} \sim 200.0\text{mS}$ 、 $0.0\% \sim 100.0\%$



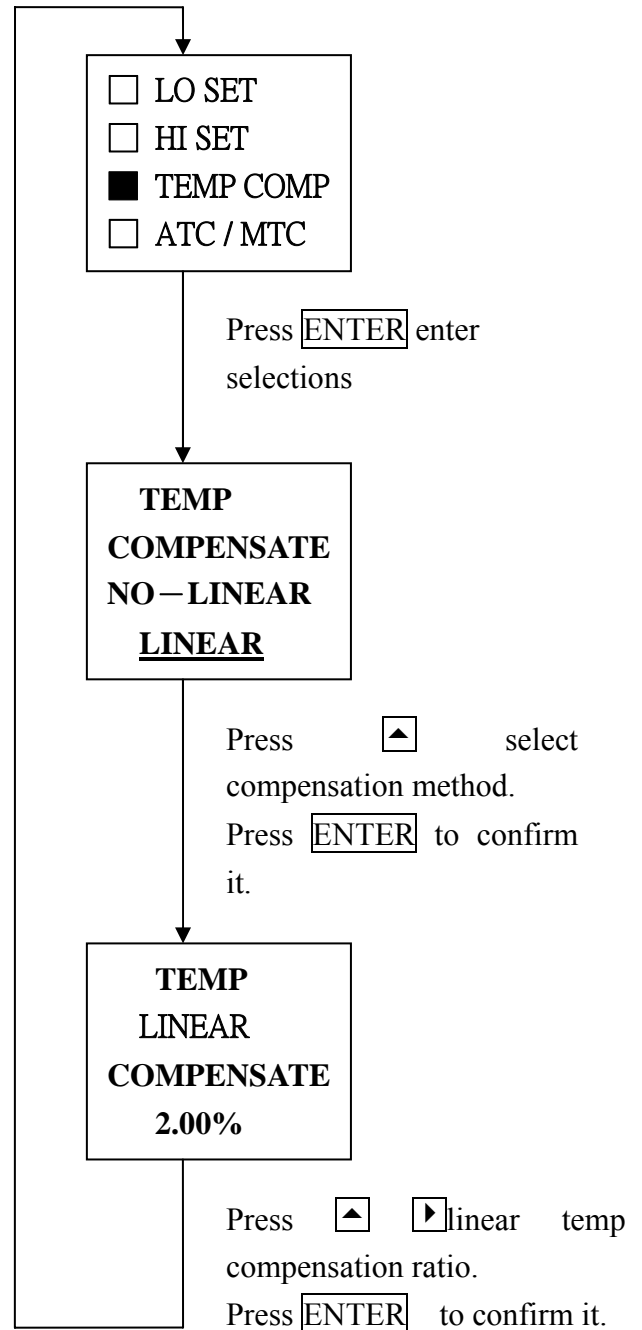
## 6.11 Temp. compensation

### 6.11.1 Non-linear compensation



### 6.11.2 Linear compensation

RANGE : 0.00%~5.00%

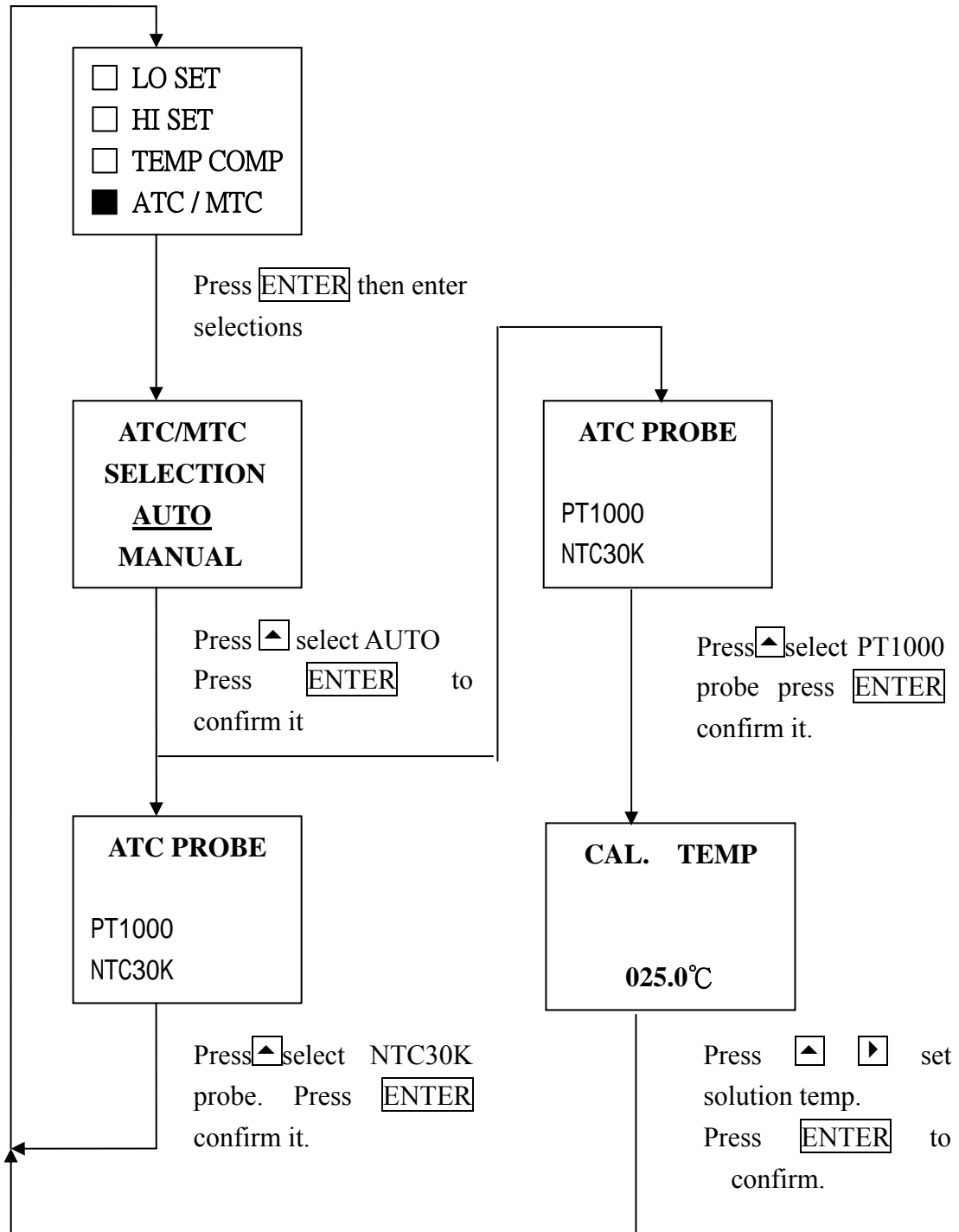


## 6.12 Temp. measuring

### 6.12.1 Temp. probe connecting

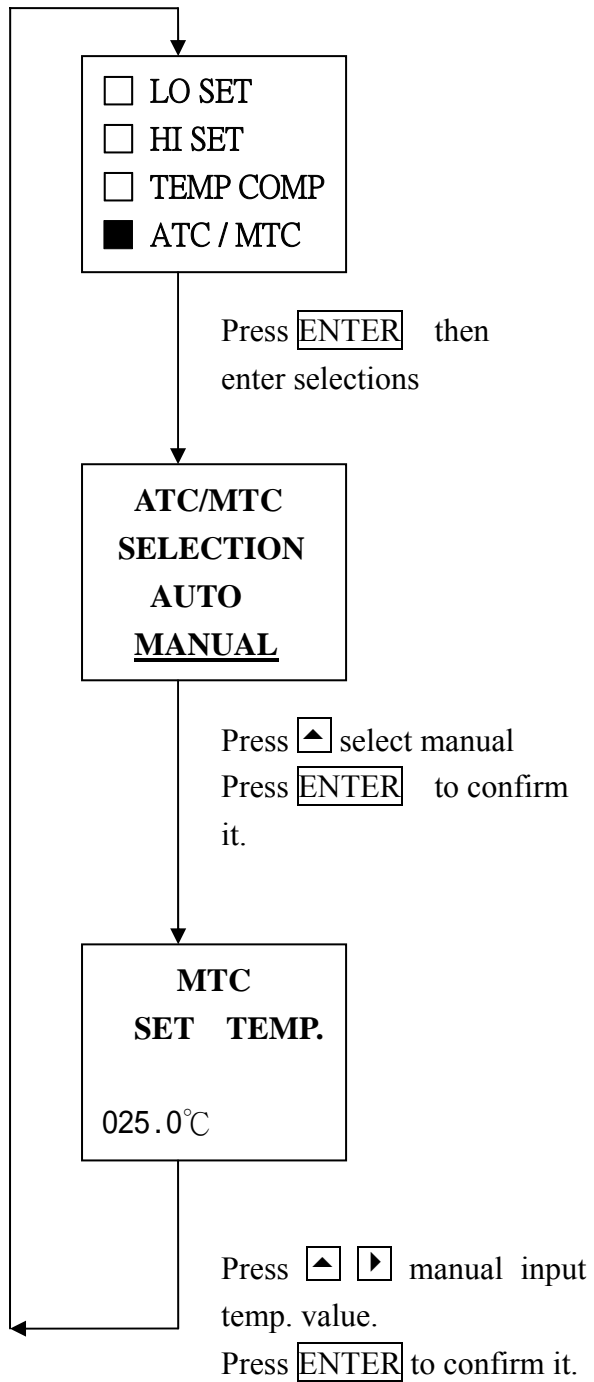
Choose either NTC30K OR PT1000TEMP

PROBE



### 6.12.2 Manual temperature setup

RANGE : 0.0°C ~ 100.0°C

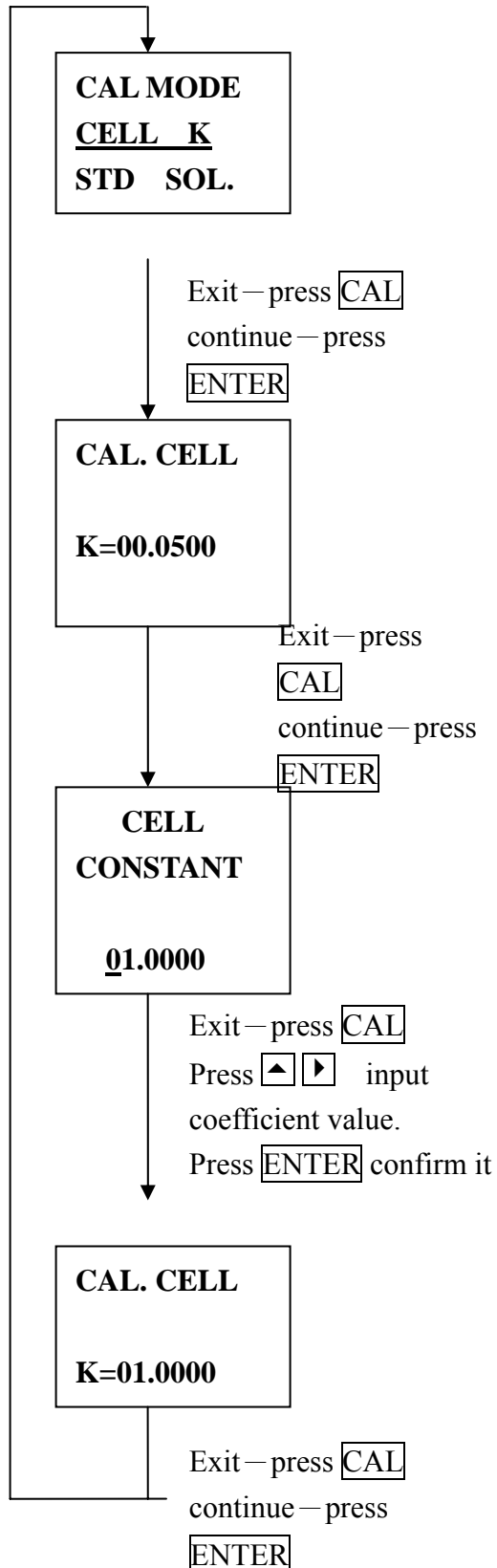




## 7calibration

### 7.1 $\Omega$ – CM calibration mode

#### 7.1.1 Cell constant input



ACCESS CH1 CALIBRATION  
MODE.

PRESS **CAL**+**CH1**

ACCESS CH1 CALIBRATION  
MODE

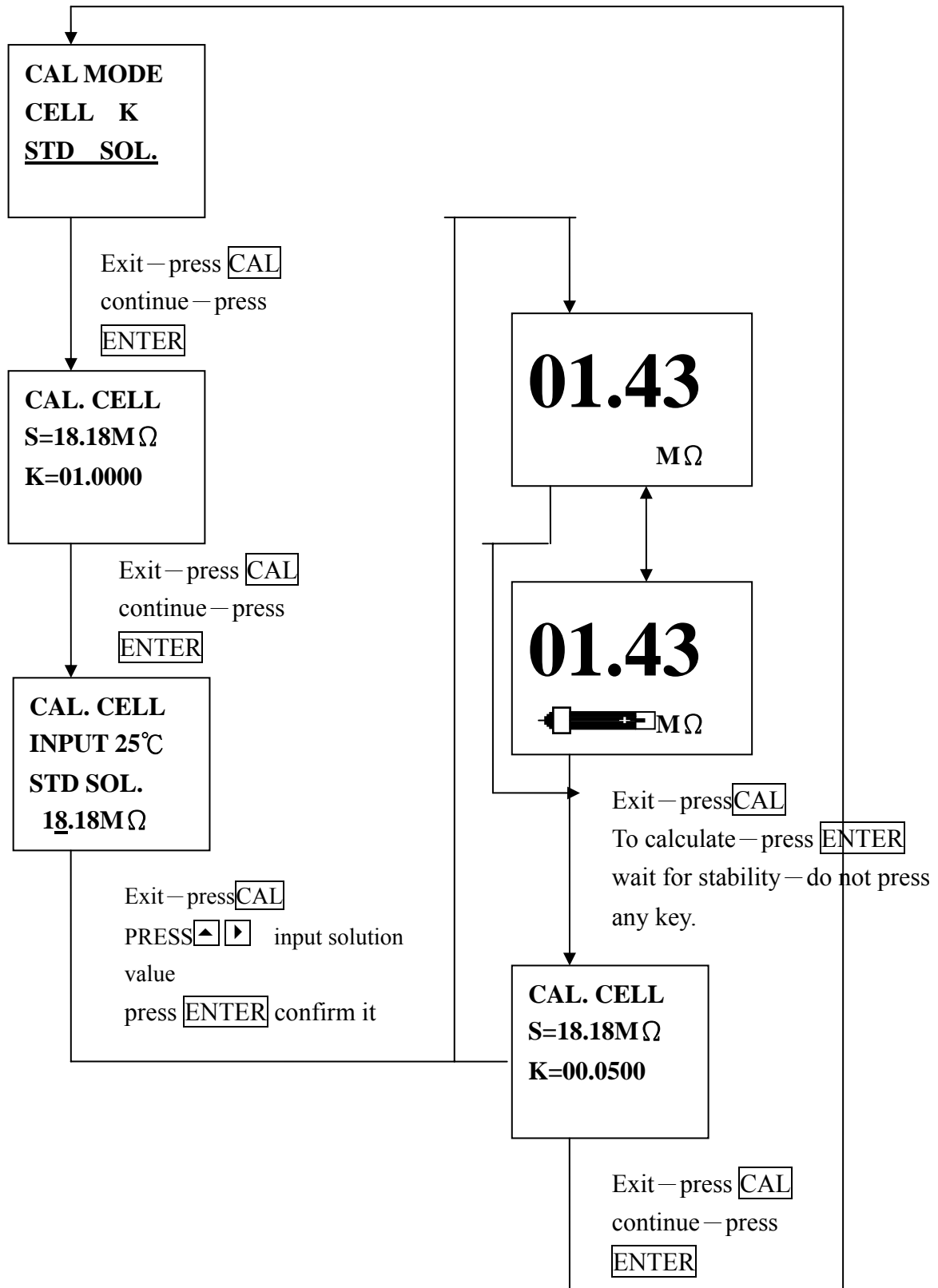
PRESS **CAL**+**CH2**

$\Omega$  – CM Calibration mode is divided into cell constant input(see 7.1.1) and user buffer solution calibration(see 7.1.2).

**Cell constant input** : the range is 0.0100 ~ 50.0000.

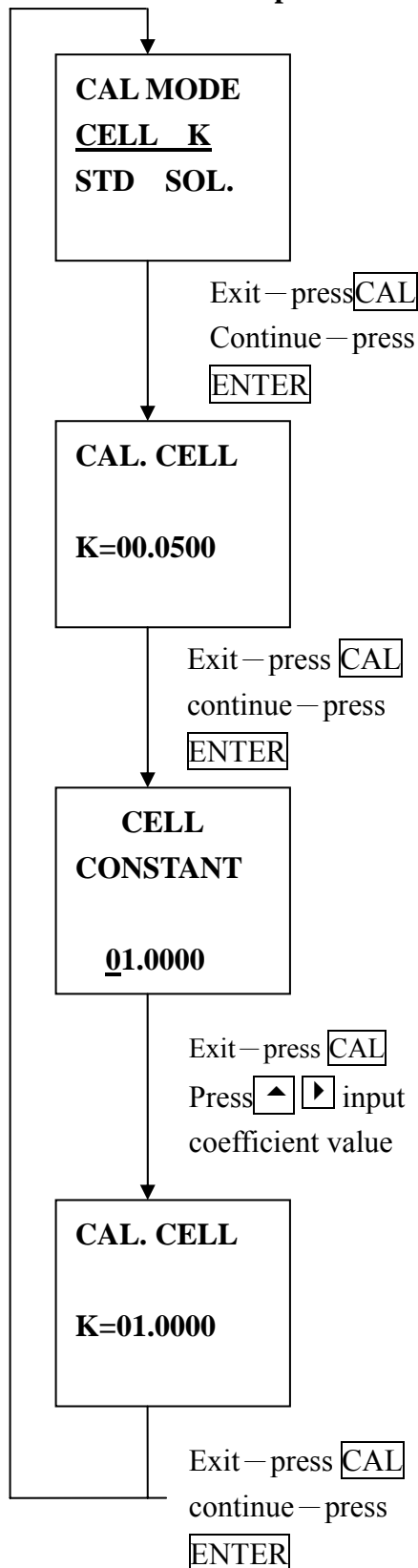
**User buffer solution calibration** : let User input the value of buffer solution, use this value (must use non-linear temp compensation) to calculate the coefficient of electrode.

### 7.1.2 User buffer solution calibration



**7.2 s/cm and rejection calibration mode**

**7.2.1 cell constant input**



ACCESS CH1 CALIBRATION MODE.

PRESS **CAL**+**CH1**

ACCESS CH2 CALIBRATION MODE

PRESS **CAL**+**CH2**

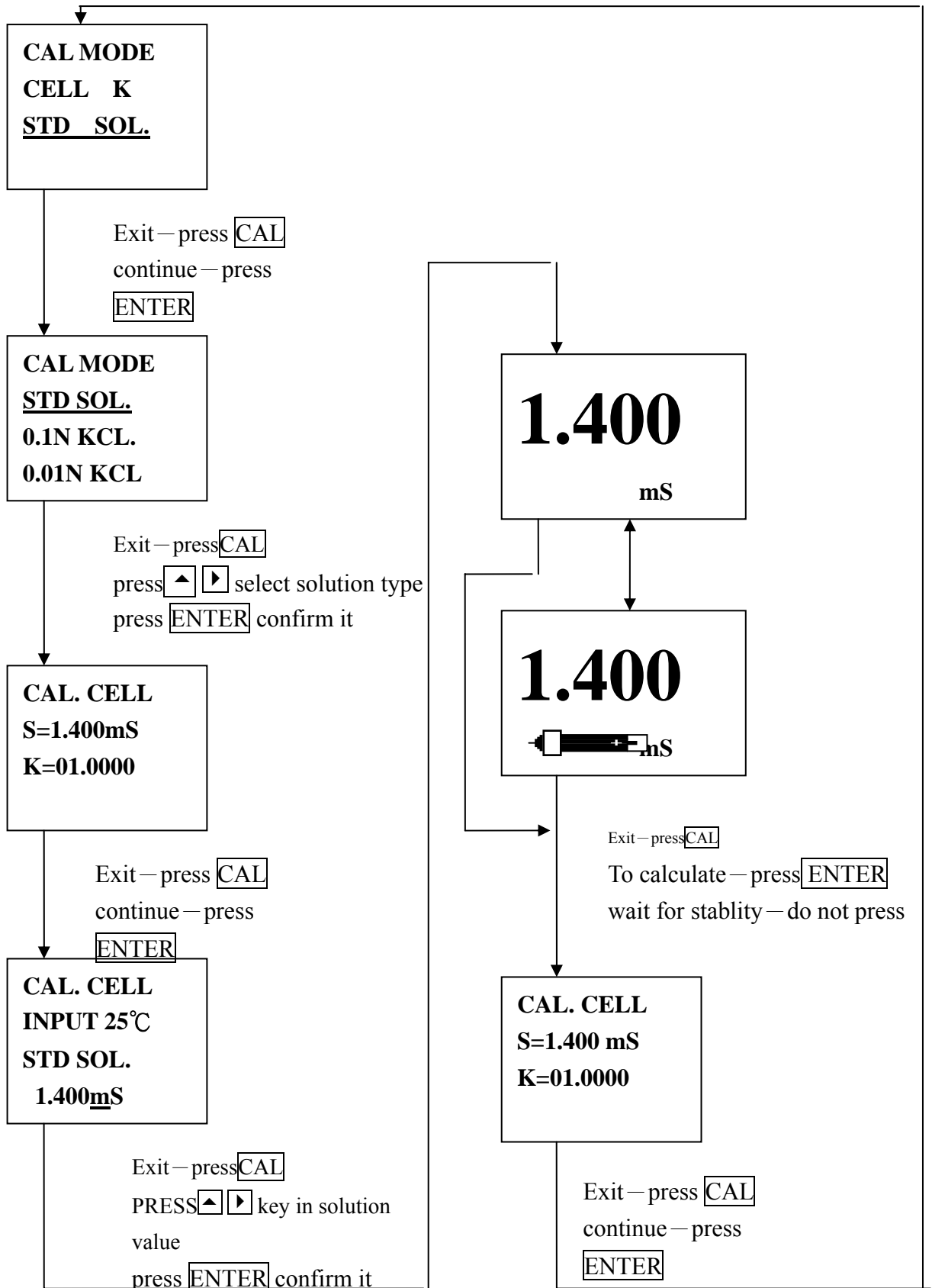
S/CM Calibration mode is divided into cell constant input(see 7.1.1) and user buffer solution calibration(see 7.1.2). Use 0.1n kcl solution to calibrate coefficient of electrode.( see 7.2.3 ). Use 0.01n kcl solution to calibrate coefficient of electrode. ( see 7.2.4 ) All four types.

**Cell constant input** : the range is 0.0100 ~ 50.0000.

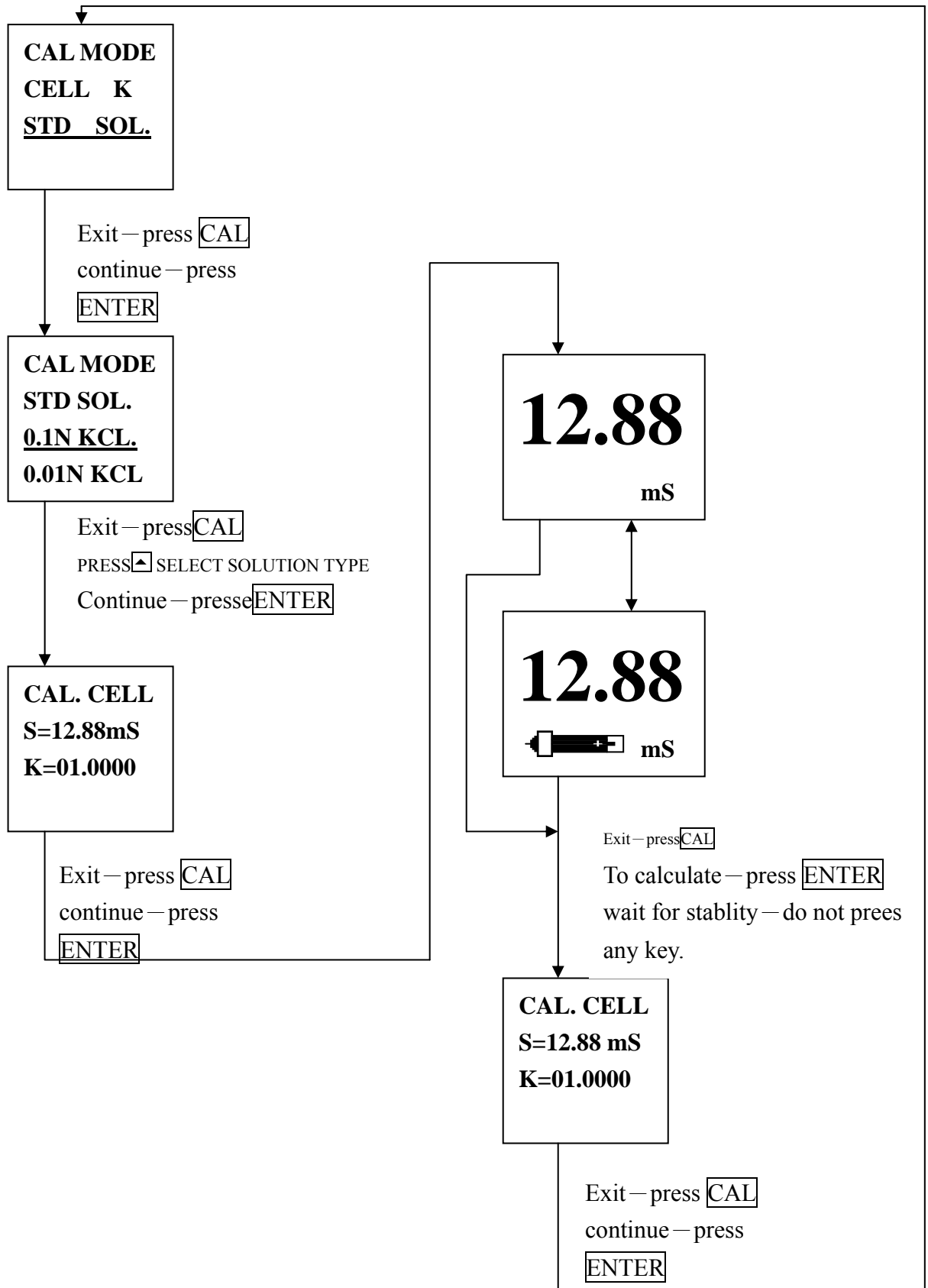
**User buffer solution calibration** : let User input the value of buffer solution, use this value to calculate the coefficient of electrode.

Use 0.1n kcl and 0.1n kcl solution to calibrate coefficient of electrode. : The program will find corresponding value to calibrate the coefficient of electrode.

## 7.2.2 User buffer solution calibration

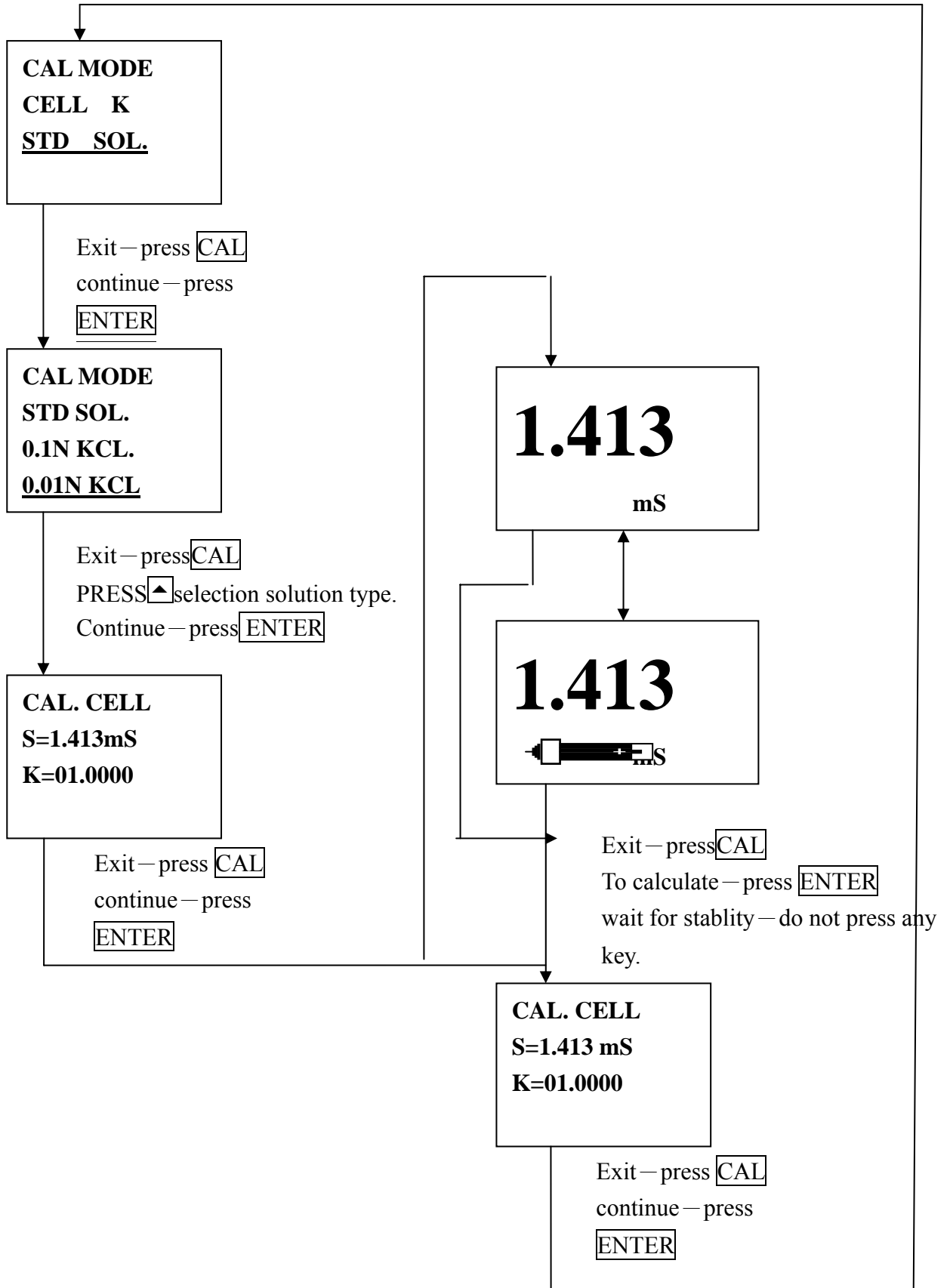


**7.2.3 Calibration electrode by 0.01 k  
ncl solution**



## 7.2.4 Calibrate electrode by 0.01N

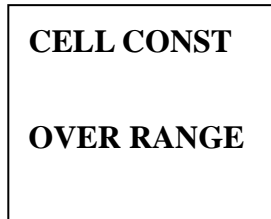
KCL solution



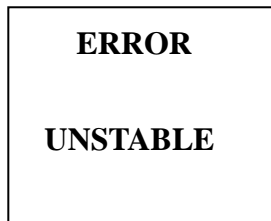
## 8. ERROR MESSAGE

### 8.1 CALIBRATION ERROR

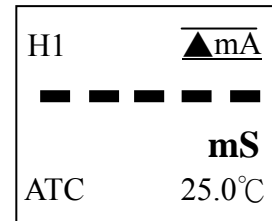
1. During calibrating, if the coefficient is over 00.0100~50.0000, it shows the following sign. ◦ But k= value will not change.



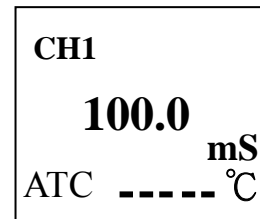
During calibration: If the electrode value is not stable the k=value will not change.



In measuring mode: If the value is over value ( range 0-200ms )



2. Measuring temp. is over range.



### 8.2 Measuring error

- 1 . In resistivity mode: If the value is over rang, it following sign will be shown ( range is 0-20MΩ )

