

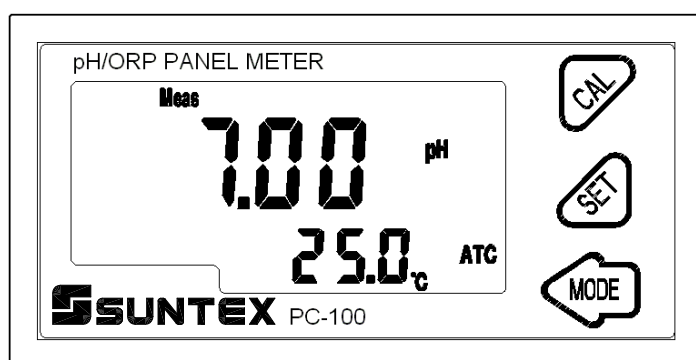
PC-100/110

Microprocessor

pH/ORP

Panel Meter

Operation Manual



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1. Specifications

Model		PC-100	PC-110
Measurement Parameter		pH/ORP/TEMP/mA/mV	
Range	pH	-2~16pH	
	ORP	-2000~2000mV	
	TEMP	-30.0~130.0℃	
	mV	-2000~2000mV	
	mA	0.00~20.00mA	
Resolution	pH	0.01pH	
	ORP	1mV	
	TEMP	0.1℃	
	Other	0.01~1	
Accuracy	pH	±0.01pH(±1Digit)	
	ORP	±0.1 % (±1Digit)	
	TEMP	±0.2℃± 1 Digit	
	Other	±0.1 % (±1Digit)	
Temperature Compensation		NTC30K/ PT1000 auto recognized	
		Manual adjustment	
Working Temp.		0~50℃	
Storage environment		-10~70℃	
Input Impedance		> 10 ¹² Ω(for pH/ORP)	
Display		LCD display	
Analog output		Isolated DC 0/4~20mA corresponding to pH/ORP, max.500Ω	
Relay		—	Yes
Contact		—	ON/OFF, 240VAC 0.5A Max.
Activate		—	One set of Hi/Lo Programmable
Power Supply		100V~240VAC±10%, 50/60Hz	
Installation		Panel mounting	
Dimensions		48 mm × 96 mm × 110 mm (H×W×D)	
Cut off Dimensions		44 mm × 92 mm (H×W)	
Weight		0.25Kg	

2. Assembly and installation

2.1 Precautions for installation

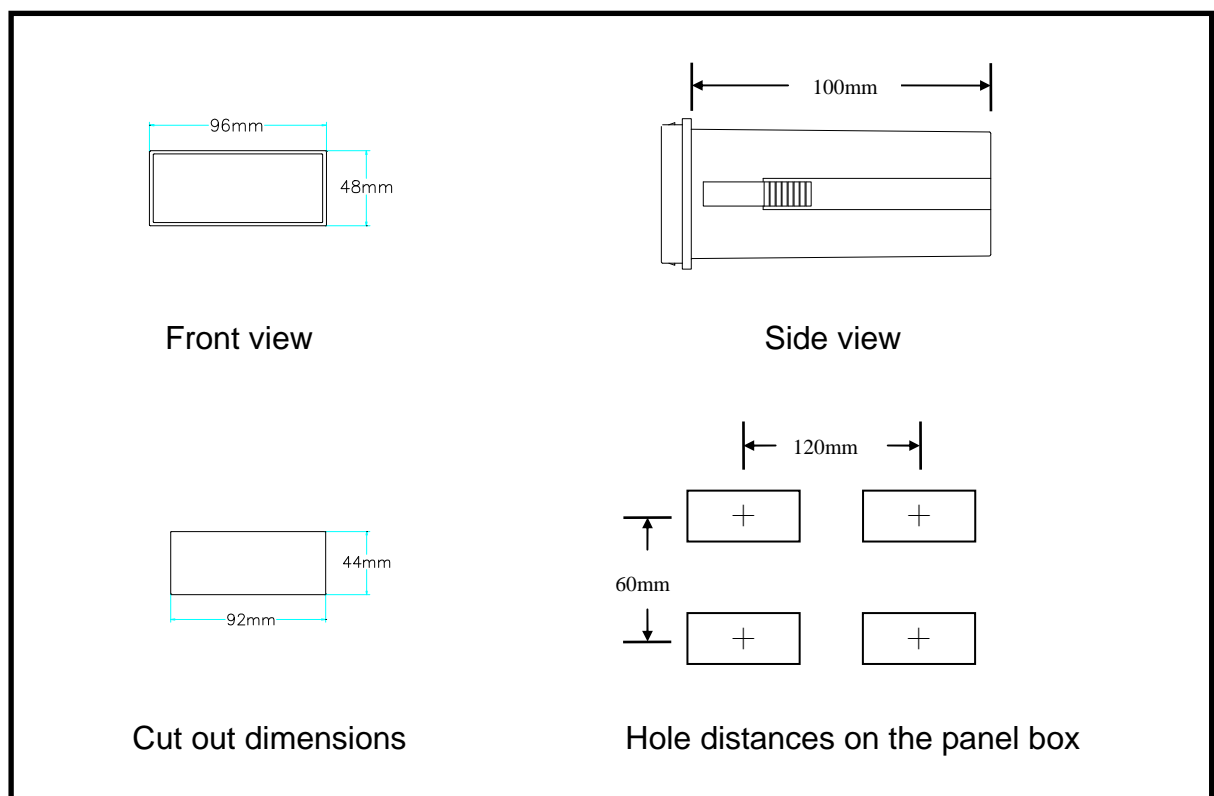
Wrong wiring will lead to breakdown or electrical shock of the instrument, please read this operation manual clearly before installation.

- Make sure to remove AC power from the meter before wiring input, output connections, and remove it before opening the meter housing.
- The installation site of the meter should be good in ventilation and avoid direct sunshine.
- The material of signal cable should be special coaxial cable. Strongly recommend using our coaxial cable. Do not use normal wires instead.
- Avoid electrical surge when using power. Especially when using three-phase power, use ground wire correctly.
- The internal relay contact of PC-110 is for low current control contact. Therefore, if you would like to control higher power accessorial equipment, please must connect external relay for higher current contact to make sure the safety operation of the instruments. (Please refer to PC-110 Illustration of electrical connection)

2.2 Meter installation

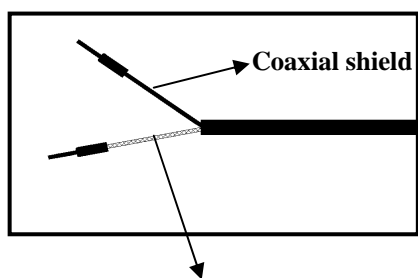
First, prepare a square hole of 44×92 mm on the panel box, and then insert the meter directly into the panel box. Insert the accessorial mounting bracket from the rear, and make it be fixed in to pickup groove.

2.3 Illustration of panel mounting:



2.4 Assembly of electrode and housing

2.4.1 Cable set-up:



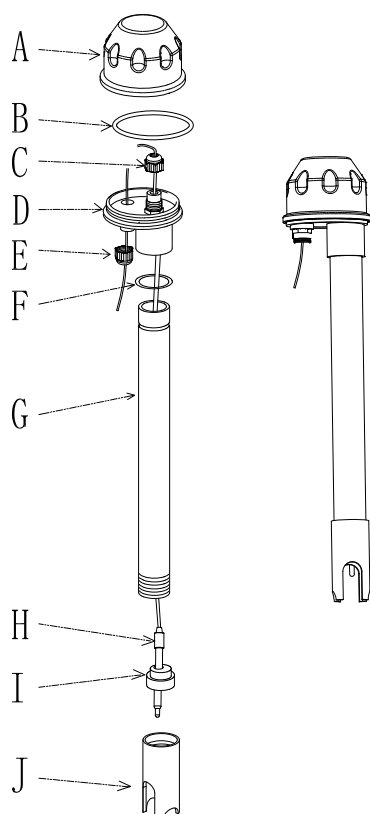
Set-up diagram of coaxial cable:

See the correct set-up method on the left:

Note: The black conductive rubber covering on the coaxial inner should be removed for use.

- Make sure to remove the conductive rubber or aluminum-foil paper between the electrode signal wire and the coaxial shield.
- Extend the cable to the meter without any joint except specific junction box. Connect the coaxial inner directly to the Glass contact on the back of meter and connect coaxial shield to Ref. contact.

2.4.2 Assembly of housing PP-100A



- A----- Upper cover of round joint box
- B----- O-ring
- C----- Cable fixing point MG16A
- D----- Lower cover of round joint box
- E----- Cable fixing point MG16A
- F----- O-ring
- G----- PP Electrode Protective Housing
- H----- Electrode (Sensor)
- I----- Rubber electrode holder
- J----- PP housing protective cover



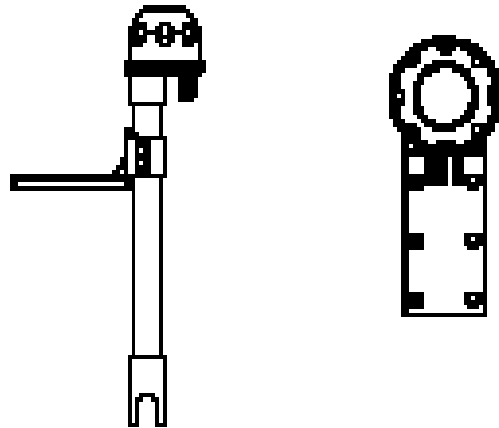
Please must seal up all the parts tightly to prevent from water and humidity.

- Insert **(H)** Electrode through **(G)** PP Electrode Protective Housing
- Rinse **(H)** Electrode properly, so that it can be easily pass through **(I)** Rubber electrode holder, leave about 5cm bellow.
- Install the prepared **(I)** Rubber electrode holder into **(G)** PP Electrode Protective Housing and lock **(J)** PP pipe protective cover tightly.
- Insert **(H)** Electrode cable through **(D)** Lower cover of round junction box and **(C)** Cable

fixing point, and use **(D)** Lower cover of round junction box to lock **(G)** PP Electrode Protective Housing tightly.

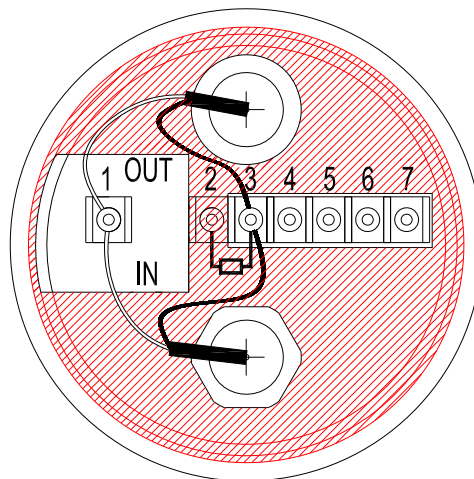
5. Prepare 15cm cable in the PP pipe, and then lock **(C)** Cable fixing point MG16A tightly. Leave **(H)** Sensing electrode cable for about 12-14cm, and split it carefully.
6. Fix the terminal of electrode coaxial inner on terminal block 1 of round holder; Fix the terminal of electrode coaxial shield on terminal block 3. (See the instruction of junction box)
7. Extend the cable to pass through **(E)** Cable fixing point on **(D)** Lower cover of round junction box, and lock **(E)** Cable fixing point MG16A tightly, leaving 12-14cm in the box for split.
8. Extend the lead coaxial inner and electrode coaxial inner to connect them; extend the lead coaxial shield to fix on the terminal block 3. Lock **(A)** Upper cover of round junction box to finish the installation.

Mounting bracket:



Our company use L-shaped mounting bracket as electrode mounting bracket. According to the site necessity, fix the bracket with steel nails or expansion bolts at proper locations by pool.

2.5 Illustration and description of junction box :(Two kinds of link distributing system)



〔 1 〕 Two-wire distributing system			
INPUT terminals	Terminal No.	OUTPUT terminals	Terminals on meter
Coaxial inner	1	Coaxial inner's extending wire for electrode	GLASS
Shield (forbidden)	2	Shield (forbidden)	-----
Coaxial shield	3	Coaxial shield's extending wire for electrode	REF
Temperature probes red wire	4	Red wire's extending wire for electrode	T/P
Temperature probes green wire	5	Green wire's extending wire for electrode	GND
Alternative	6、 7	Alternative	-----

Note: 1. Our company's extending wire for electrode material No. is 7202-F94009-BK and 7202-RG-58

1.) If temperature probe is not used, the Order No. is 7202-RG-58.

2.) If temperature probe is used, the Order No. is 7202-F94009-BK.

2. If temperatures probe 8-26-3(NTC30K) or 8-26-8(PT1000) is used for two-wire distribution, the black wire terminal should be forbidden.

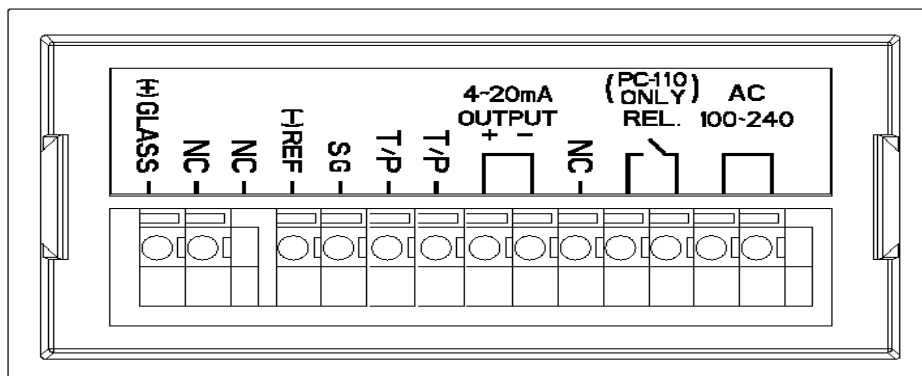
〔 2 〕 Three-wire distributing system			
IN terminals	Terminal No.	OUT terminals	Terminals on meter
Coaxial inner	1	Coaxial inner's extending wire for electrode	GLASS
Ground Rods	2	GND	GND
Coaxial Shield	3	Coaxial Shield's extending wire for electrode	REF
Temperature probes red wire	4	Red wire's extending wire for electrode	T/P
Temperature probes green wire	5	Green wire's extending wire for electrode	GND
Alternative	6、 7	Alternative	----

Note: 1. The black wire on the temperature probes of 8-26-3(NTC30K) or 8-26-8(PT1000) is used as special wire for Ground Rods to be connected at terminal 2.

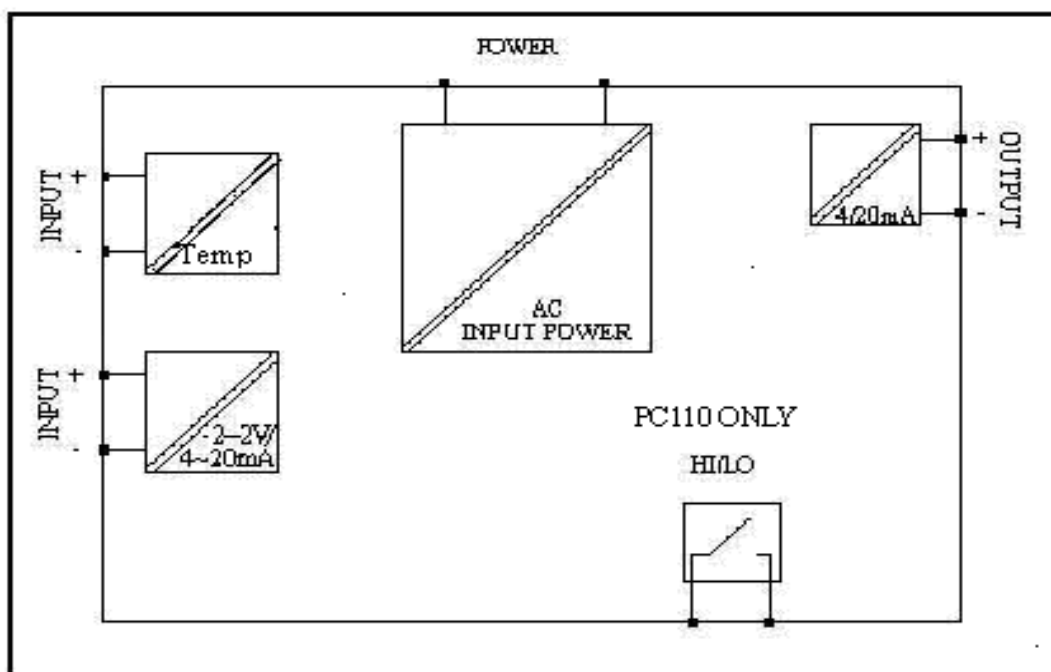
2. The extending wire for electrode that has a temperature probe or ground rod is marked with material number 7202-F94009-BK.

3. Overview of pH/ORP panel meter PC-100/110

3.1 Illustration of rear panel



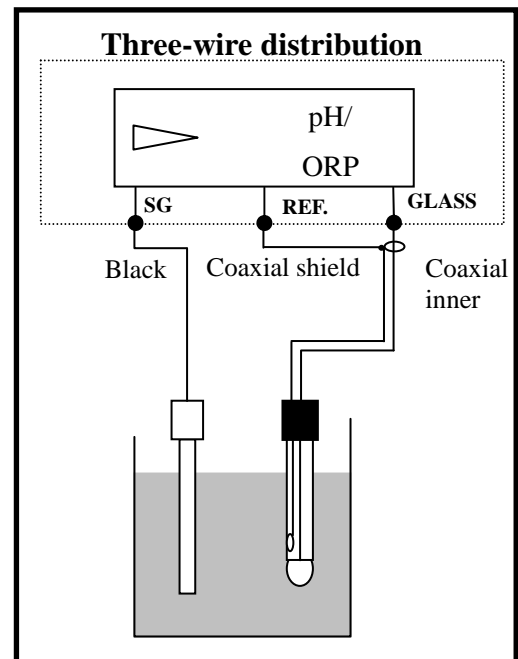
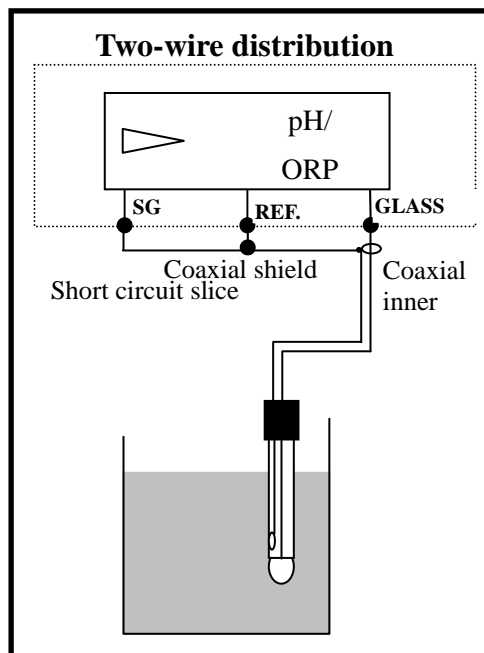
3.2 Illustration of terminal function



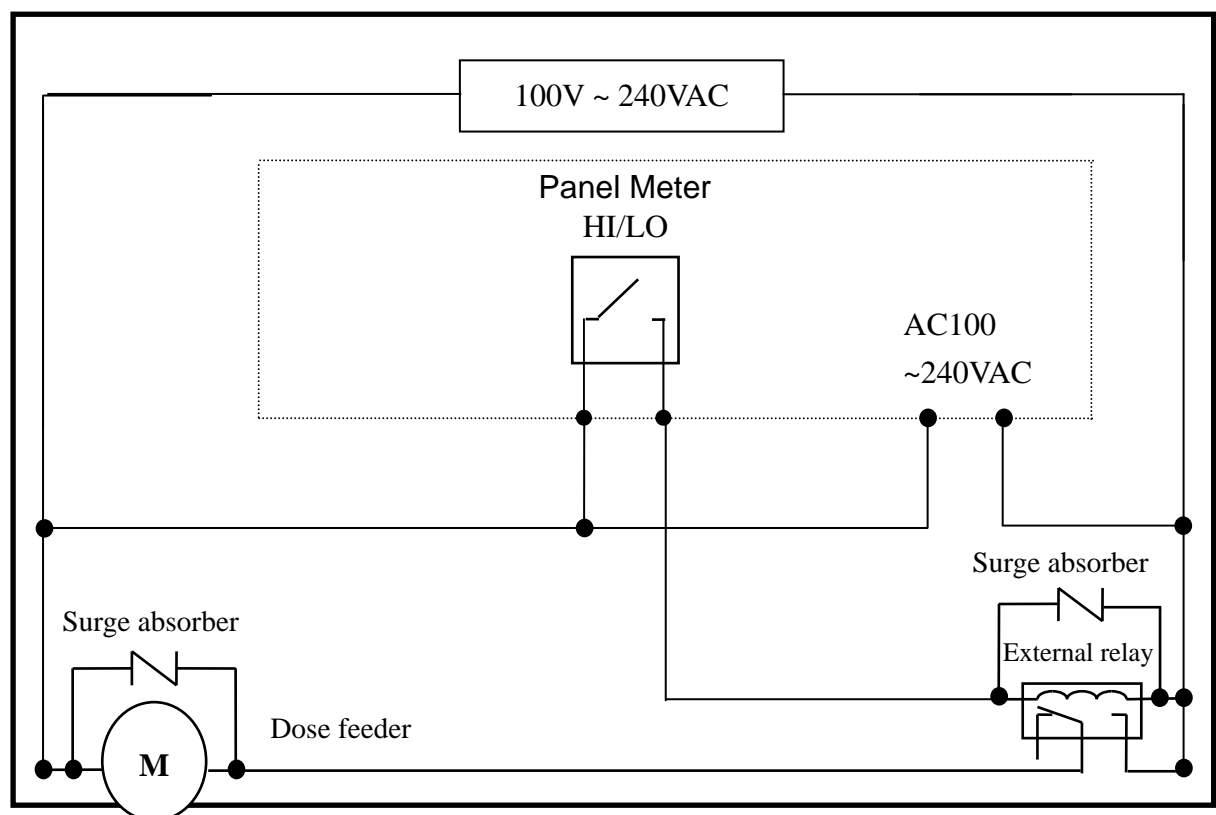
3.3 Description of terminal function

GLASS(+)	: Coaxial inner connecting pH/ORP electrode signal wire or (+) signal
NC	: NC
NC	: NC
REF(-)	: Coaxial shield connecting pH/ORP electrode signal wire (+) signal
SG	: Connect solution ground probe to prevent from earth potential
T/P	: Connect one end of temperature probe
T/P	: Connect the other end of temperature probe
4~20mA	: current output terminal, for external recorder or PLC control
NC	: NC
REL	: External relay terminal Hi/Lo control (PC-110 only)
AC100~240V	: Power supply terminal

3.4 Typical wirings:

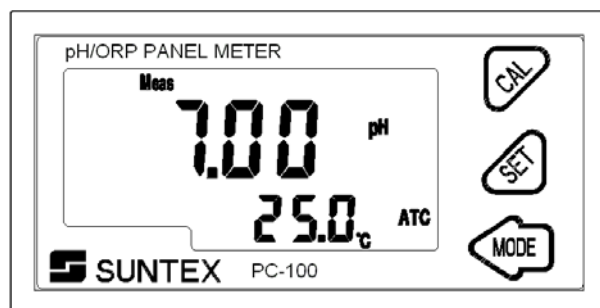


3.5 Illustration of electrical connection











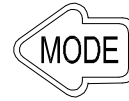
4. Front View

4.1 Illustration of front panel





4.2 Keypad



In order to prevent inappropriate operation by others, before the parameter setting and calibration, the operation applies multi-keys, and coding protection if necessary. Description of the key functions is in the following:

-  : Up adjustment button; working with button  to enter calibration mode
-  : Down adjustment button; working with button  to enter setup mode
-  : Confirm button in the calibration and setup mode
-  +  : At measurement mode, push these two buttons to enter parameter setting mode.
-  +  : At measurement mode, push these two buttons to enter calibration setting mode.

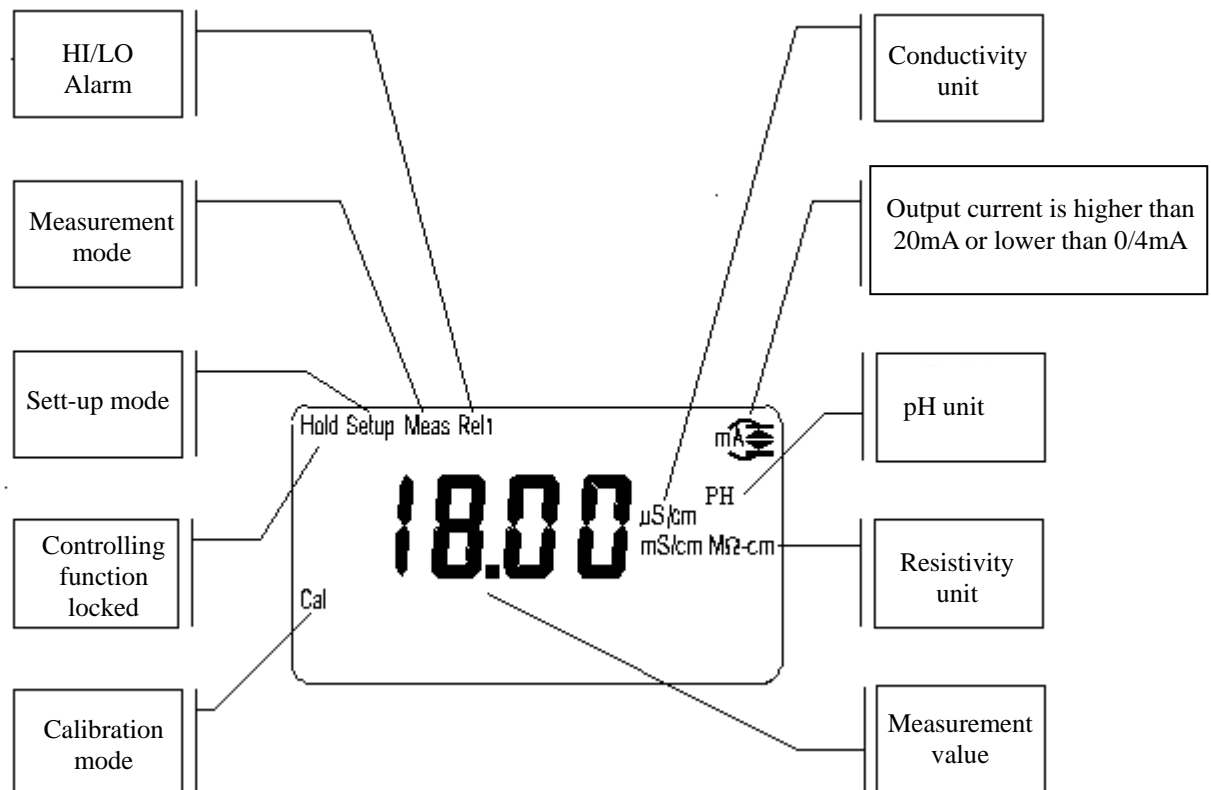
(Master Reset) Restore factory default parameter's settings


In the Measurement mode, press the two keys  +  simultaneously for few seconds, until you see the display shows "init" release both keypad simultaneously, then the instrument recovery to factory default parameter settings.


(Calibration Reset) Restore factory default calibration's settings

In the Measurement mode, press the two keys  +  simultaneously for few seconds, until you see the display shows "init" release both keypad simultaneously, then the instrument recovery to factory default calibration settings.

4.3 Display



mA  : Output current is higher than 20mA.

mA  : Output current is lower than 0/4mA

5. Operation


5.1 Measurement mode:

After all electrical connections are finished and tested, connect the instrument to the power supply and turn it on. The instrument will automatically entering measurement mode with the factory default settings or the last settings from user.

5.2 Set-up mode:



Please refer to the set-up instructions in Chapter 6, and press  to back to measurement mode.

5.3 Calibration mode:

Please refer to the calibration instruction in chapter 7, and press  to back to measurement mode.

5.4 Reset:

5.4.1 Master reset:

In the Measurement mode, press the two keys  +  simultaneously for few seconds, until you see the display shows “init” release both keypad simultaneously, then the instrument recovery to factory default parameter settings.

Factory defaults:

Measurement mode: pH

Temperature compensation: NTC

Alarm : HI (PC110 only)

pH measurement : SP1= 7.00 pH , db1= 0.10 pH



ORP measurement : SP1= 600mV, db1= 10 mV

As a analog current received monitor : SP1=1200 mV, db1= 10 mV

pH/ORP current output : 4~20 mA , 2.00~12.00pH

TP current output : 4~20 mA, 0~100.0°C

5.4.2 Calibration reset:

In the Measurement mode, press the two keys  +  simultaneously for few seconds, until you see the display shows “init” release both keypad simultaneously, then the instrument recovery to factory default calibration settings.

Factory defaults:

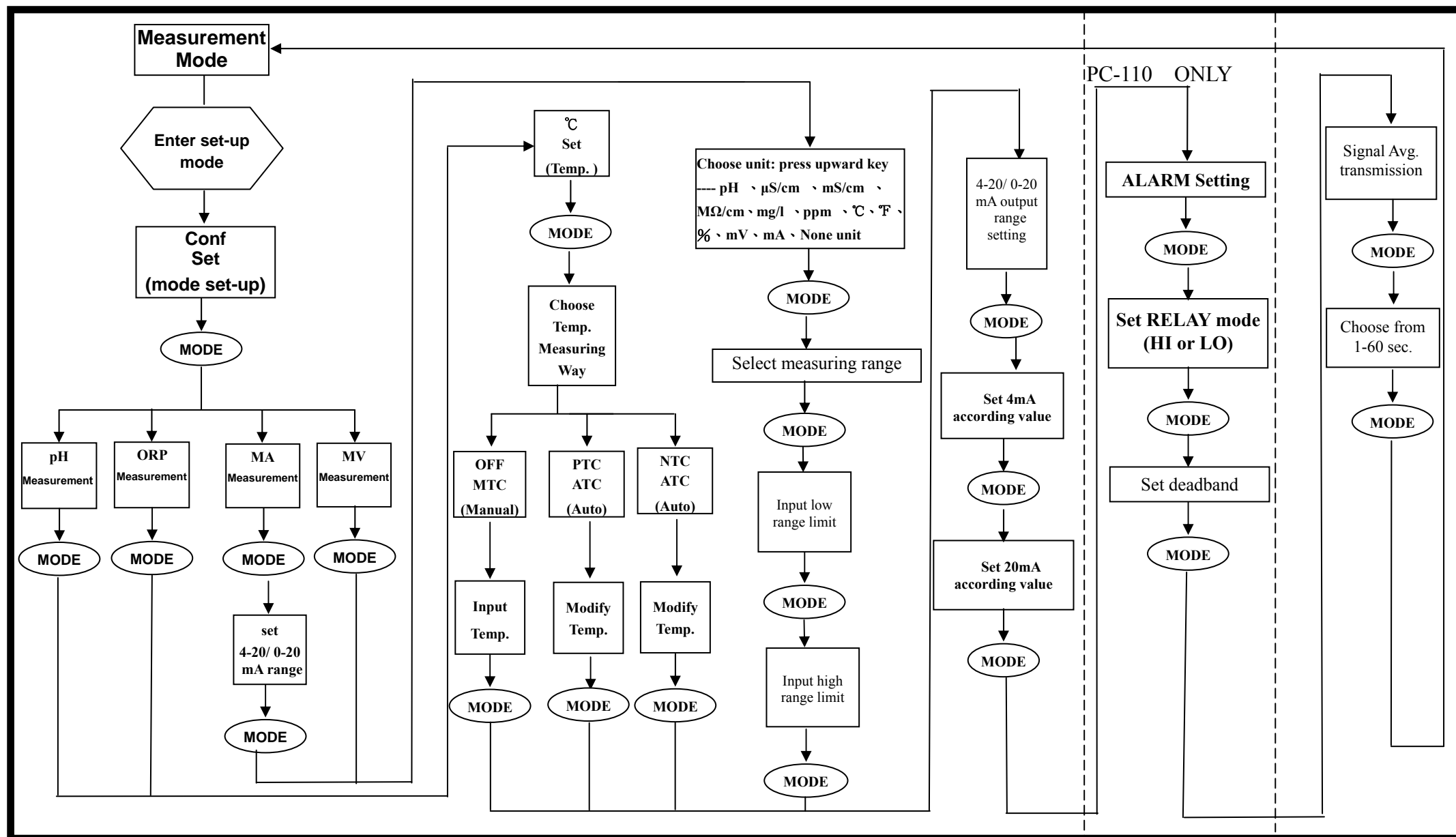
OS value : 0 mV

SLOPE : 100.0 %



Calibration : Single point or dual point(CA1 , Ct1, Cn1)

6. Settings

Block diagram of settings:

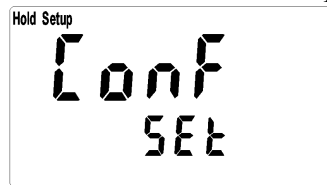



6.1 Entry of set-up mode

Press  +  buttons simultaneously to enter setup mode for parameters.



6.2 Measurement parameters:



Enter the measurement parameter set-up





Press  for confirmation




Press  or  to select

Press  or  to select

Press  or  to select

Press  for confirmation

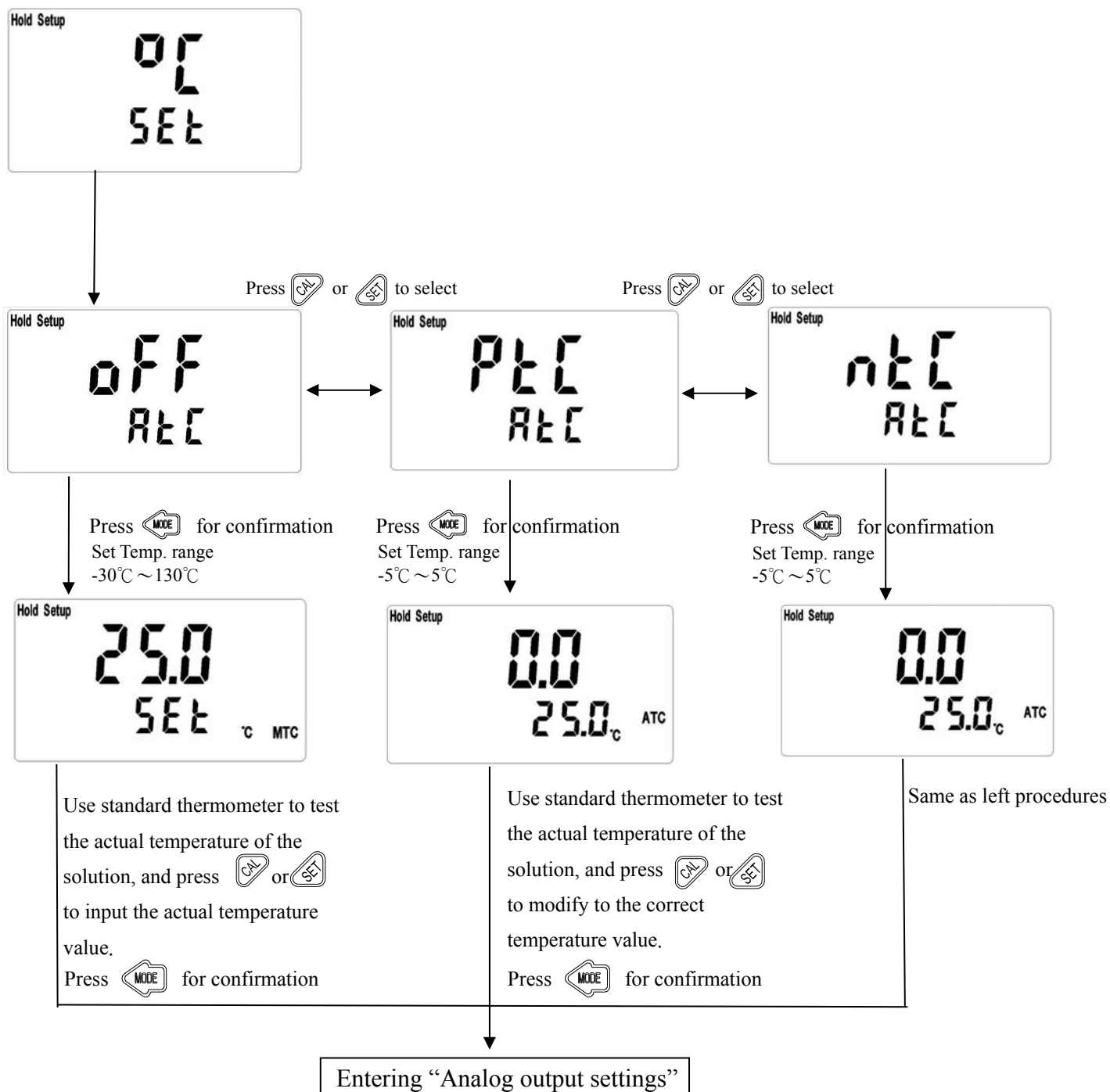
Entering temperature setting

Press  for confirmation

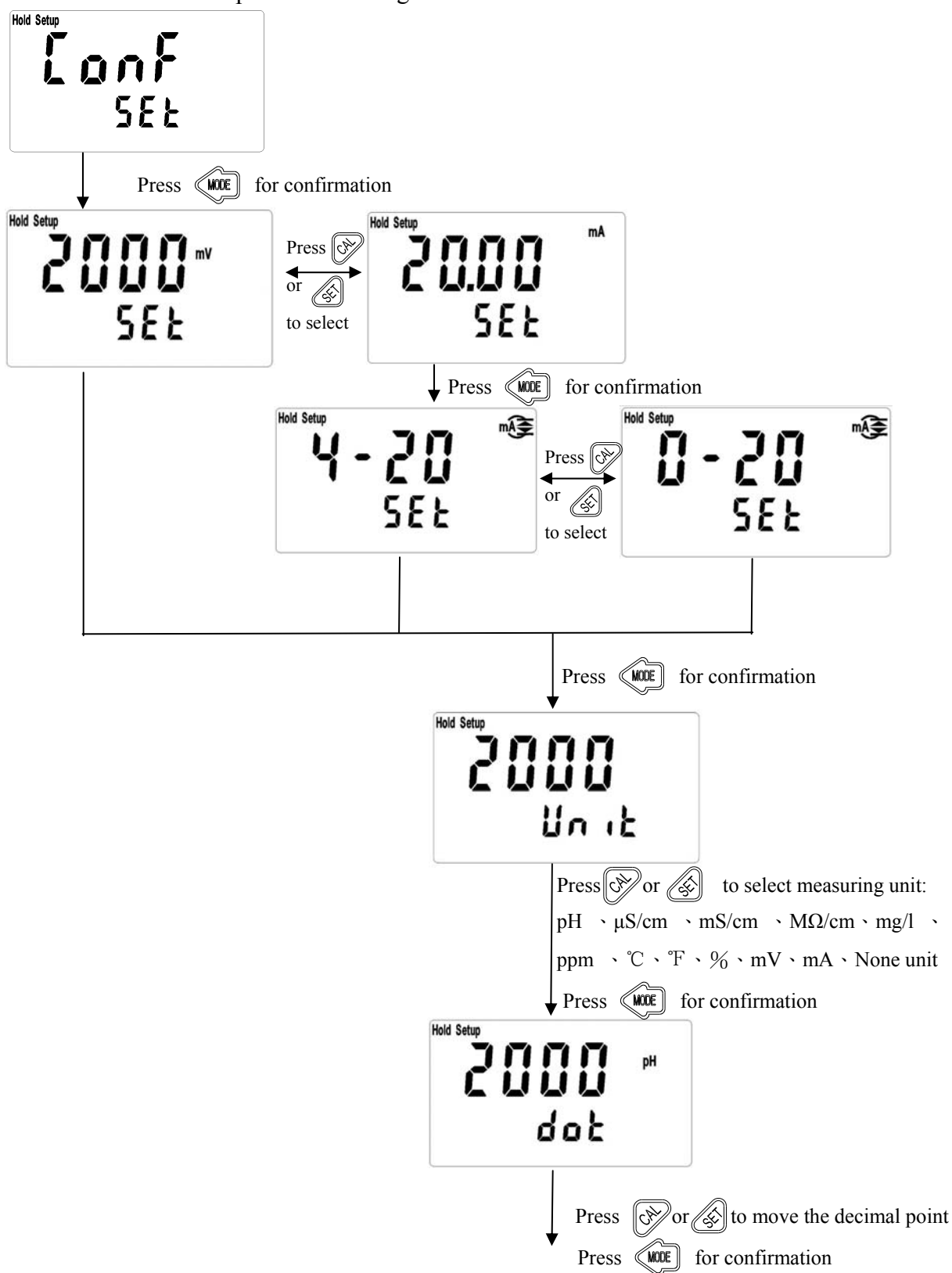
Entering mV/mA parameter settings

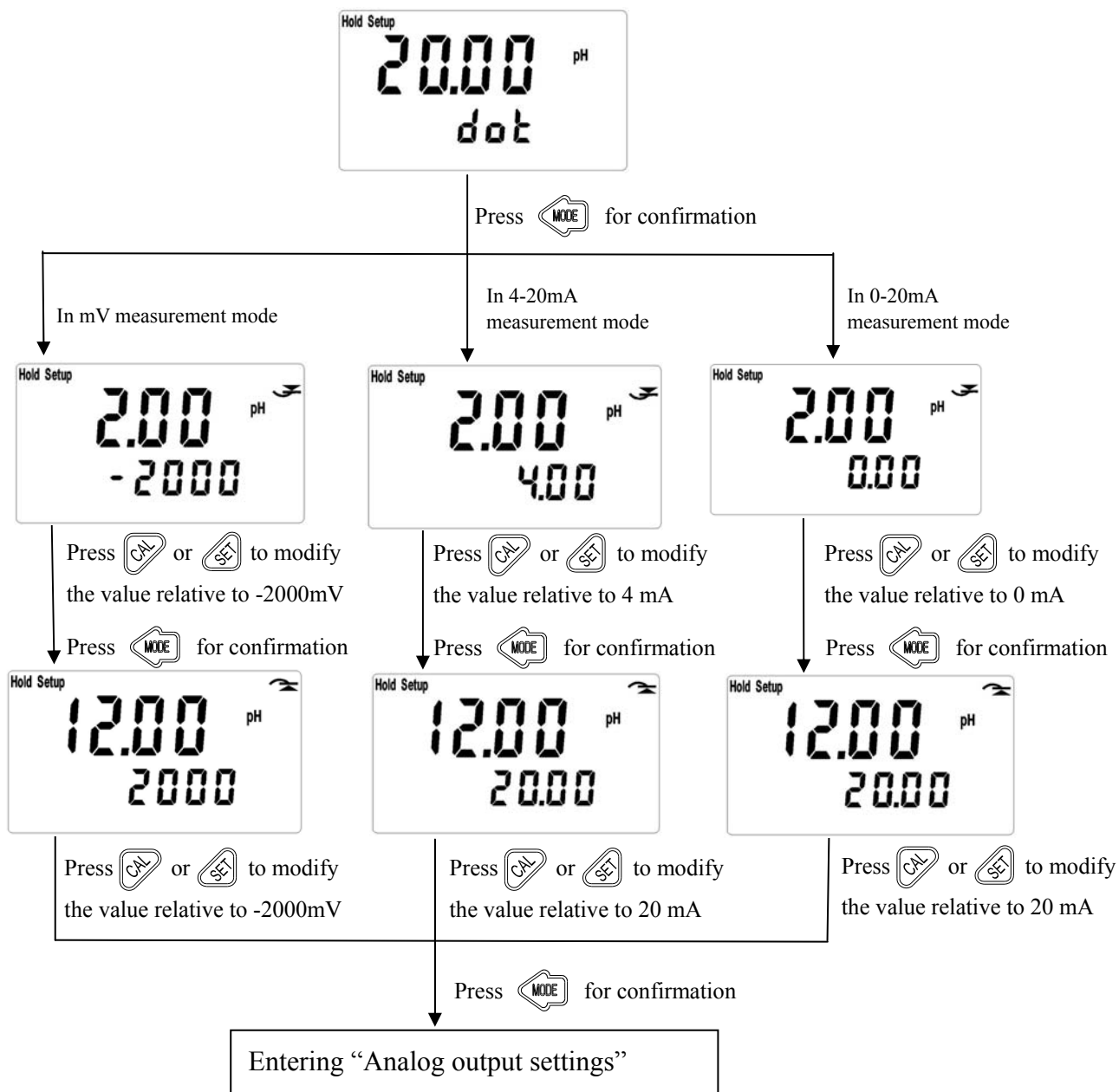
6.3 Temperature

Enter temperature parameter set-up



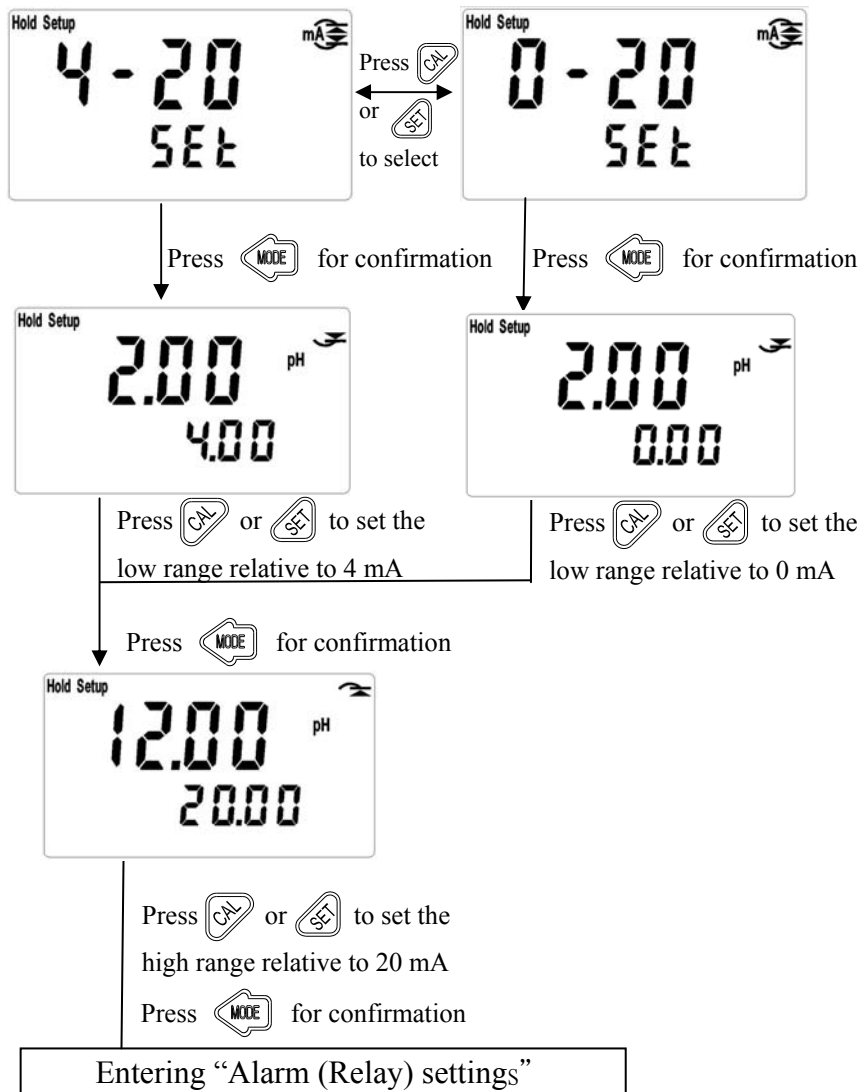
6.4 mA/mV measurement parameter settings





6.5 Analog output settings (For example: pH/ORP measurement)

According to your need, you can freely adjust pH/ORP or other (as second monitor) measurement value relative to current output range to increase the resolution.



6.6 Alarm (Relay) settings (PC-110 only)

Set the Hi/LoTH (THRESHOLD) and DB (DEADBAND) of Alarm

Threshold Range :

pH : -2.00~16.00 pH

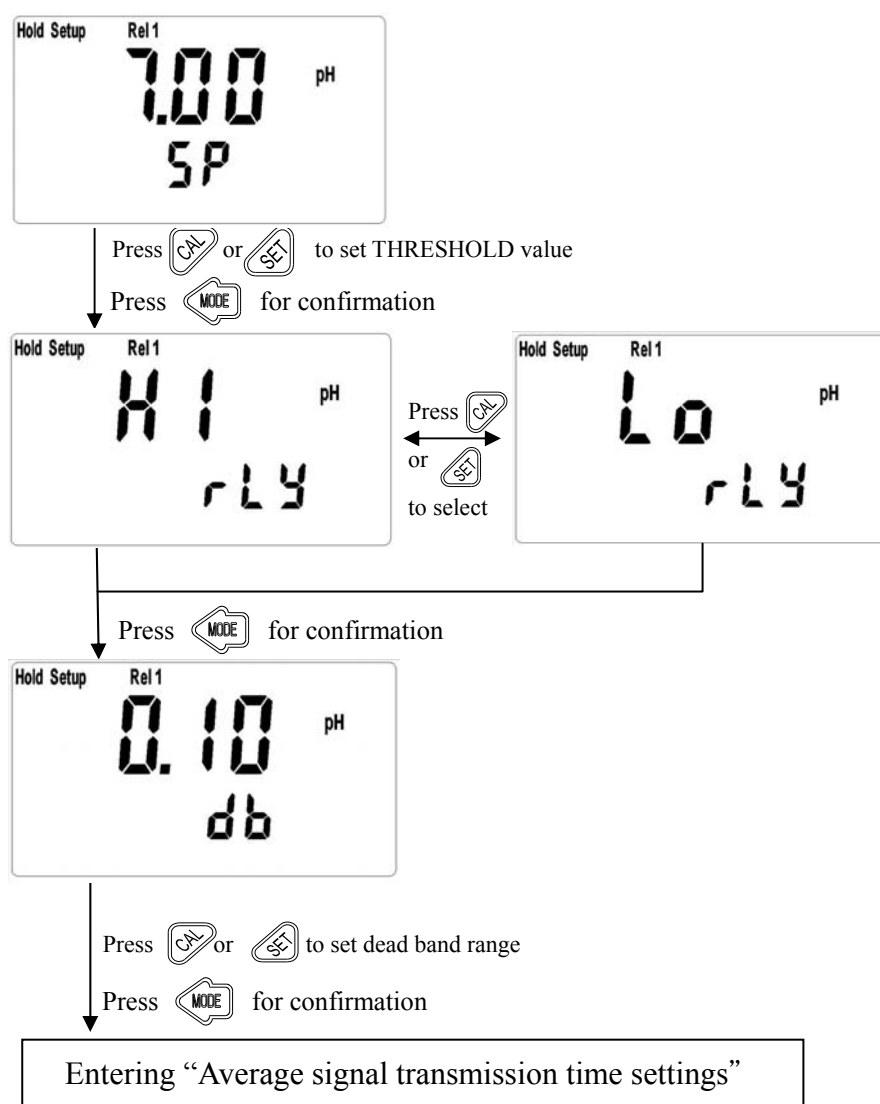
ORP : -1999~1999mV

Other : -2000~2000

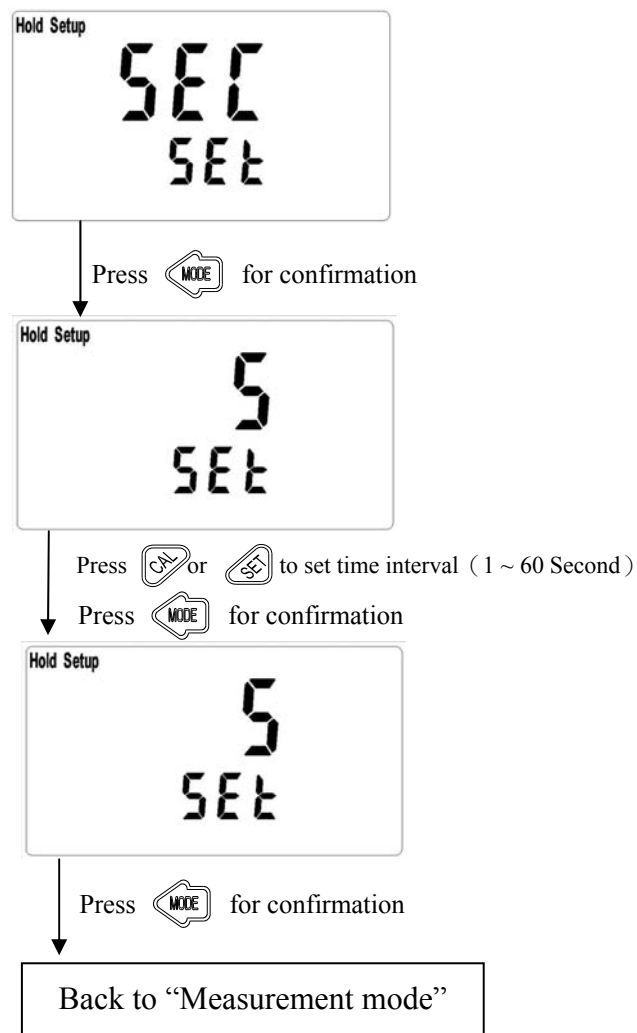
Deadband Range:

pH : 0.00~3.00 pH

ORP/Other : 0~300

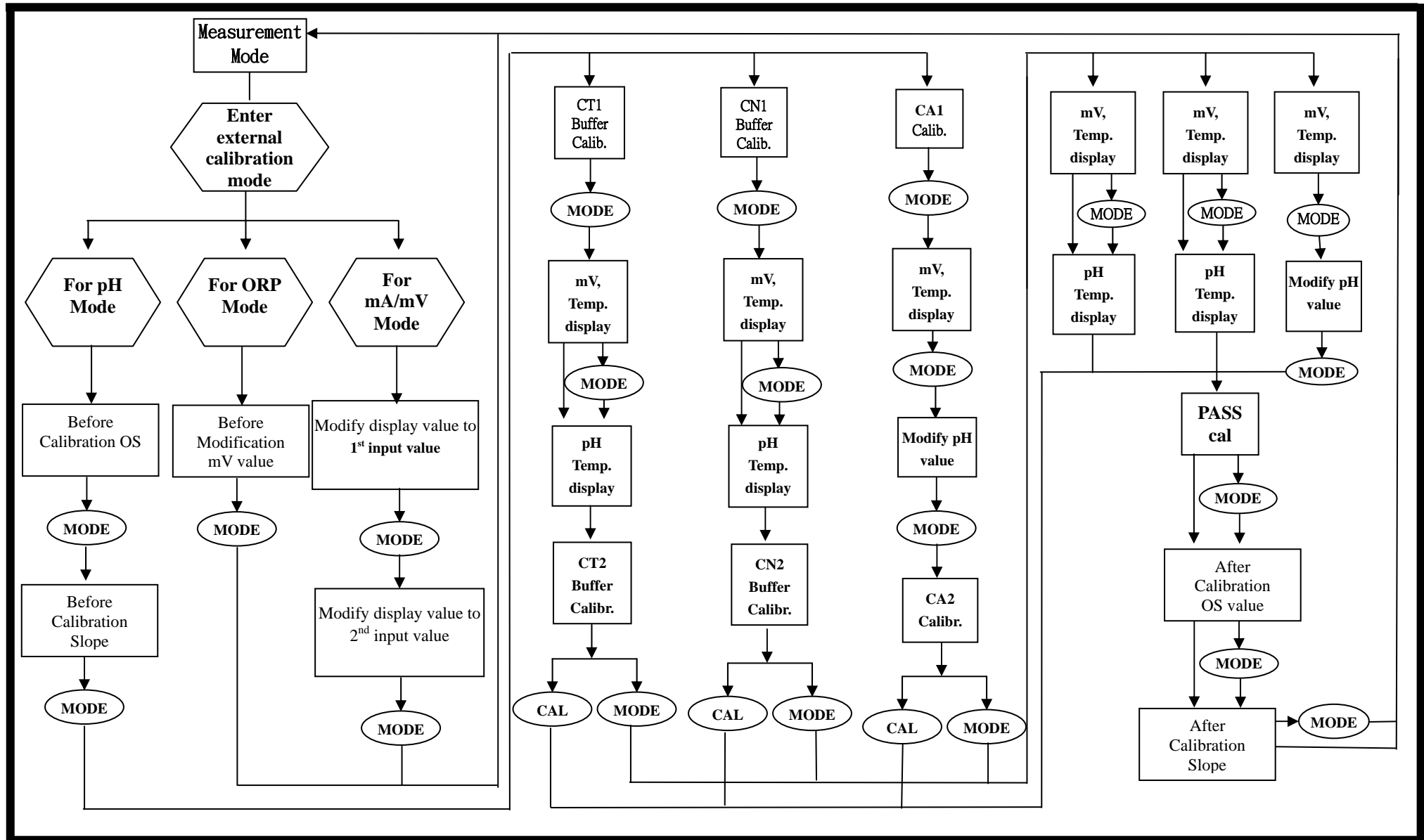


6.7 Average signal transmission time settings







7. Calibration

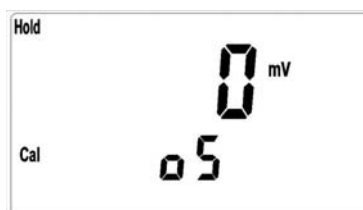
Block diagram of Calibration




7.1 Entry of calibration mode




1. Press  +  simultaneously allows entering calibration mode, and press  at any time allows you back to the measurement mode.

2. When entering the calibration for pH mode, the display shows the previous calibration OS (null-point potential) value. Press  allows you enter into the next page.



3. The display shows the previous calibration SLP (Slope) value. Press  allows you enter into the calibration menu.



4. Use  or  to select **CA1**, **Ct1** or **Cn1**, and press  for confirmation. The preset is Ct1 Buffer calibration.







Note:

1. Ct1: Refer to TECH. Buffer: pH2.00, pH4.01, pH7.00, pH10.00
2. Cn1: Refer to NIST. Buffer: pH4.01, pH6.86, pH9.18
3. CA1 : Refer to Asymmetry Buffer, for single point or dual-point calibration

7.2 Asymmetry Buffer calibration





7.2.1 Single point calibration (For pH)

In single-point calibration, it is only necessary to calibrate OS value(zero point). About the unmodified SLP value, the instrument will apply the factory defaults or the SLP value of last





1. When entering CA1 calibration mode, clean the electrode with distilled water before putting it in the buffer solution. Press  to start the calibration. Then display will show the mV value of the buffer and “Cal” begin to twinkle. After showing a similar number of pH value to the buffer solution, press  or  to set the digit until it is equal to the buffer’s standard. Then, press  to ensure it.



7.2.2 Dual point calibration

1. When entering CA1 calibration mode, clean the electrode with distilled water before putting it in the buffer solution. Press  to start the calibration. Then display will show the mV value of the buffer and "Cal" begin to twinkle. After showing a similar number of pH value to the buffer solution, press  or  to set the digit until it is equal to the buffer's standard. Then, press  to ensure it.





2. When entering CA2 calibration mode, clean the electrode with distilled water before putting it in the other buffer solution. Press  to start the calibration. Then display will show the mV value of the buffer and "Cal" begin to twinkle. After showing a similar number of pH value to the buffer solution, press  or  to set the digit until it is equal to the buffer's standard. Then, press  to ensure it.



3. When being calibrated successfully, it will show "CAL PASS". If the calibration is unsuccessful, it will show "CAL Err". (See chapter 8 for Error messages and solutions).




4. The display will automatically show the OS (zero-point) value. Press  to see SLP (slope) value. Press  again to back to measurement mode.



7.3 Standard Buffer calibration (**TECH.**)


7.3.1 Dual point calibration

1. Enter Ct1 calibration mode. Clean the electrode completely. Put it into the first buffer solution.

Then, press  to start the first-point calibration.




2. The display will show mV value after being calibrated. The instrument has auto judge function.

After first step calibration, the display shows the first pH value of calibration. Then, it will enter the second calibration (Ct2).

3. Clean the electrode completely, and put it into the second buffer solution. Then, press  to start the second-point calibration.

4. The display will show mV value while being calibrated. After the value becomes stable, the display will show the second pH value of calibration. Then, it will enter the calibration mode.◦



5. When being calibrated successfully, it will show “CAL PASS”. If the calibration is unsuccessful, it will show “CAL Err”. (See chapter 8 for Error messages and solutions).




6. The display will automatically show the OS (zero-point mV) value. Press  to see SLP (slope) value. Press  again to repeat the calibration steps as shown in 7.4.1, or press  to back to the measurement mode.

Note: The dual calibration steps of NTST Buffer is the same procedure as the calibration of TECH Buffer except the buffer's standard value.






7.4 ORP adjustment

It is unnecessary to make regular calibration for ORP electrode as pH electrode, and it is only necessary to use ORP Buffer to check the electrode or adjust the deviation of electrical potential. Press  +  simultaneously for the adjustment.

Clean the electrode completely, and put it into the buffer solution. Check the difference between the readout and buffer solution. Press  or  to set the digit until it is equal to the buffer's standard. Then, press  to ensure it and back to the measurement mode.







7.5 mV measurement mode field calibration

1. When in the **mV** measurement mode, press  +  simultaneously to enter calibration mode. Press  at any time allows you back to the measurement mode.







2. Between the input range, input 1st standard voltage.

Press , then the parameter twinkles. Press  or  to adjust the display value to the same as target value, and then press  to enter to next voltage setting.






3. Between the input range, input 2nd standard voltage.

Press , then the parameter twinkles. Press  or  to adjust the display value to the same as target value. Press  to back to the measurement mode.







7.6 mA measurement mode field calibration





1. When in the **mV** measurement mode, press  +  simultaneously to enter calibration mode. Press  at any time allows you back to the measurement mode.



2. Between the input range, input 1st standard current.




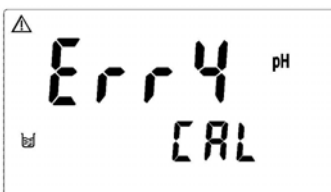

Press , then the parameter twinkles. Press  or  to adjust the display value to the same as target value, and then press  to enter to next current setting.

3. Between the input range, input 2nd standard current.

Press , then the parameter twinkles. Press  or  to adjust the display value to the same as target value. Press  to back to the measurement mode.



8. Error messages (Error code)

Messages	Reason	Dispositions
	OFFSET(zero-point) value \geq 60mv	Maintain the electrode or replace the electrode, and make another calibration.
	SLOPE value exceeds the limit	Maintain the electrode or change a new electrode, and make another calibration.
	The readout is unstable during calibration	Please check whether there is bubble or air in the glass end of the electrode; maintain the electrode or change a new electrode, and make another calibration.
	<ol style="list-style-type: none"> During calibration, the buffer solution temperature exceeds a range of 5~50℃ The buffer can not be identified. 	<p>■ Please adjust the buffer solution temperature to the appropriate temperature range and make another calibration.</p> <p>■ Please replace the buffer, or maintain or replace the electrode and make another calibration.</p>
	Serious error that does not permit any further measuring	Please call service engineer.

9. Maintenance

Generally speaking, under normal operation, the panel meter produced by our company need no maintenance expect regular cleaning and calibration of the electrode to ensure accurate and stable measurement and system operation.

The cleaning cycle for the electrode depends on the pollution degree of the measurement sample. Generally speaking, it is recommended to make weekly cleaning. The following chart gives introductions of different cleaning methods according to different type of contaminations to provide the operators with reference for cleaning and maintenance.

Type of Contaminations	Cleaning methods
Measuring solutions containing proteins. (Contamination of the junction)	The electrode should be soaked in Pepsin/HCl for several hours. METTLER-TOLEDO 9891 Electrode Cleaner is recommended.
Measuring solution containing sulfides. (The junction becomes black)	The junction should be soaked in Thiourea/HCl solution until being bleached. METTLER-TOLEDO 9892 Electrode Cleaner is recommended.
Contamination by grease or organic substance	Short rinsing of the electrode with acetone and ethanol.
Acid and alkaline soluble contaminations	Rinsing the electrode with 0.1mol/l NaOH or 0.1mol/l HCl for a few minutes.
Apply clean water to flash the electrode after above cleaning steps and immerse the electrode in 3M KCl solution for 15 minutes at least, and then calibrate the electrode.	
The electrode should only be rinsed and never rubbed or otherwise mechanically cleaned, since this would lead to electrostatic charges. This could cause an increase in the response time.	
In cleaning the platinum electrode, the platinum ring of the electrode can be rubbed gently with a wet soft piece of cloth.	

※ **The frequency of electrode cleaning depends on the type and degree of contamination. However it is recommended that the electrode be cleaned once a week.**