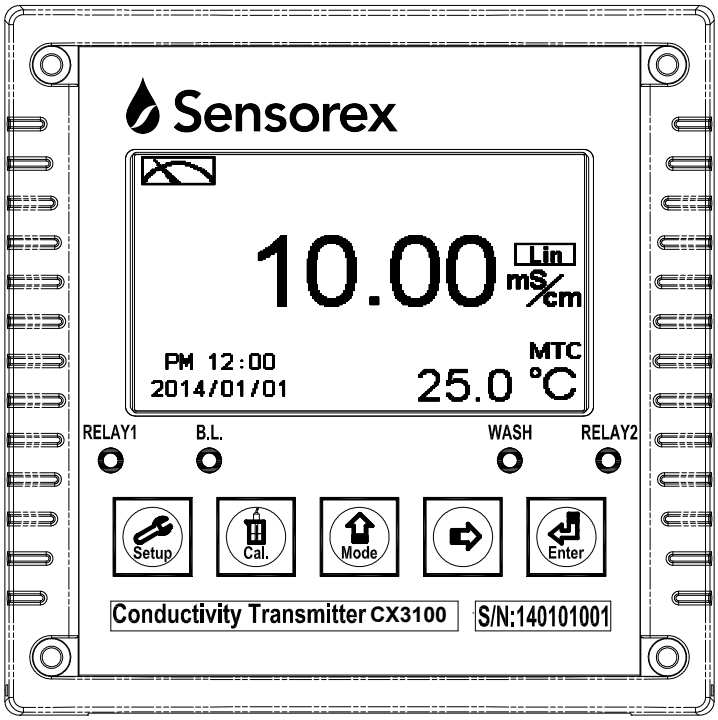
CX3100
Intelligent Conductivity Transmitter

Operation Manual



CONTENTS

Thank you for purchasing Sensorex products. In order to continuously improve and enhance the transmitter's function and capabilities, Sensorex reserves the right to modify the content and icon display of the product without notice. When using this transmitter, please follow all instructions on installation and operation as described within this manual. Sensorex Corporation is not liable for any direct or indirect loss or damages caused by improper usage of this product. If there are any omissions or mistakes, questions or concerns, regarding the product of this operation manual, please contact our staff. Thank you.

Precautions for Installation

Please read this operation manual thoroughly before installation to prevent incorrect wiring which may lead to instrument damage and/or safety issues.

- In order to avoid electrical hazards, all wiring must be correctly connected and inspected before connecting to power supply.
- Meter installation site should be properly ventilated and kept from direct sunlight and high temperature.
- The signal cable requires a special coaxial cable material. Cables provided by Suntex are strongly recommended. Please do not use normal electric wires.
- Prevent power surge interference to the transmitter. Especially when using a three-phase power system, make sure the device is properly grounded. If power surge interference occurs, separate the power supply of the transmitter from that of the controlled device (i.e. dosing machines, mixers, etc.), or install surge absorber to reduce power surges from all electromagnetic switches and power control device coils.
- To protect the instrument, the internal relays must be connected to **external power relays with sufficient ampere capacity** before connecting to external alarms or devices. (Please refer to chapter 3.6 "Electrical Connection Illustration")
- Suntex logo is shown on the top right corner of the display during all operations. For function illustration purposes, the logo is not shown in the figures presented in this operation manual.

Brief Instructions

Description of Setup Settings (See Chapter 6 for Details)

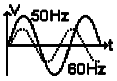
Press [Setup] and [Mode] simultaneously to see current setup settings overview. Then press [Enter] to enter setup menu. Press keypad according to the index bar at the bottom of the screen.

Index of Keypad

Keypad	Index Bar	Description
Setup	SET:Back	Return to previous level or action
Mode	▲:◢	Left or left page
	▲:+	Increase digit
⇨	▶:◢	Right or right page
	▶:−	Decrease digit
Enter	ENT:Enter	Confirm and proceed to next step

Setup Items

Function	Icon	Description
Mode		Measurement mode, select Conductivity (Cond.), Resistivity (Res.), Total Dissolved Solids (TDS) or Salinity
Product Adj.		Sample reading adjustment
Temperature		Temperature measurement and compensation settings, including MTC, PTC100Ω, PTC1KΩ, NTC. MTC---Manual Temperature Compensation, PTC100Ω/PTC1KΩ/NTC--- Auto Temperature Compensation
Compensation		Temperature compensation settings, select from linear (Lin.), non-linear (Non-Lin.) or no compensation (Off)
Relay 1		First relay settings, select action off or Hi/Lo alarm
Relay 2		Second relay settings, select action off or Hi/Lo alarm

Clean		Automatic wash time settings; adjust external sensor cleaning device ON and OFF duration
Analog 1		Current output corresponding to Res, Cond., TDS or Sal. settings range
Analog 2		Current output corresponding to temperature settings range
Clock		Time and date settings (An internal battery keeps the clock running when disconnected from power. Replace with 3V CR2025/2032 lithium battery.)
Digital Filter		Takes 1~60 serial measurements, average continuously, and display as the reading following stabilization
Backlight		Backlight settings, set Auto/ON/OFF backlight, brightness, and sensitivity
Contrast		Screen contrast settings
Frequency		Power frequency settings
Return		Setup mode return settings
Code		Setup mode security code. The setup passcode is precedential to calibration code. A different security code for calibration mode can be set.
Language		English, Traditional Chinese, and Simplified Chinese

Description of Calibration Settings (See Chapter 7 for Details)

Press [Cal.] and [Mode] simultaneously to see current calibration information overview. Press [Enter] to make a new calibration or to modify calibration settings. Press keypad according to the index bar at the bottom of the screen.

Index of Keypad:

Keypad	Index Bar	Description
Cal.	CAL:Back	Return to previous level or action
Mode	▲: ◢	Left or left page
	▲: +	Increase digit
⇨	▶: ◢	Right or right page
	▶: −	Decrease digit
Enter	ENT: Enter	Confirm and proceed to next step

Calibration Items

Function	Icon	Description
Cell Constant		Adjust the instrument's cell constant to match the cell constant provided with the installed sensor.
Std. Solution		Calibration with standard solution
Return		Calibration mode return settings
Code		Calibration mode security code

Note

Due to the need for continuous improvement of the transmitter, we reserve the right to modify the icons and content. The icons and contents of the instrument are subject to change without notice.

1. Specifications

Model		**CX3100**
Measuring Modes		Resistivity/Conductivity/TDS/Salinity/Temp.
Range	Resistivity	0.00 MΩ·cm~20.00 MΩ·cm
	Conductivity	0.000 μS/cm ~ 2000 mS/cm (depending on connected sensor)
	Salinity	0.0~70.0 ppt (according to IOT)
	TDS	0~19999 ppm; 0.00~199.99 ppt
	Temp.	PT-1000/PT-100: -30.0~200.0°C, NTC30K: -30.0~130.0°C
Resolution	Resistivity	0.01 MΩ·cm
	Conductivity	0.001 / 0.01 / 0.1 / 1 μS/cm, 0.01 / 0.1 / 1 mS/cm
	Temp.	0.1°C
Accuracy	Resistivity	±1% (± 1 Digit)
	Conductivity	±1% (± 1 Digit)
	Temp.	±0.2°C (± 1 Digit), (excluding two-wiring PT100) Equipped with temperature error correction function
Temperature Compensation		Automatic with NTC 30KΩ / PT-1000 / PT-100
		Manual adjustment
Calibration Mode		(1) Manual cell-constant adjustment (2) Conductivity standard solution calibration
Ambient Temp.		0~50°C
Storage Temp.		-20~70°C
Cell Constant		0.01, 0.05, 0.1, 0.5, 10.00 cm^{-1} fixed, 0.0080~19.99 cm^{-1} adjustable
Temperature Compensation Coefficient		Linear temp. compensation at 0.00~40.00%, Non-Linear temp. compensation, No compensation
Display Modes		Large LCM with sensor for backlight and contrast
		Text mode: Numerical display
Language		English, Traditional Chinese, and Simplified Chinese
Analog Output 1		Isolated DC 0/4~20mA corresponding to measurement, max. load 500Ω
Analog Output 2		Isolated DC 0/4~20mA corresponding to temp., max. load 500Ω
Settings	Contact	240VAC, 0.5A max. (recommended)
	Activate	Hi/Lo. Hi/Hi. Lo/Lo selectable two limited programmable, ON/OFF
Wash	Contact	240VAC, 0.5A max. (recommended)
	Time	ON 0~99 min 59 sec / OFF 0~999 hr 59 min
Power Supply		100V~240V AC ±10%, 7W max., 50/60Hz
Installation		Wall or Pipe or Panel Mounting
Dimensions		144 mm × 144 mm × 115 mm (H×W×D)
Cut off Dimensions		138 mm × 138 mm (H×W)
Weight		0.8 kg
Protection		IP 65 (NEMA 4X)

Note: The specifications and appearance of the instrument are subject to change without notice.

2. Assembly and Installation

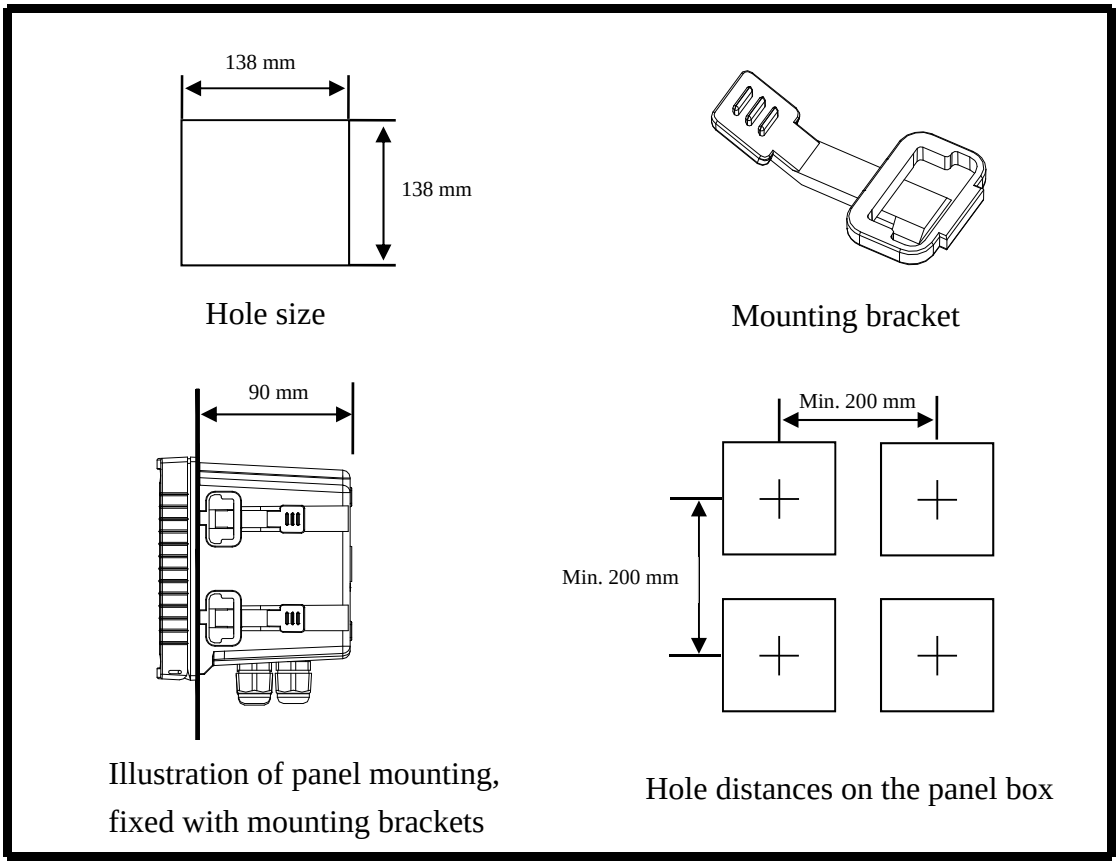
2.1 Transmitter Installation:

The transmitter can be installed by panel mounting, wall mounting or 2” pipe mounting.

Panel Mounting:

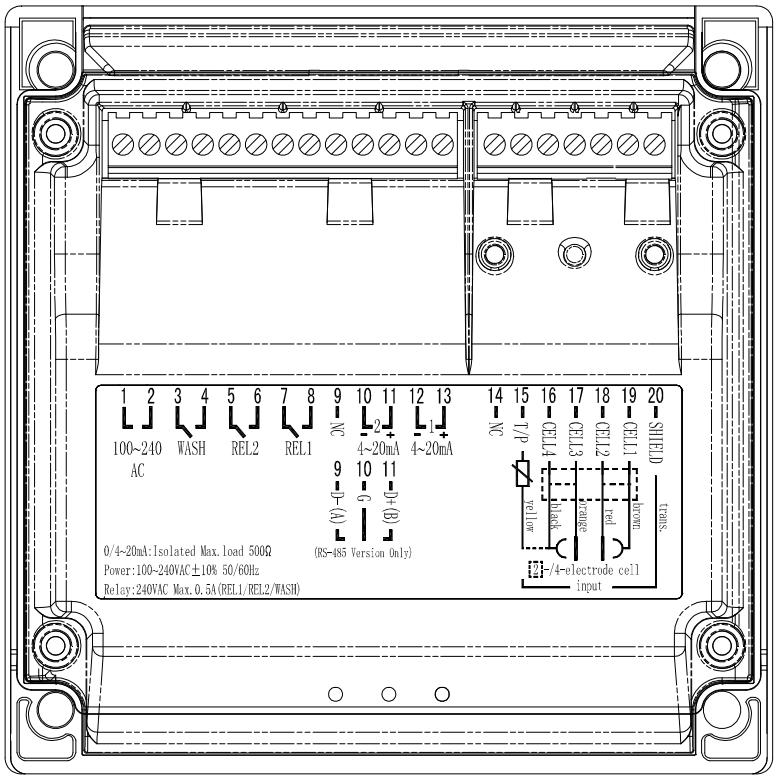
Prepare a square hole of 138 mm x 138 mm on the panel box, then insert the controller directly into the hole. Insert the accessorial mounting bracket from the rear, and fix into the pickup groove.

2.2 Panel Mounting Illustration

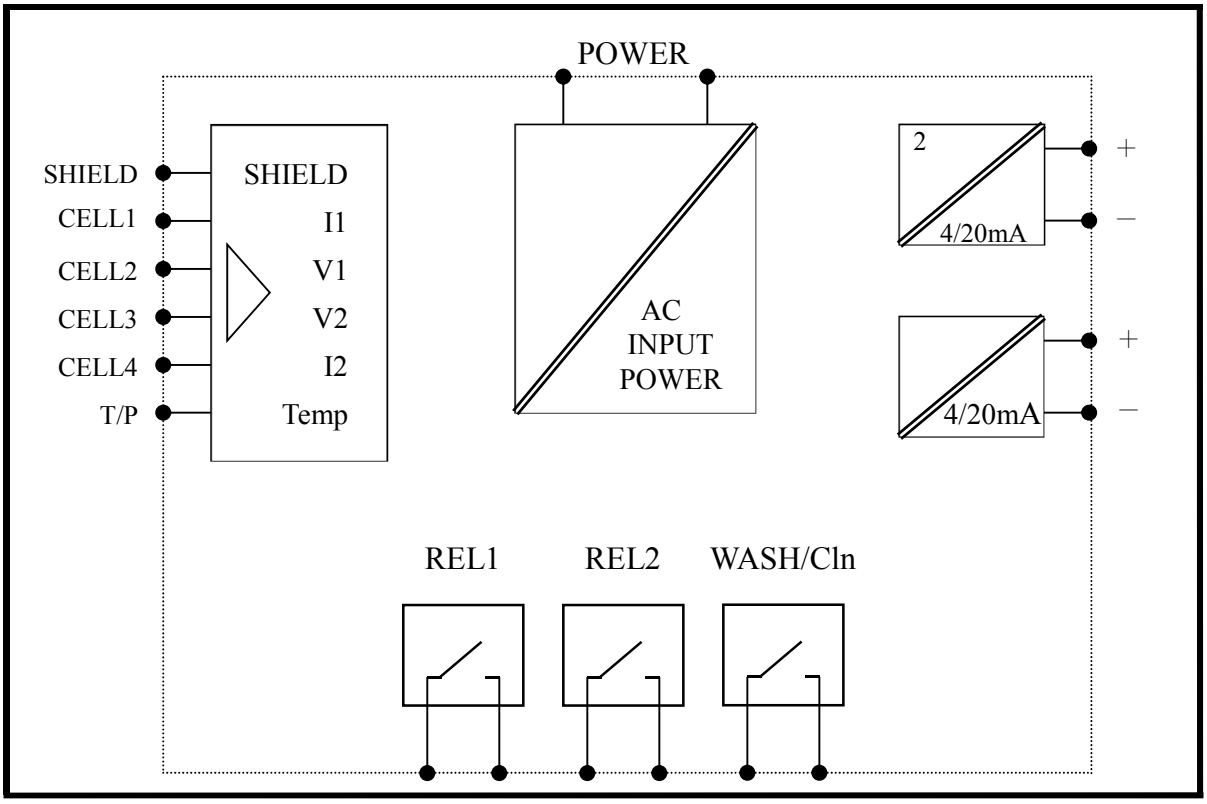


3. Overview of Conductivity Transmitter CX3100

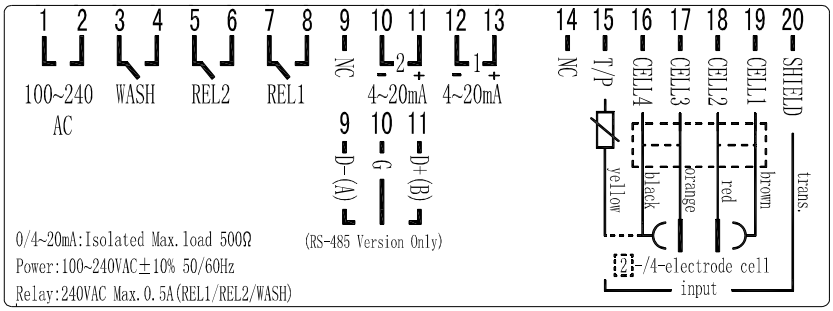
3.1 Rear Panel Illustration



3.2 Terminal Function Illustration



3.3 Terminal Function Description



1 2 — **100~240 AC:** Power supply terminal

3 4 — **WASH:** Wash relay contact for an external relay

5 6 — **REL2:** Second alarm control, the contact for an external relay

7 8 — **REL1:** First alarm control, the contact for an external relay

9 — **NC / D-(A):** No contact

10 — **4~20mA -terminal / G:** Temperature current output terminal -, for an external recorder or PLC control

11 — **4~20mA +terminal / D+(B):** Temperature current output terminal +, for an external recorder or PLC control

12 — **4~20mA –terminal:** Master measure current output terminal -, for an external recorder or PLC control

13 — **4~20mA +terminal:** Master measure current output terminal +, for an external recorder or PLC control

14 — **NC:** No contact

15 — **T/P:** The temperature probe cell wire

16 — **CELL4: Short to Cell3(17)**

17 — **CELL3:** The red cell wire

18 — **CELL2:** The black cell wire

19 — **CELL1: Short to Cell2(17)**

20 — **SHIELD:** The transparent cell wire

3.5 Cable Circuit Reference

	Sensorex Conductivity Cell	Others
Terminal	2-Electrode Cell: CS150TC, CS200TC, CS675TC, CS676TC	Please refer to the cell instructions
SHIELD	Transparent wire	SHIELD
CELL 1	Short to cell 2	Current electrode 1
CELL 2	Black wire	Voltage electrode 1
CELL 3	Red wire	Voltage electrode 2
CELL 4	Short to cell 3, White wire	Current electrode 2
T/P	Green wire	T/P (the other end with CELL 4)

Note: If another brand's 2-electrode cell is used, connect using 8-11-3 circuit reference.

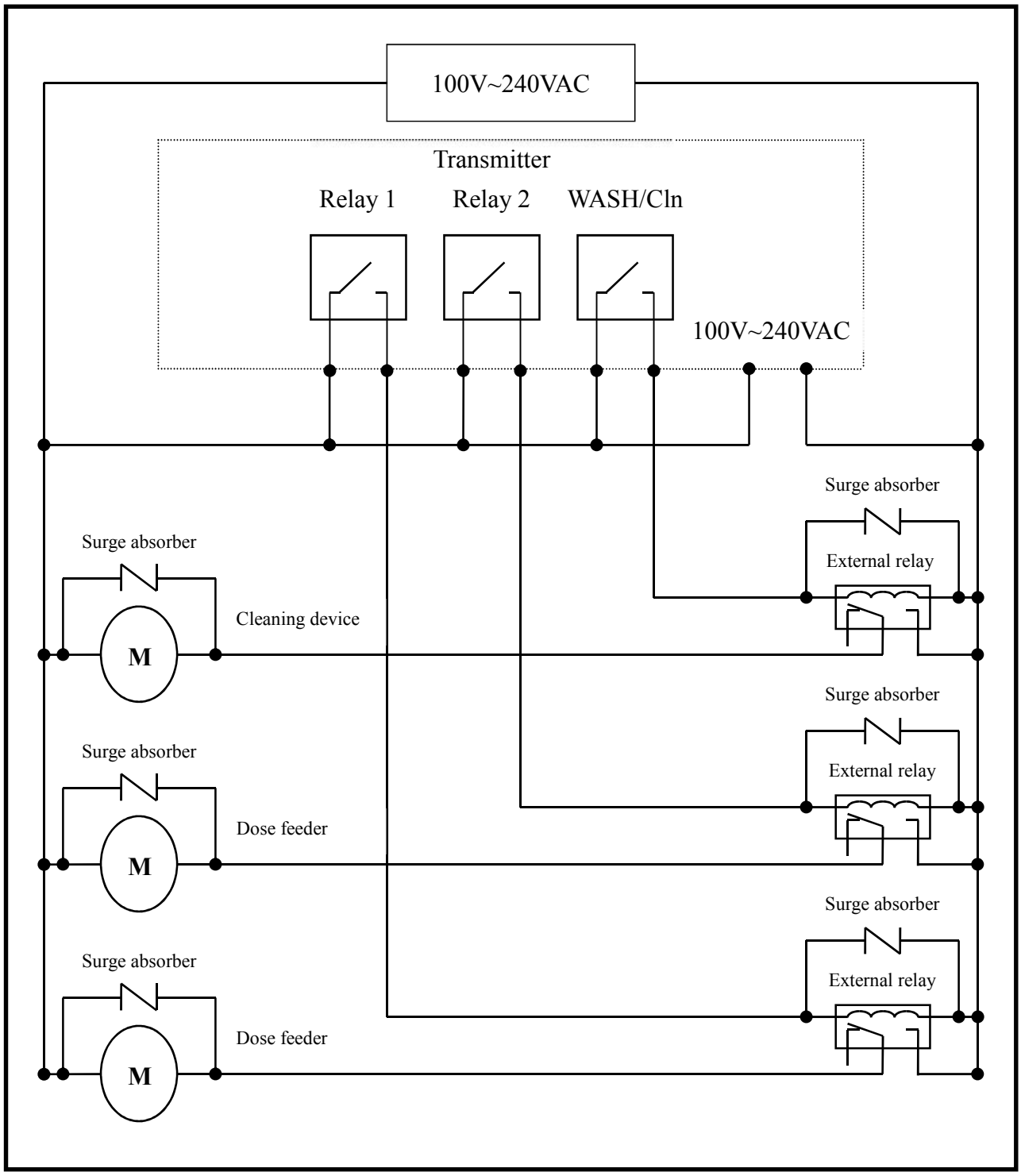
	Sensorex Conductivity Cell	Others
Terminal	2-Electrode Cell: CS665TC	Please refer to the cell instructions
SHIELD	Transparent wire	SHIELD
CELL 1	Short to cell 2	Current electrode 1
CELL 2	Black wire	Voltage electrode 1
CELL 3	White wire	Voltage electrode 2
CELL 4	Short to cell 3, Red wire	Current electrode 2
T/P	Green wire	T/P (the other end with CELL 4)

Note: If another brand's 2-electrode cell is used, connect using 8-11-3 circuit reference.

	Sensorex Conductivity Cell	Others
Terminal	CS300 + S855 cable	Please refer to the cell instructions
SHIELD	N/A	N/A
CELL 1	Short to cell 2	Current electrode 1
CELL 2	Coaxial Center	Voltage electrode 1
CELL 3	Coaxial Braid	Voltage electrode 2
CELL 4	Short to cell 3, Red wire	Current electrode 2
T/P	black wire	T/P (the other end with CELL 4)

Note: If another brand's 2-electrode cell is used, connect using 8-11-3 circuit reference.

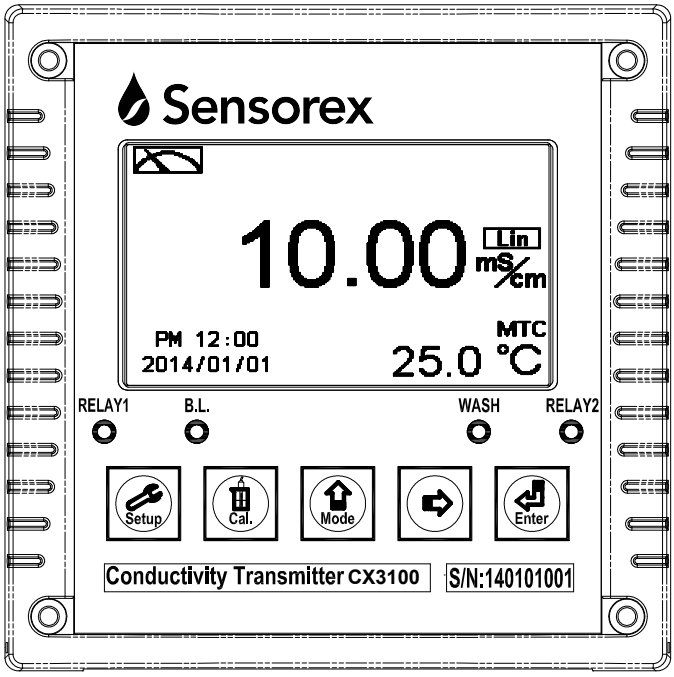
3.6 Electrical Connection Illustration



Note: The transmitter's built-in miniature relays are required to be repaired and replaced by trained technicians. External relays (power relay) must be connected to activate external devices to protect the instrument.

4. Configuration

4.1 Front Panel Illustration



4.2 Keypad

In order to prevent unauthorized operations, the transmitter utilizes multi-key and passcode functions to enter parameter and calibration setting modes. Descriptions of the key functions are as follows:

Setup **:** When in parameter setup mode, press this key to exit and return to measurement mode.

Cal. **:** When in calibration mode, press this key to exit and return to measurement mode.

Mode **:** 1. When in parameter setup mode and calibration mode, press this key to move left or return to the previous page.
2. When adjusting values, press this key to increase the value.

: 1. In parameter setup mode and calibration mode, press this key to move right or proceed to the next page.
2. When adjusting values, press this key to decrease the value.

Enter **:** Confirmation key; press this key to confirm value or selection.

4.3 LED Indicators:

WASH : Washing device operation indicator

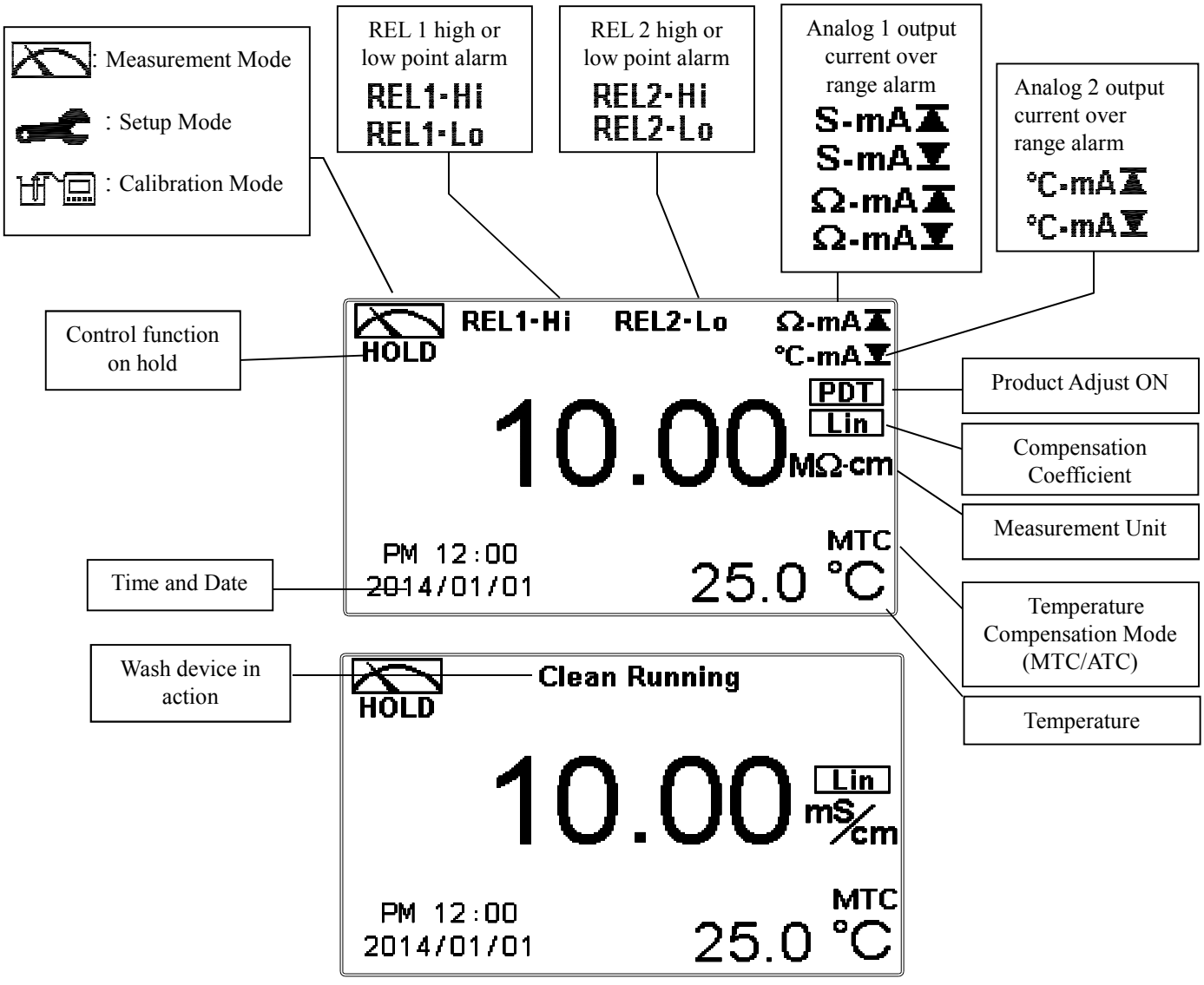
RELAY1 : Dosage control operation indicator (Relay 1)

RELAY2 : Dosage control operation indicator (Relay 2)

B.L. : Light sensor, under automatic display backlight mode, the indicator will light up when the surrounding brightness changes.

4.4 Display:

1. When clean function is activated, the display will show “HOLD” and flash “Clean Running”. At the same time, the WASH indicator LED will light up, and the transmitter will automatically turn off Relay 1 and Relay 2 function. After cleaning is completed, both Relay 1 and Relay 2 will automatically return.
2. When Relay 1/Relay 2 Hi settings are activated, the display will flash “REL1-HI/ REL2-HI”, and the RELAY1/RELAY2 indicator LED will light up. When Relay 1/Relay 2 Lo settings are activated, the display will flash “REL 1-Lo/ REL 2-Lo”, and the RELAY1/RELAY2 indicator LED will light up.
3. When the Analog 1 current output exceeds the upper/lower limit, the display will flash “S-mA ▲ /S-mA ▼ ” or “ Ω-mA ▲ /Ω-mA ▼ ”.



Note: The “HOLD” warning text appears when clean function is activated, when entering setup menu, or when entering calibration menu. Under HOLD status, the corresponding display and output are as follows:

1. Both Relay 1 and Relay 2 will cease from action. When entering settings menu or calibration menu under cleaning status, the instrument will automatically halt the cleaning action.
2. The current output which corresponds to measurement value remains at the last output value before HOLD status.
3. The last signal output value of RS-485 interface is kept at the last output value before HOLD status.

5. Operation

5.1 Measurement Mode:

After all electrical connections are secured and tested, connect the instrument to the power supply and turn it on. The transmitter will automatically enter measurement mode with the factory default settings or the previous user settings.

5.2 Setup Menu:

Please refer to the setup instructions in Chapter 7. Press [Setup] and [Mode] simultaneously to enter setup menu, and press [Setup] to return to measurement mode.

5.3 Calibration Menu:

Please refer to the calibration instructions in Chapter 8. Press [Cal.] and [Mode] simultaneously to enter calibration menu, and press [Cal.] return to measurement mode.

5.4 Shortcuts:

1. When in measurement mode, if MTC is selected for temperature compensation mode, press [Mode] and [⇨] to adjust the MTC temperature value.

5.5 Default Values:

5.5.1 Settings Default Values:

Measurement Mode: Conductivity, Auto-Range
Temperature Compensation: NTC
Temperature Coefficient: Linear, 2.00%
Relay 1: High point alarm: AUTO, SP1 = 100.0 mS, Hys. = 10.0 mS
Relay 2: Low point alarm: AUTO, SP2 = 10.0 mS, Hys. = 1.00 mS
Wash Time: OFF
Analog 1 Current Output (Cond./Res.): 4~20 mA, 0.00~199.9 mS
Analog 2 Current Output (Temp.): 4~20 mA, 0~100.0ºC
Date and Time: 2014/1/1 00:00:00
Digital Filter: 0
Backlight Settings: OFF
Contrast: 0
Logbook: None
Auto Return: Auto, 3 minutes
Setup Code: OFF

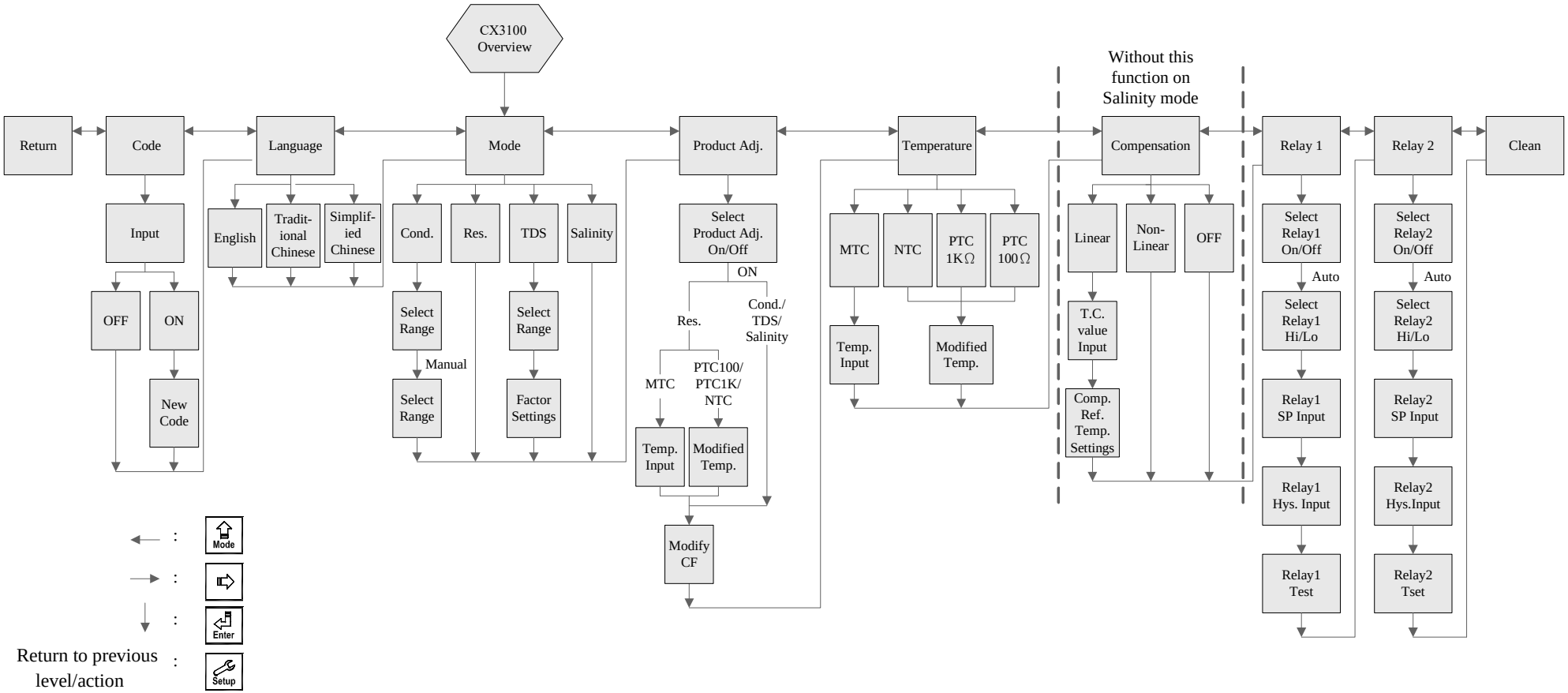
5.5.2 Calibration Default Values:

Cal Type: No Cal
Cal Temp: None
Cell Constant: 0.5000
Auto Return: Auto, 3 minutes
Calibration Code: OFF

Note: The factory default calibrations setting is “No Cal”, and the cell constant setting is “0.5000”. This means that the user has not calibrated the sensor with the transmitter yet. When selecting standard solution for calibration, the display will show the cell constant of the sensor and the value of the standard solution.

6. Settings

Settings Block Diagram – Part 1



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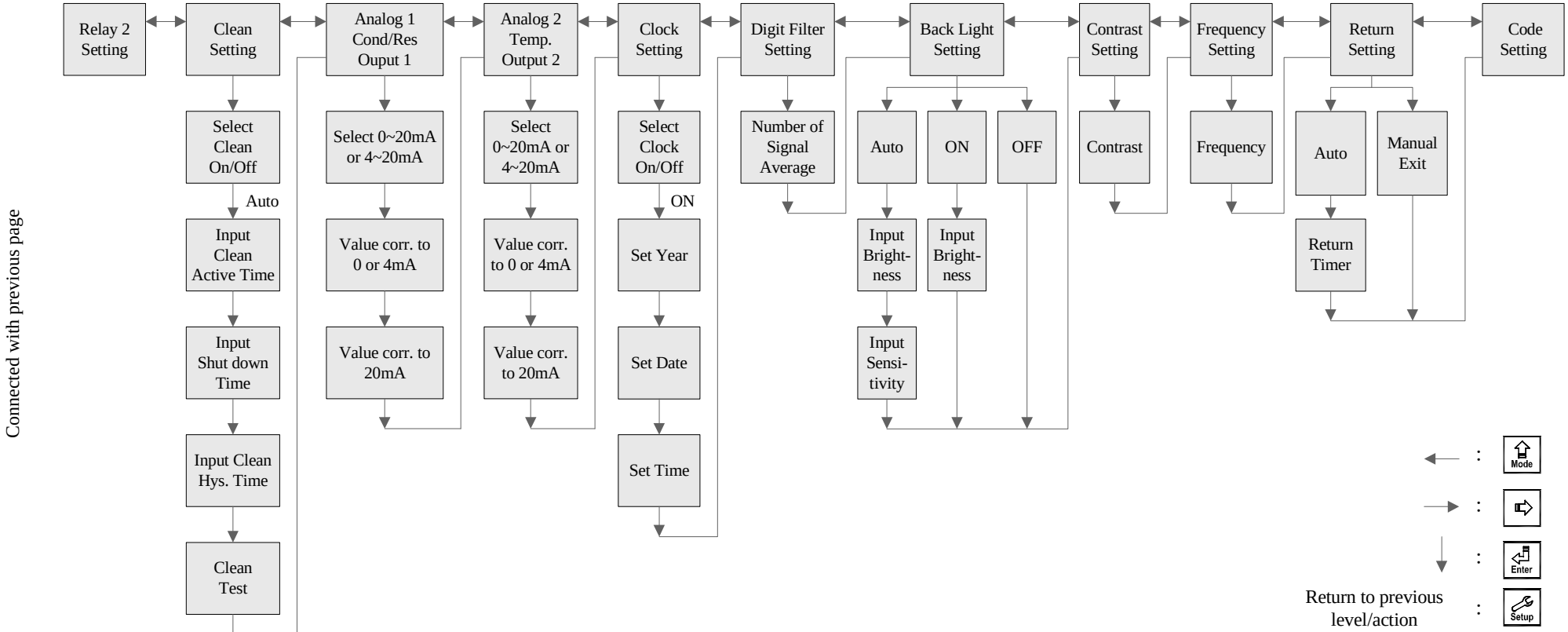
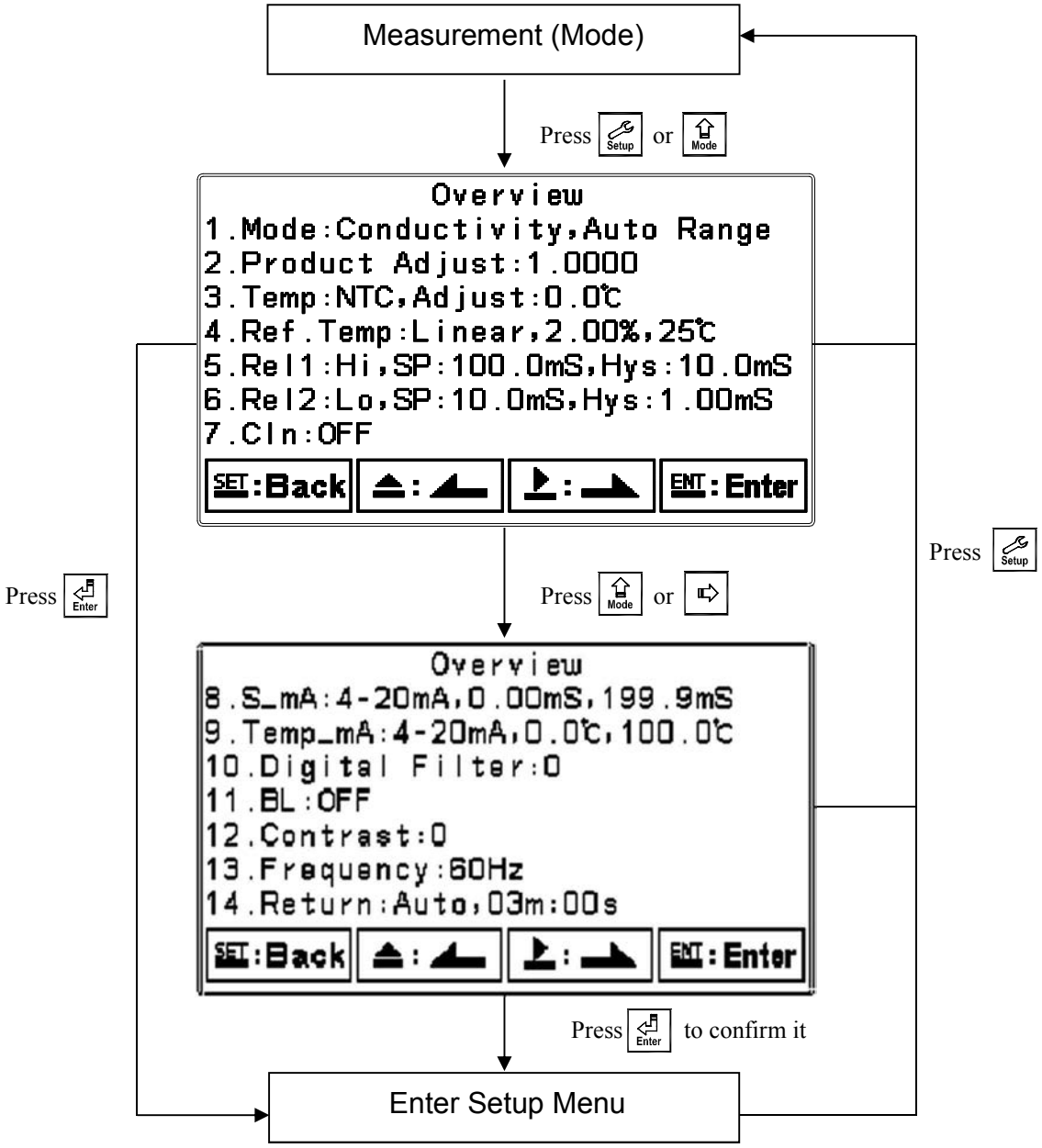
Settings Block Diagram – Part 2



6.1 Setup Menu

In measurement mode, press [Setup] and [Mode] simultaneously to display current settings overview. Press [Enter] to enter setup menu and modify the settings.

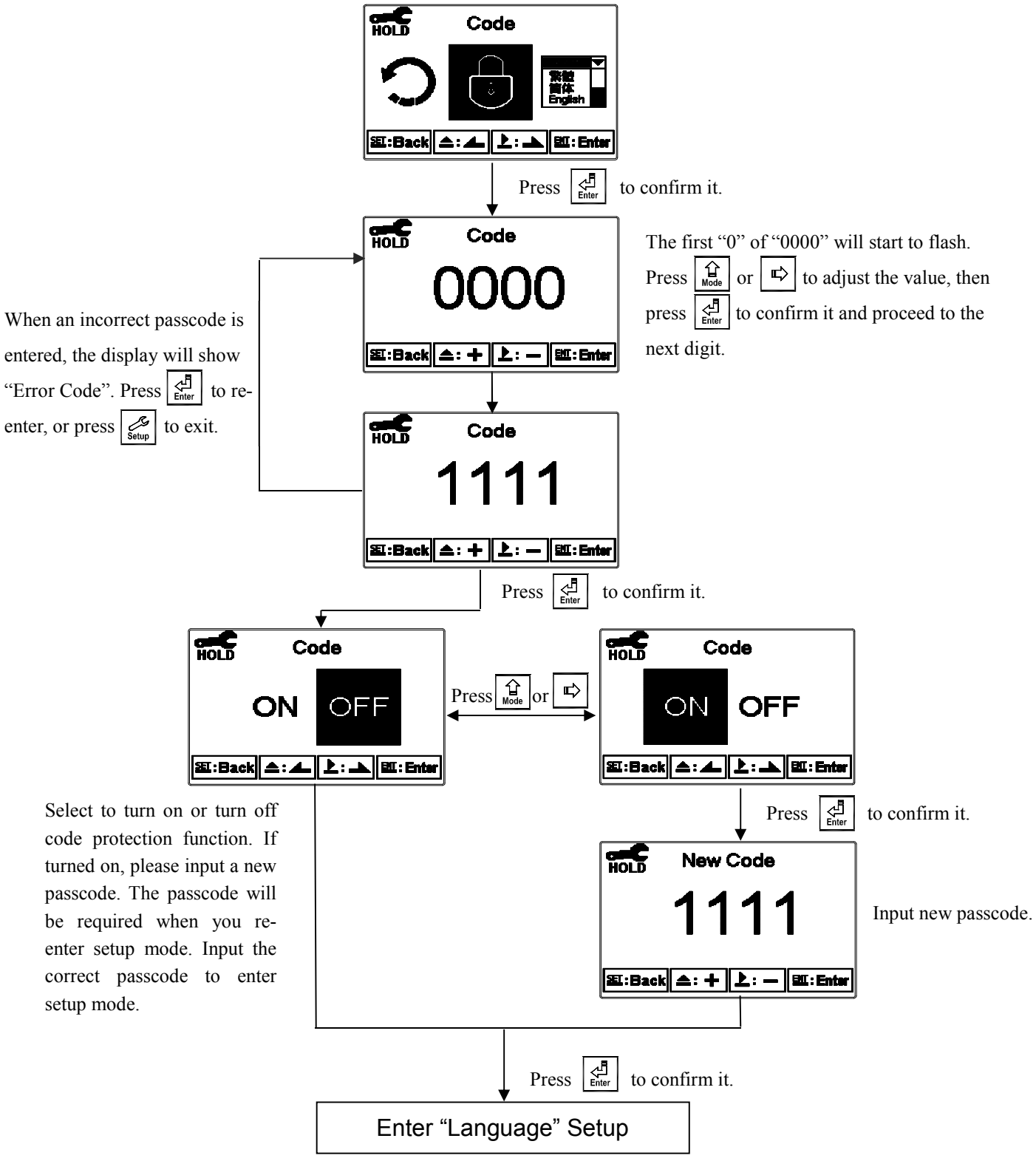


6.2 Settings Security Code (Code)

In setup menu, select “Code” and press [Enter] to enter passcode setting procedure.

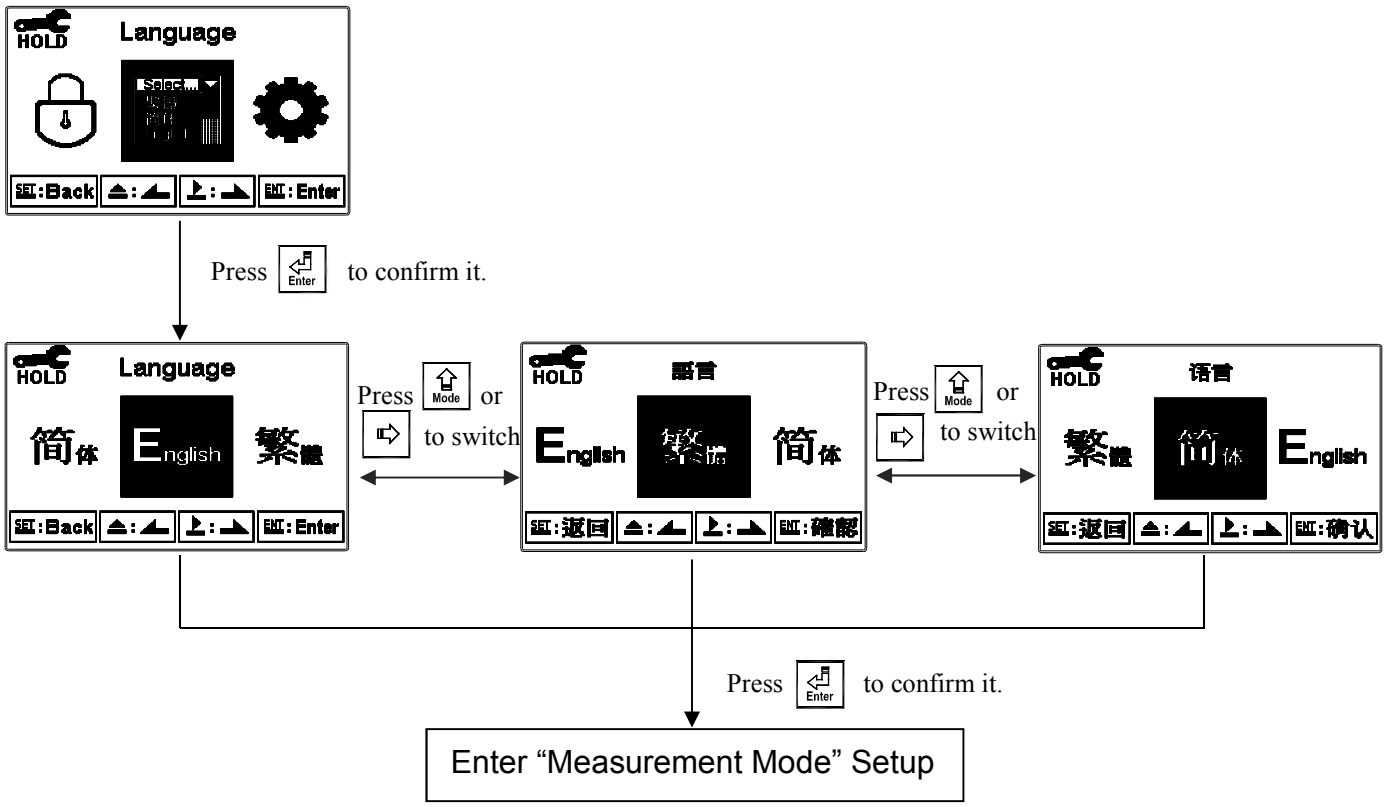
The preset settings security code is 1111.

Note: The passcode for settings mode is at a higher security level than the passcode for calibration. Thus, the passcode for settings mode can also be used to unlock calibration mode.



6.3 Language

In setup menu, select “Language” and press Enter to enter language selection menu. Select the system language from English, Traditional Chinese or Simplified Chinese.

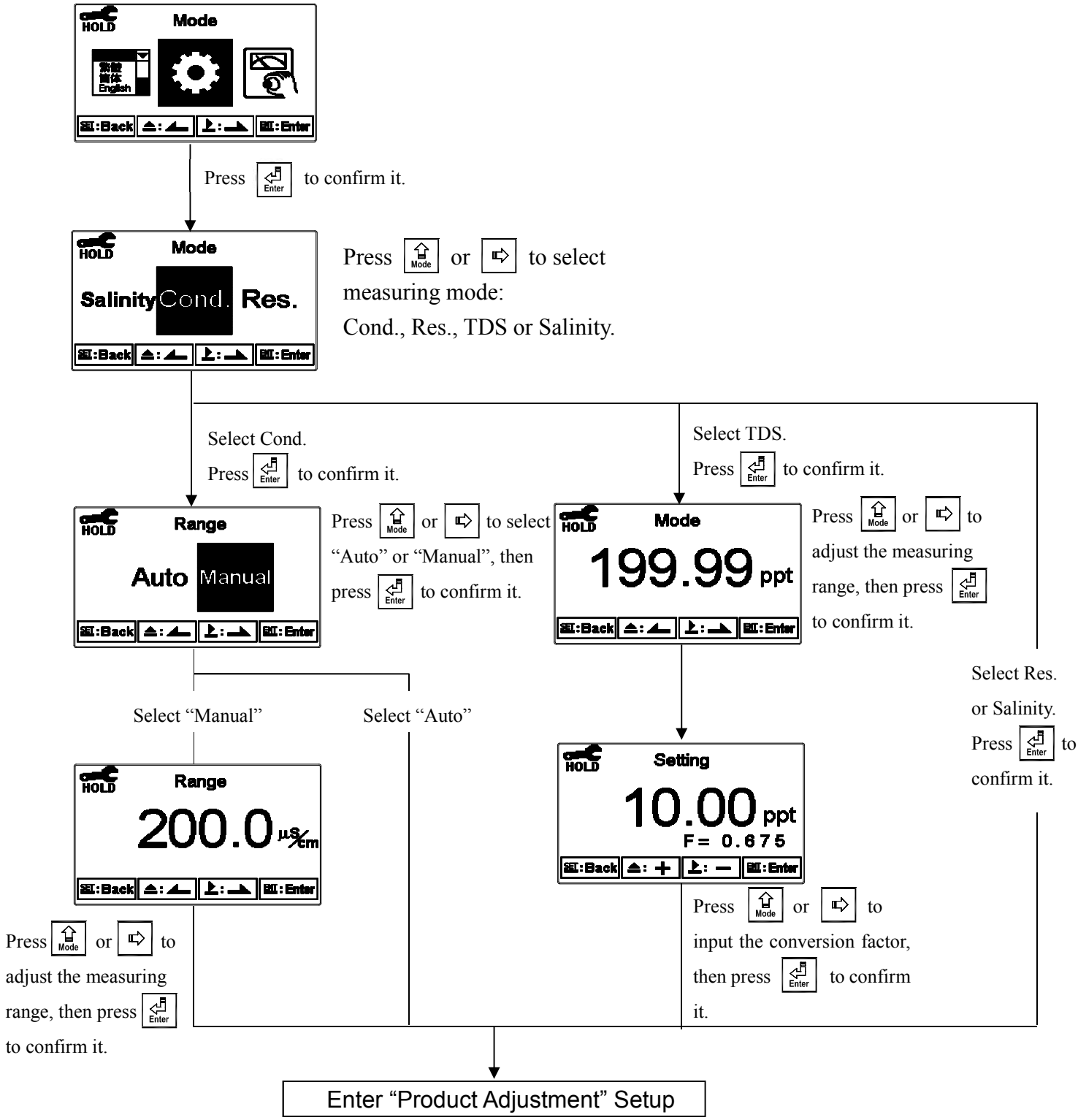


6.4 Mode

Select “Mode”, then select “Conductivity (Cond.)”, “Resistivity (Res.)”, “Salinity” or “TDS” measurement.

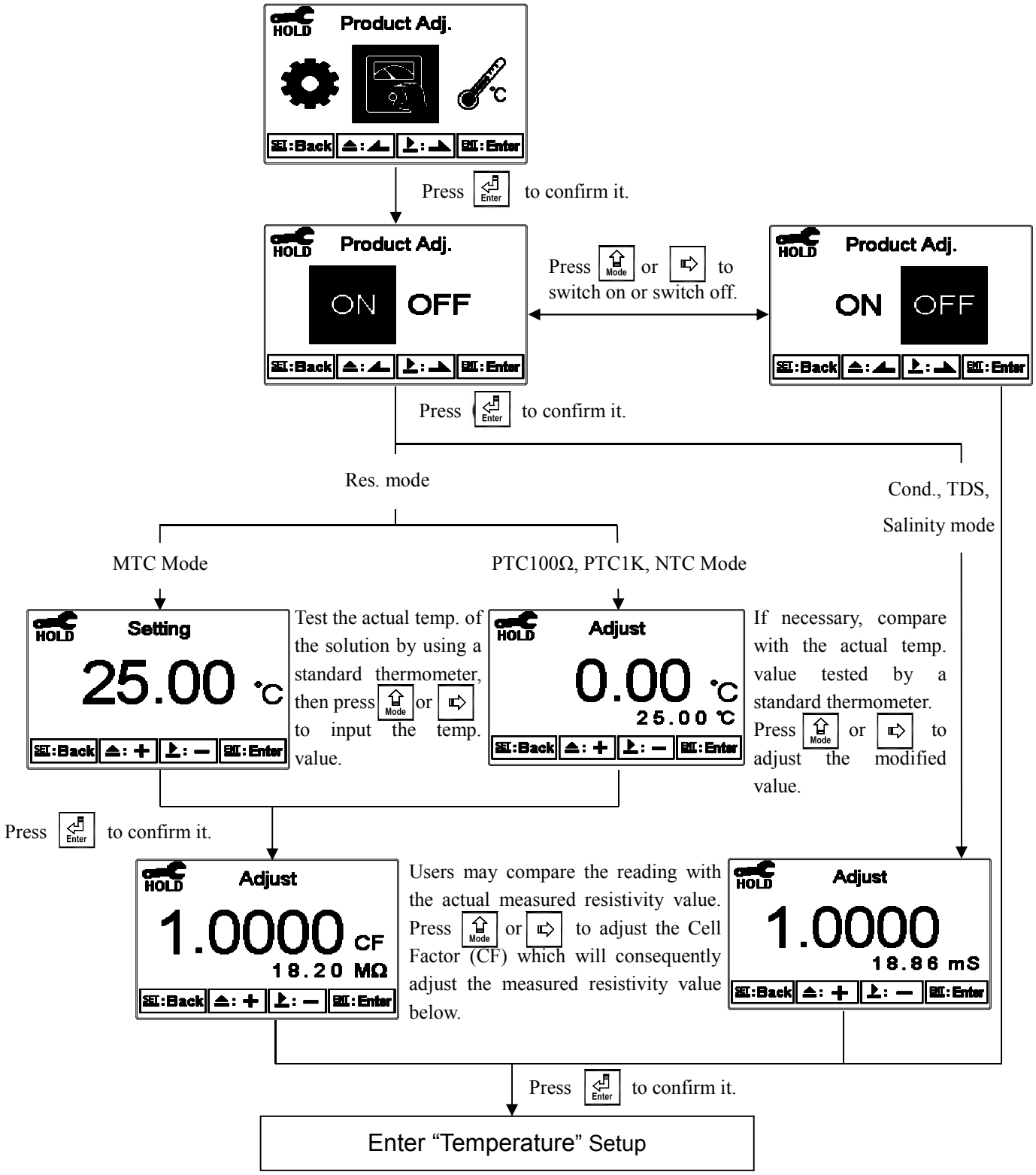
Conductivity: Set the measuring range to Auto or Manual for 2.000μS, 20.00μS, 200.0μS, 2000μS, 20.00mS, 200.0mS or 2000mS.

Total Dissolved Solids: Set the measuring range to 0~19999 ppm or 0~199.99 ppt, then set the conductivity conversion factor.



6.5 Product Adjustment

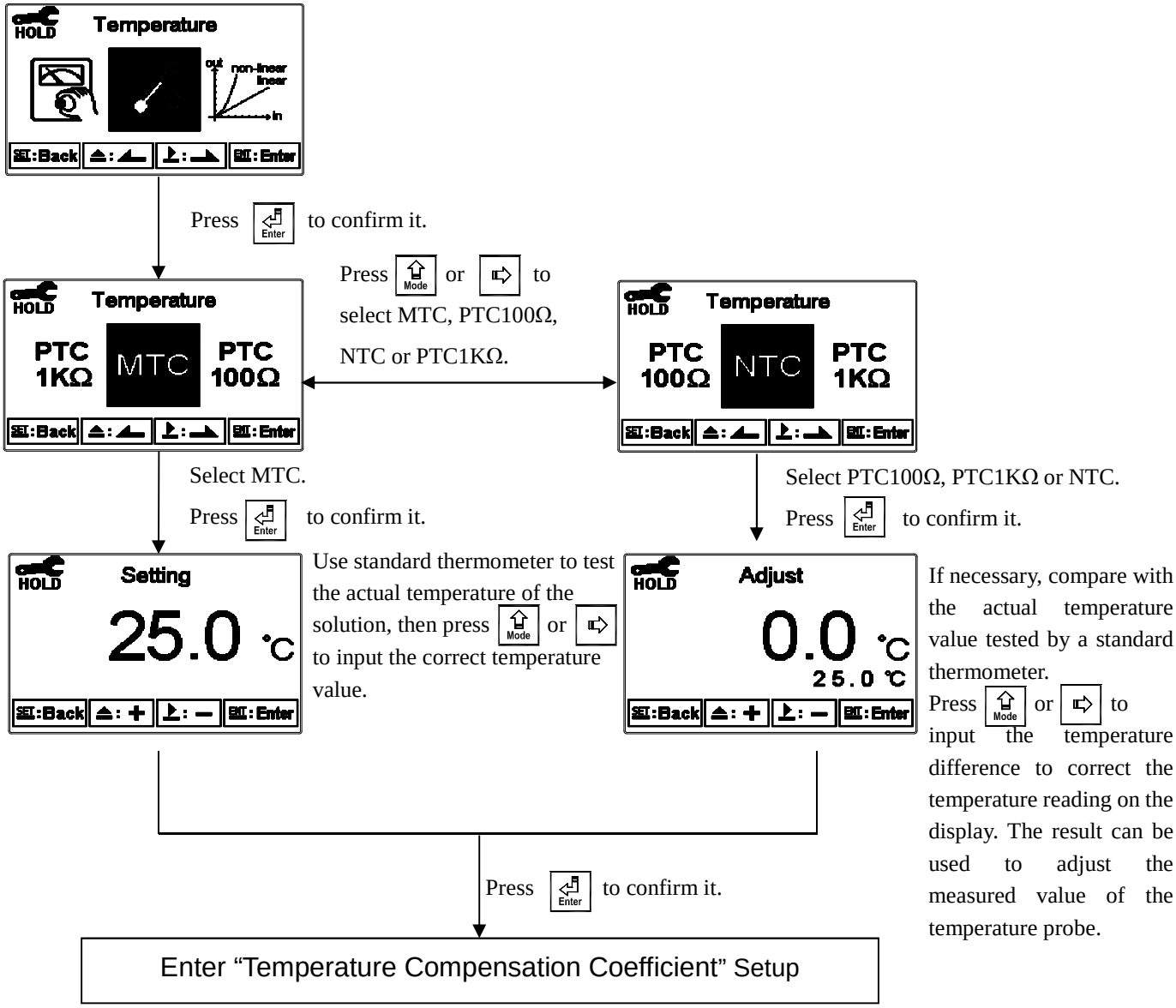
In setup menu, select "Product Adj." and press Enter to make set adjustments to the measurement. For ultra-pure water applications, this function can enhance the resolution of the measured values. By adjusting the cell factor of the cell constant or increasing the temperature display to two decimal points, the resolution of the measuring value can be increased up to 0.01 MΩ (for Resistivity).



6.6 Temperature

In setup menu, select “Temperature” and press [Enter] to select temperature compensation mode. Select from NTC (NT30K), PTC1KΩ (PT-1000) and PTC100Ω (PT-100) for auto temperature compensation or select MTC for manual adjustment.

Note: The temperature system designed is based on the two-wiring scheme and thus may have a difference between actual temperature and measured temperature due to different size or thickness of the temperature wire used for PTC1KΩ or PTC100Ω mode. However, this temperature error can be fixed with the following adjustment function.



6.7 Temperature Compensation Coefficient

The instrument's reference temperature for temperature compensation is preset at 25˚C, and the temperature compensation coefficient is preset at 2.00%. In setup mode, select "Compensation" and press Enter. Select temperature coefficient from linear (Lin.), non-linear (Non-Lin.), or non-compensated (OFF) according to your measurement. Linear compensation is normally applied to conductivity measurement (Cond.), and non-linear compensation is normally applied to resistivity measurement.

Temperature Compensation Coefficient (hereinafter referred to as TC): The conductivity of the solution increases as temperature rises. The relationship is as follows:

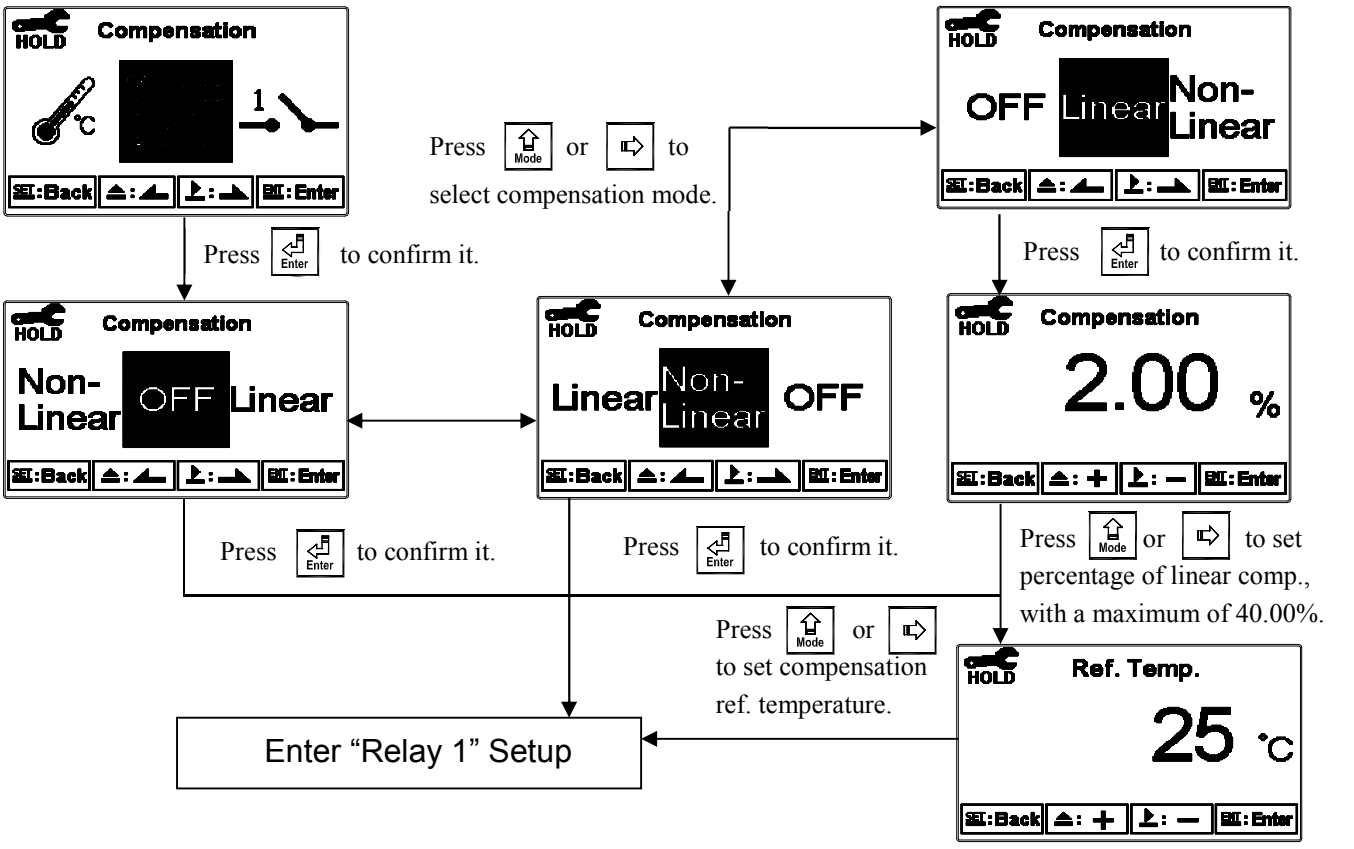
Ct_{ref}	Conductivity at ref. temperature	$Ct = Ct_{ref}\{1+\alpha(T-t_{ref})\}$
Ct_1	Conductivity at T1˚C	
T	Measured solution temperature	$\alpha=(Ct_2-Ct_1)/Ct_1(T_2-t_{ref})-Ct_1(T_1-t_{ref})$
Ct_2	Conductivity at T1˚C	
T_2	Measured solution temperature	
α	Temperature compensation coefficient	

How to obtain solution's TC:

Take 0.01M KCl as an example. No compensation (OFF) is set under TCC mode. With the solutions at different temperature, 20˚C (Ct_1) and at 30˚C (Ct_2) respectively, measure the conductivity value of each solution, approx. 1,278μS at 20˚C and 1,552μS at 30˚C. Based on the formula provided in the table above (Ct_{ref}: 25˚C), the temperature compensation coefficient would be: α＝1.94%.

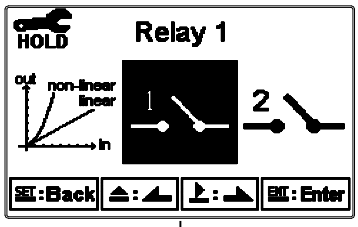
$$\alpha = \frac{1552-1278}{1278(30-25)-1552(20-25)} \times 100 = 1.94$$

Linear TC range: 0.00%~40.00%
Temperature comp. range: 0˚C~100˚C

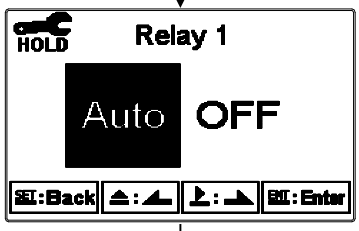


6.8 Relay 1

In setup menu, select “Relay 1” and press Enter to turn relay 1 on or off. If you select to turn on relay 1, set relay 1 as “High set-point” alarm or “Low set-point” alarm. Set the value of Set-Point (SP) and Hysteresis (Hys.). Refer to the graph below for the relationship between parameters (for high point alarms).

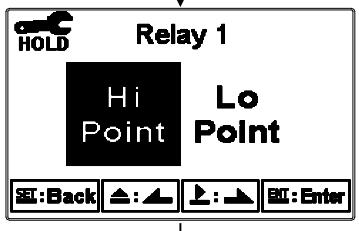


Press Enter to confirm it.



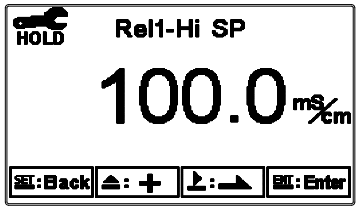
Press Mode or ⇨ to select to activate REL1. If turned off, the menu will proceed to setup of Relay 2.

Press Enter to confirm it.



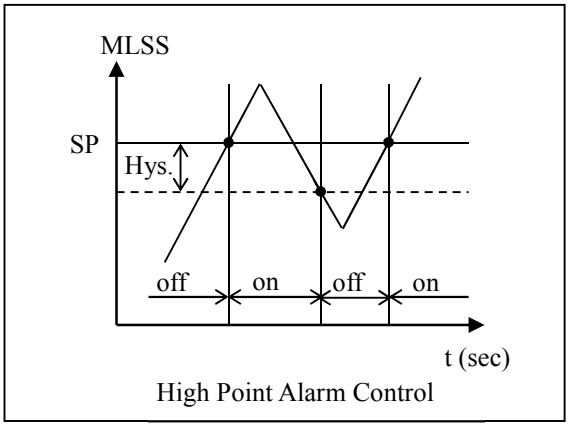
Press Mode or ⇨ to select REL1 as Hi point or Lo point alarm.

Press Enter to confirm it.

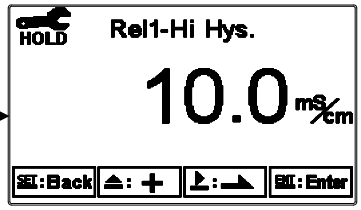


Press Mode or ⇨ to adjust Set-Point (SP) value.

Press Enter to confirm it.

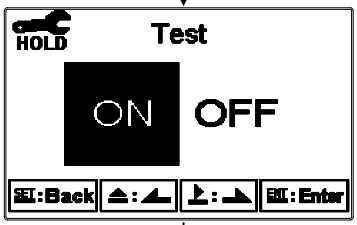


High Point Alarm Control



Press Mode or ⇨ to adjust Hysteresis (Hys.) value

Press Enter to confirm it.



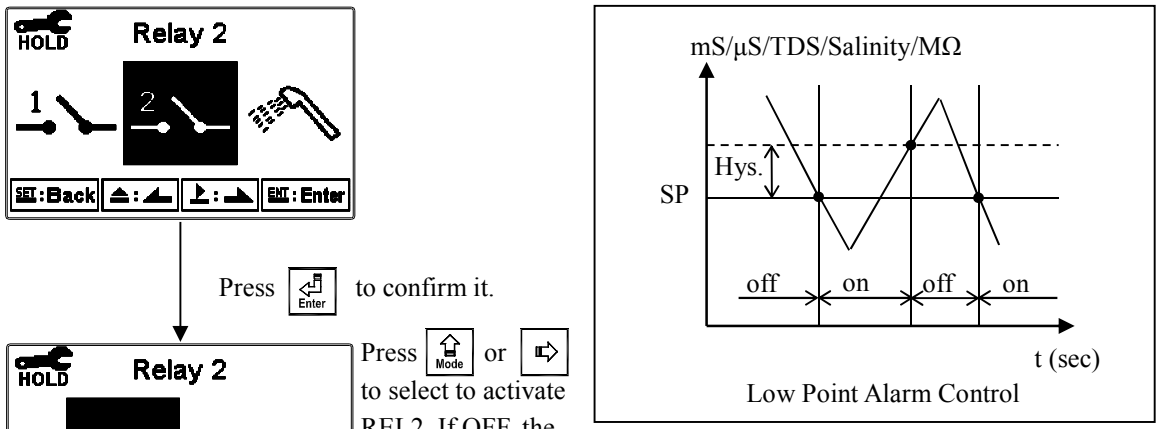
Press Mode or ⇨ to select to test REL1. If “ON”, relay 1 will activate. “RELAY1” will show on the main screen.

Press Enter to confirm it.

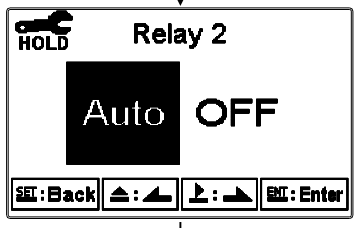
Enter “Relay 2” Setup

6.9 Relay 2

In setup menu, select “Relay 2” and press Enter to turn relay 2 on or off. If you select to turn on relay 2, set relay 2 as “High set-point” alarm or “Low set-point” alarm. Set the value of Set-Point (SP) and Hysteresis (Hys.). Refer to the graph below for the relationship between parameters (for high point alarms).

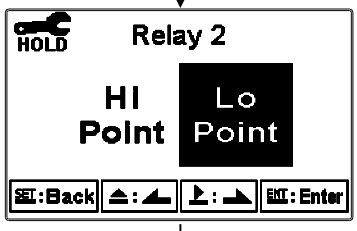


Press Enter to confirm it.



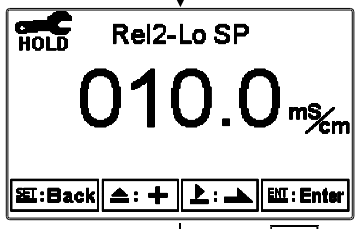
Press Mode or to select to activate REL2. If OFF, the guide menu will proceed to setup of Clean.

Press Enter to confirm it.



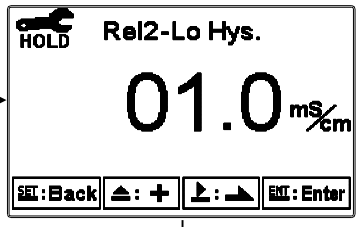
Press Mode or to select REL2 as Hi point or Lo point alarm.

Press Enter to confirm it.



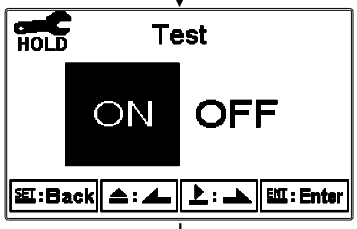
Press Mode or to adjust Set-Point (SP) value.
If the measuring range of conductivity measurement is set to AUTO, then the unit (µS/cm or mS/cm), value, and decimal point will need to be set.

Press Enter to confirm it.



Press Mode or to adjust Hysteresis (Hys.) value

Press Enter to confirm it.



Press Mode or to select to test REL2. If “ON”, relay 2 will activate. “RELAY2” will show on the main screen.

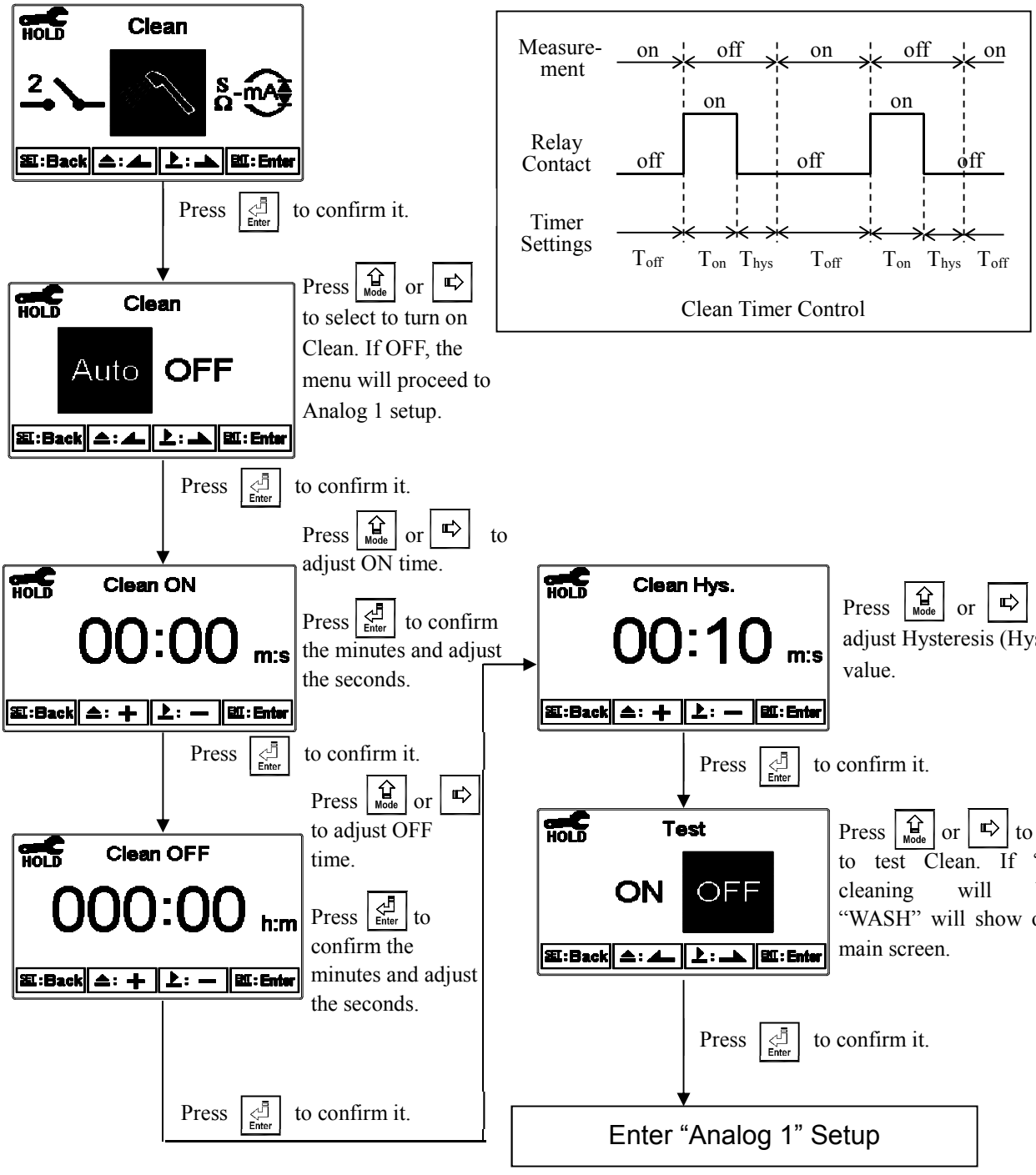
Press Enter to confirm it.

Enter “Clean” Setup

6.10 Clean

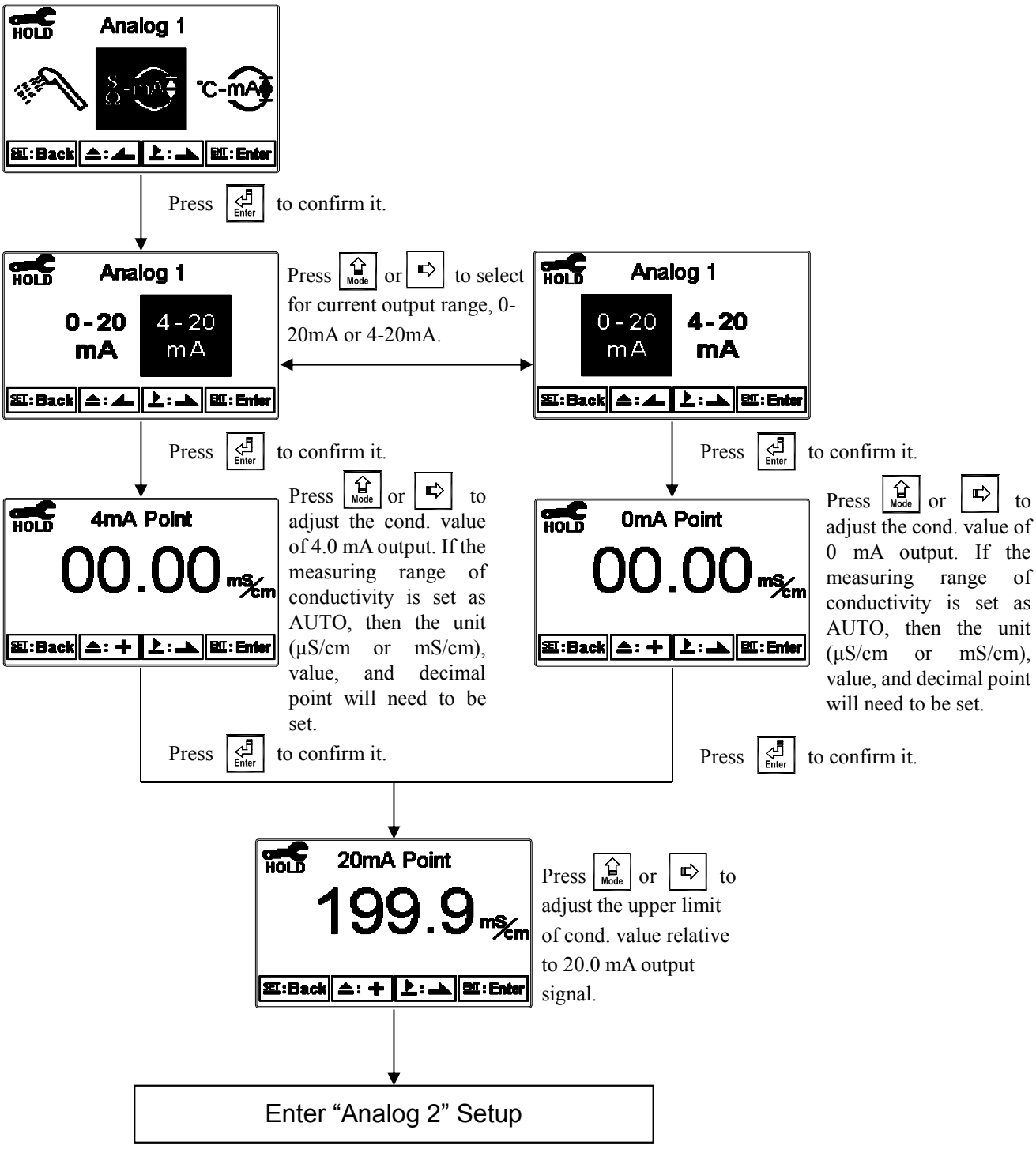
In setup menu, select “Clean” and press Enter to turn clean on or off. If “Auto” is selected, set the “Clean ON” and “Clean OFF” timers respectively, and then set the Hysteresis value (Hys.). The relationship for these settings can is explained more clearly with the graph provided velow (Clean Timer Control).

Note: When the clean function is turned on, if any value is set to 0, the instrument will automatically turn off this function. If the clean function is turned on under measurement mode, a “Clean Running” message will show on top of the display. The measured value will be kept at what it was before cleaning. The unit will pause the cleaning procedure when entering settings menu or calibration menu.



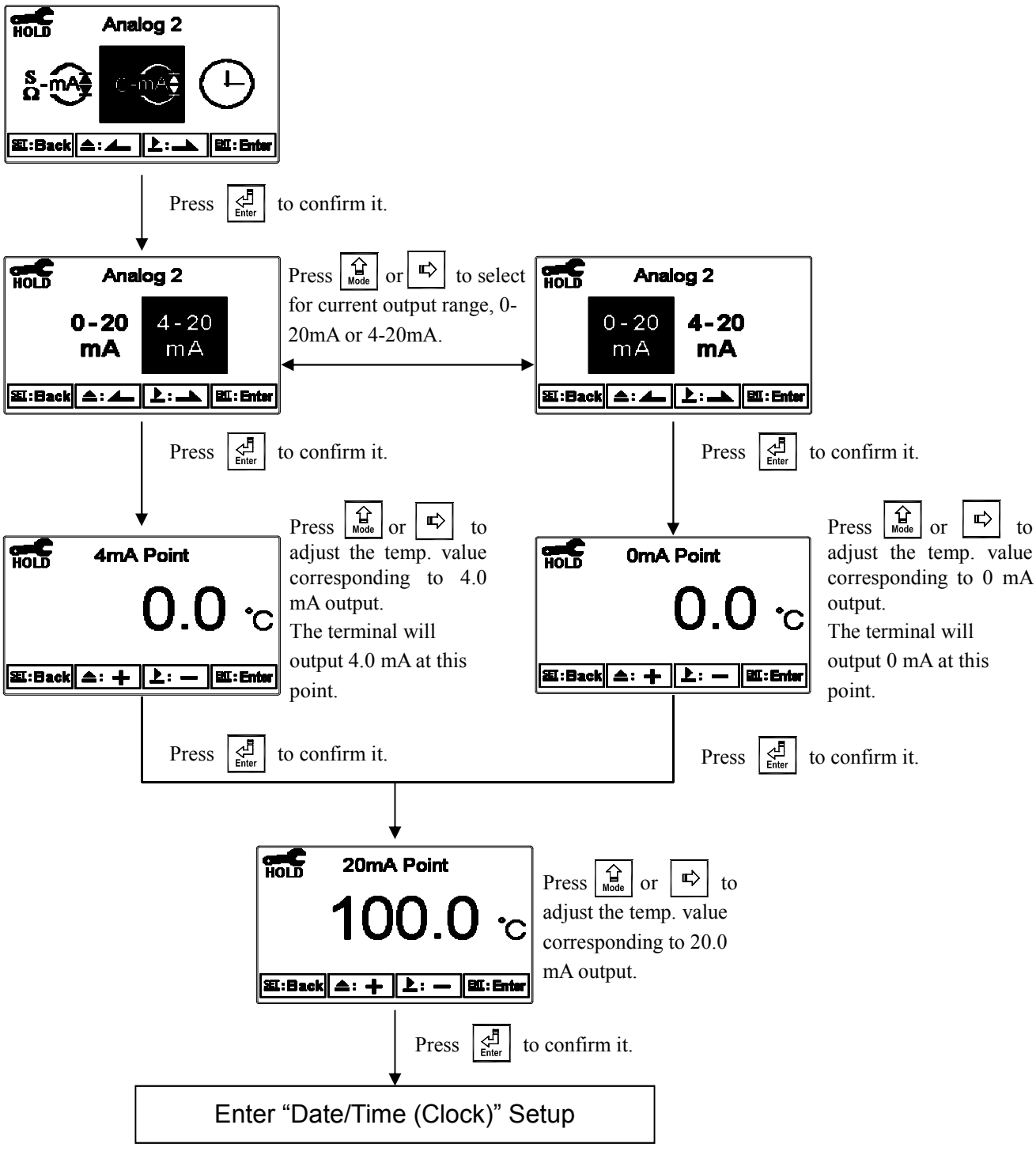
6.11 Analog Output 1

In setup menu, select "Analog 1" and press [Enter] to set up Analog 1 output. Select 0~20mA or 4~20mA as output current and set its corresponding measuring range. The smaller the set corresponding measuring range, the higher the output current accuracy. When the measured value exceeds the set range upper limit, the output current will remain approximately 22 mA. When the measured value exceeds the set range lower limit, the output current will remain 0 mA under 0~20 mA mode, and approximately 2 mA under 4~20 mA mode, which can be used as a failure notice. Under HOLD (measurement) status, the current output will be kept at the last output value before HOLD. However, for the convenience of setting up an external recorder or a PLC controller, the output current will remain at 0/4 mA or 20 mA under analog output setup menu.



6.12 Analog Output 2

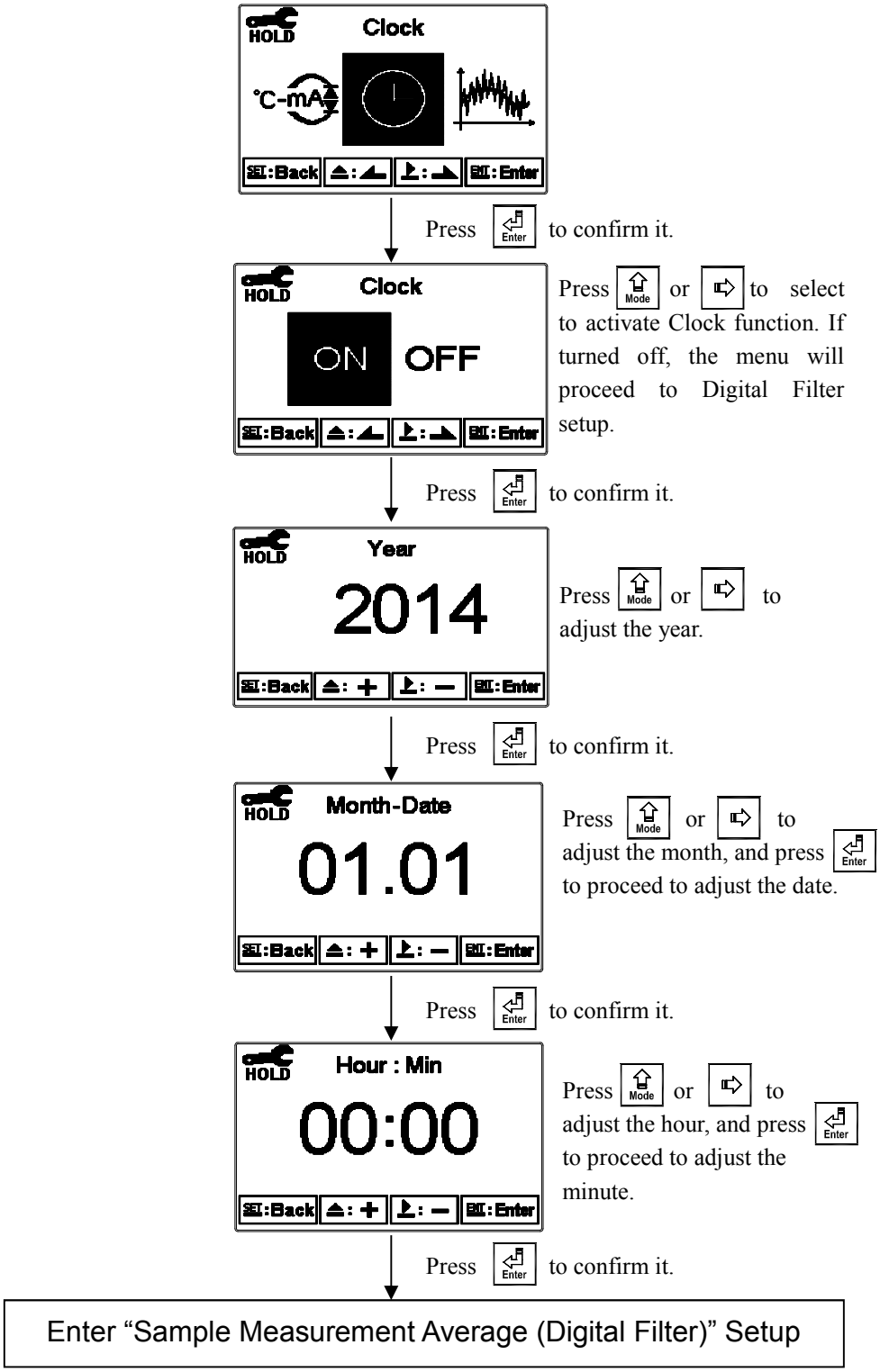
In setup menu, select "Analog 2" and press [Enter] to set up Analog 2 output. Select 0~20mA or 4~20mA as output current and set its corresponding measuring range. The smaller the set corresponding measuring range, the higher the output current accuracy. When the measured value exceeds the set range upper limit, the output current will remain approximately 22 mA. When the measured value exceeds the set range lower limit, the output current will remain 0 mA under 0~20 mA mode, and approximately 2 mA under 4~20 mA mode, which can be used as a failure notice. Under HOLD (measurement) status, the current output will be kept at the last output value before HOLD. However, for the convenience of setting up an external recorder or a PLC controller, the output current will remain at 0/4 mA or 20 mA under analog output setup menu.



6.13 Date/Time (Clock)

In setup menu, select “Clock” and press [Enter] to turn the clock function on or off or to adjust the time and date. If the clock function is turned off, the time and date will not be displayed under measurement mode. The calibration time within the calibration records will show as “OFF” when in calibration overview display.

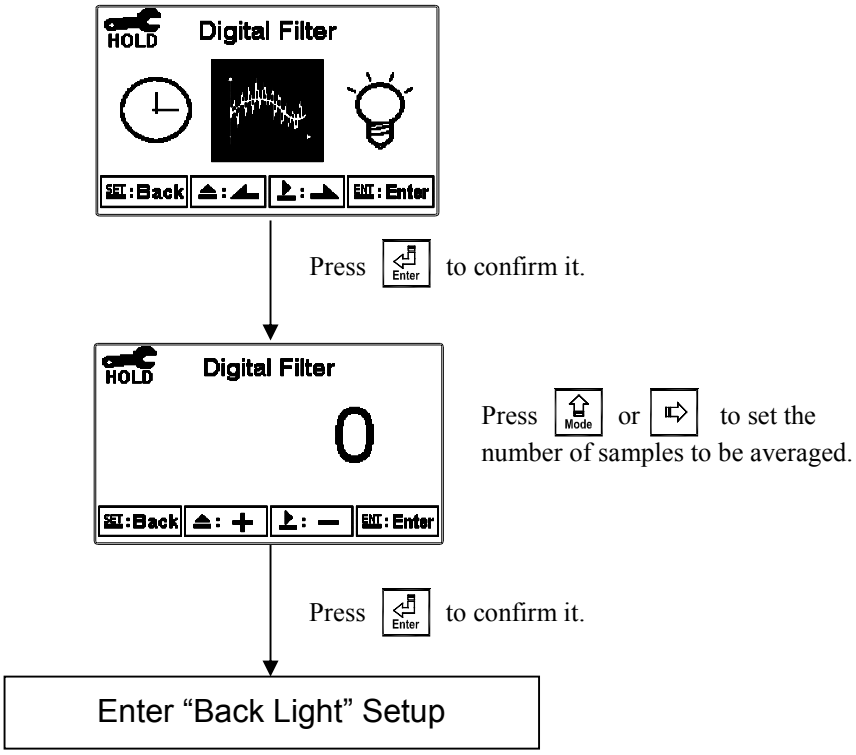
Note: The clock will be reset once the AC power supply is cut off.



6.14 Sample Measurement Average (Digital Filter)

In setup menu, select “Digital Filter” and press [Enter] to modify filter settings. Set the number of samples to be averaged for each reading to increase the stability of the displayed measurement. The greater the number, the more stable the measurement value; the smaller the number, the more acute the measurement value.

Note: Set at “0” for automatic sample average setting based on conductivity or resistivity value.



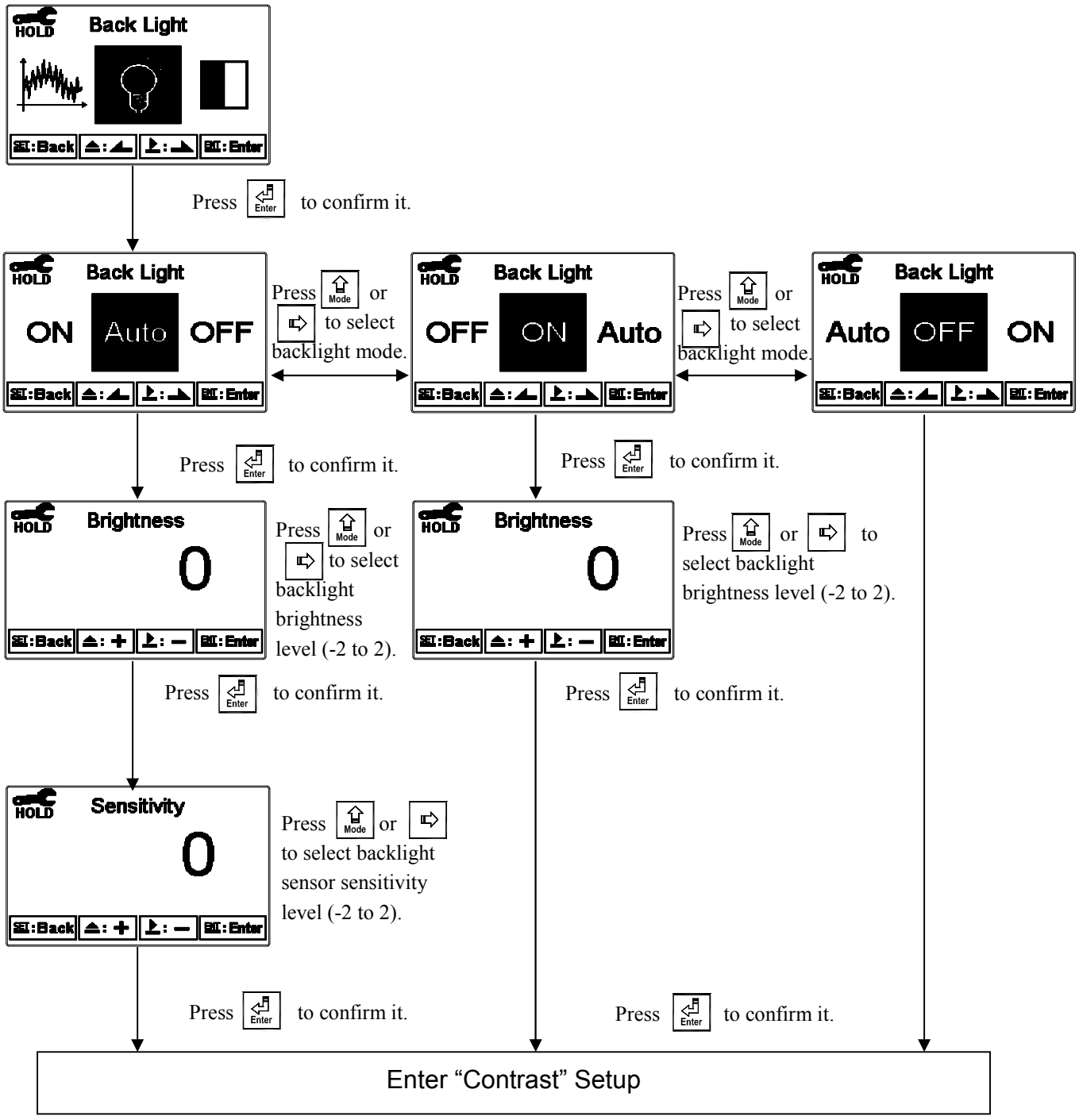
6.15 Backlight

In setup menu, select “Back Light” and press Enter to adjust display brightness (-2~2, dark ~ bright) and brightness sensor sensitivity (-2~2, insensitive ~ sensitive). Whether under OFF or AUTO mode, the touch-on function will activate the backlight when any button is pressed. If no buttons are pressed for 5 seconds, the display will return to the default backlight mode.

ON: The backlight remains on.

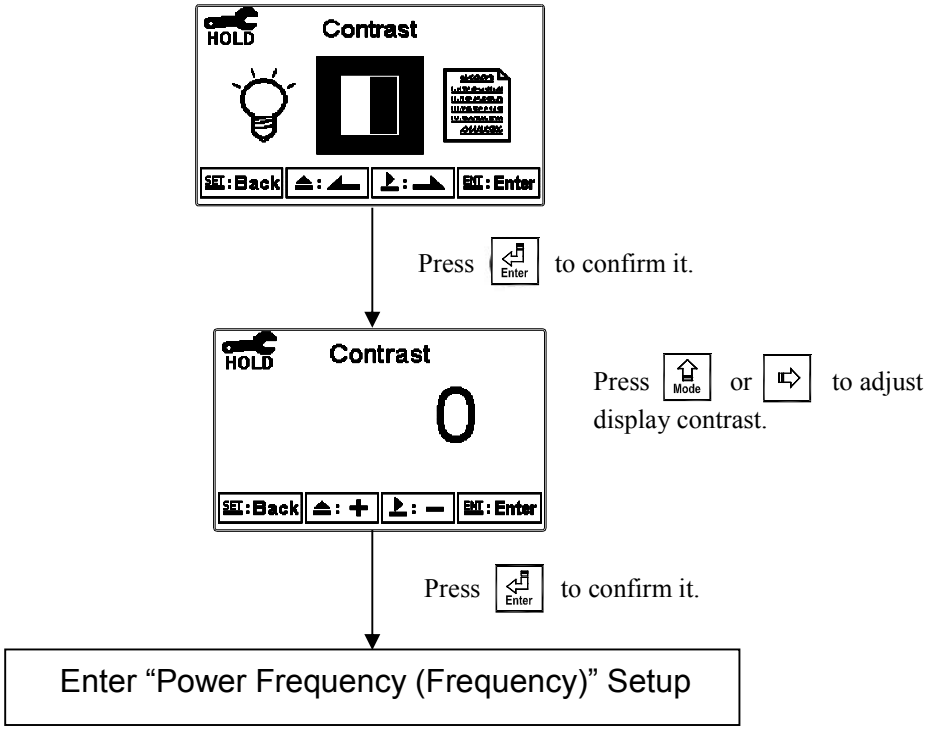
OFF: The backlight is turned off. When any button is pressed, it will enter touch-on status.

Auto: Transmitter will activate or deactivate the backlight according to the ambient lighting. When a button is pressed, it will enter touch-on status.



6.16 Contrast

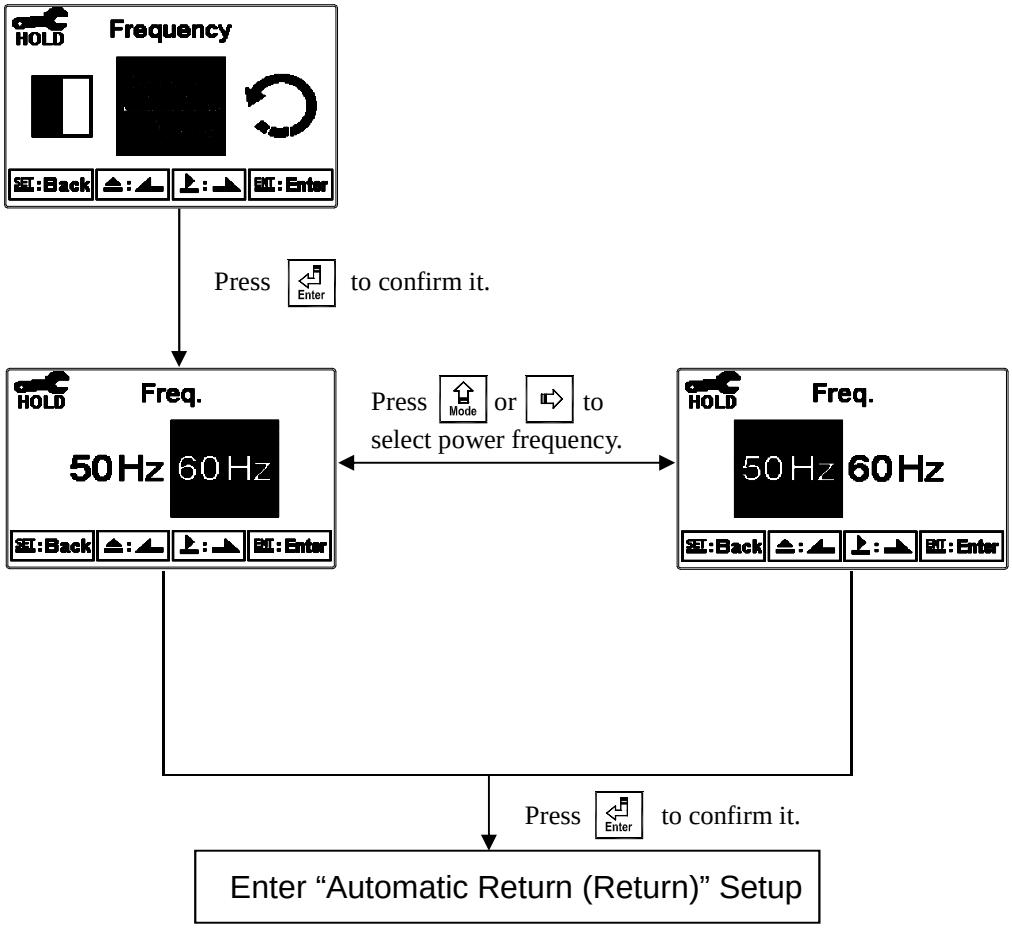
In setup menu, select “Contrast” and press [Enter] to adjust display contrast (-2, -1, 0, 1, 2, light to dark).



6.17 Power Frequency (Frequency)

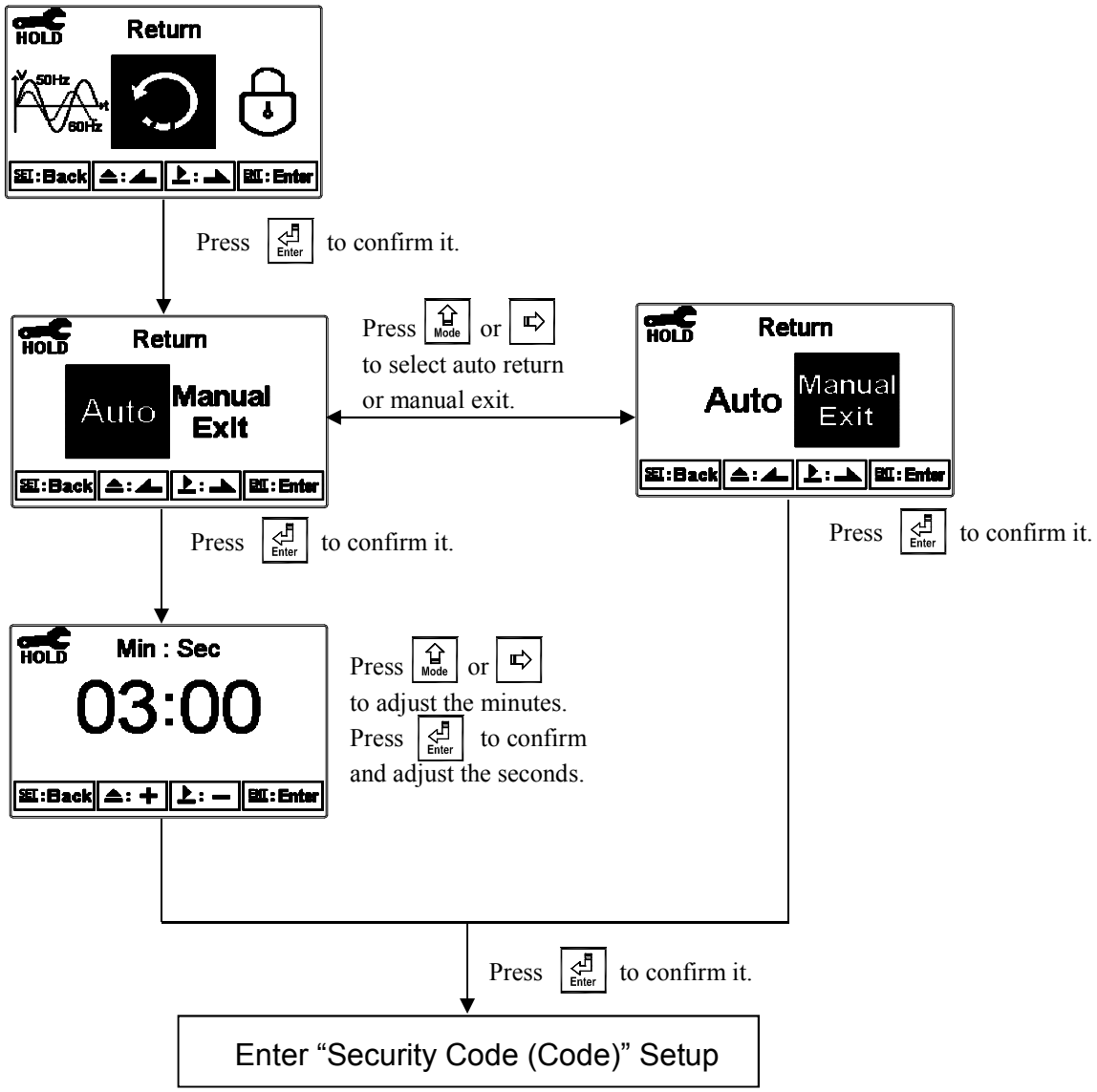
In setup menu, select “Frequency” and press [Enter] to adjust power frequency. You may select 50Hz or 60Hz according to local power frequency.

Note: This setting will affect transmitter performance and measurement. Please adjust with caution and absolute certainty.



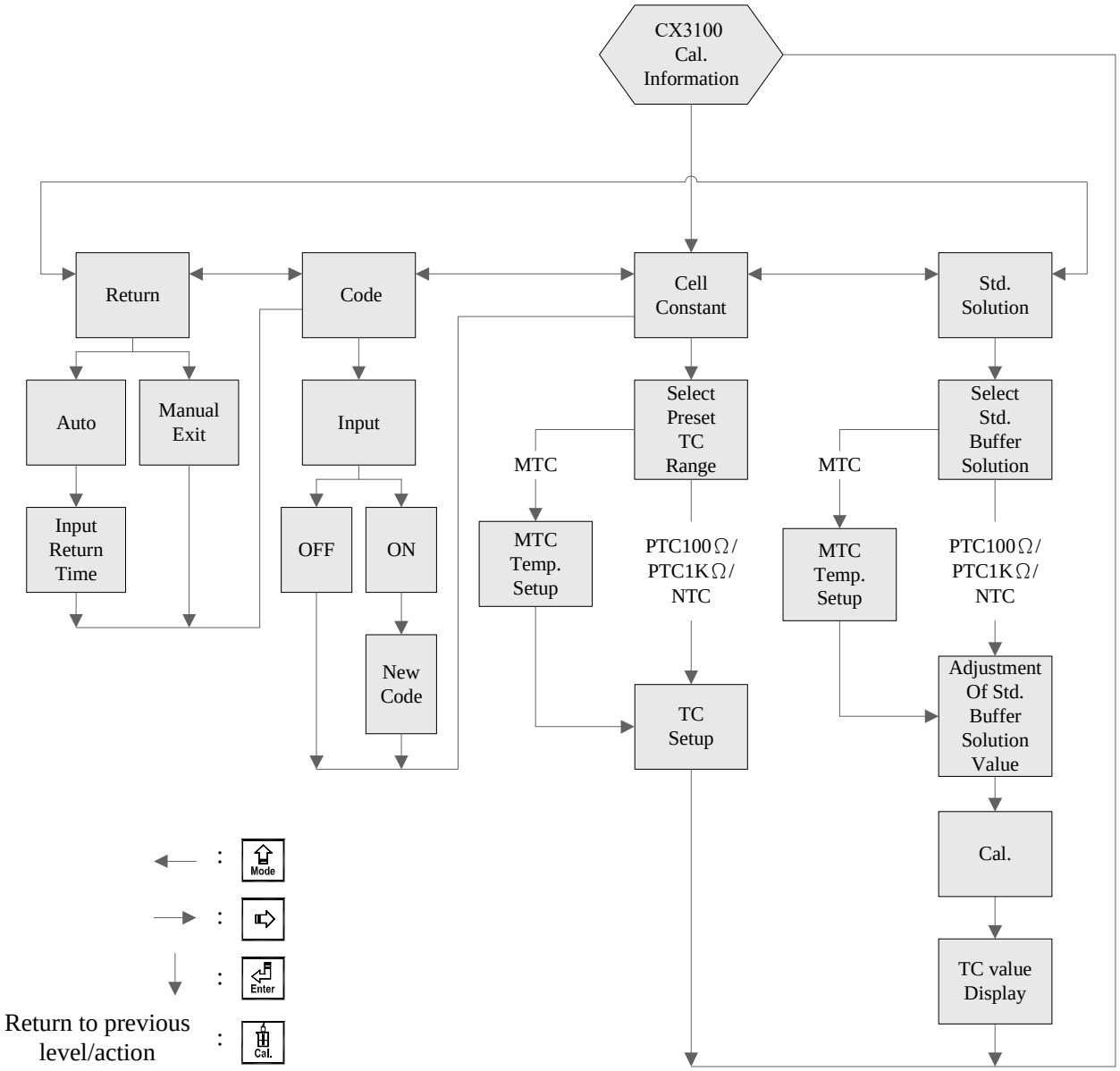
6.18 Automatic Return (Return)

In setup menu, select “Return” and press [Enter] to set the instrument to automatically exit the setup menu after a period of user inactivity. “Manual Exit” requires the user to exit setup manually, while “Auto” will set the menu to automatically exit and return to measurement mode after a period of time of user inactivity.



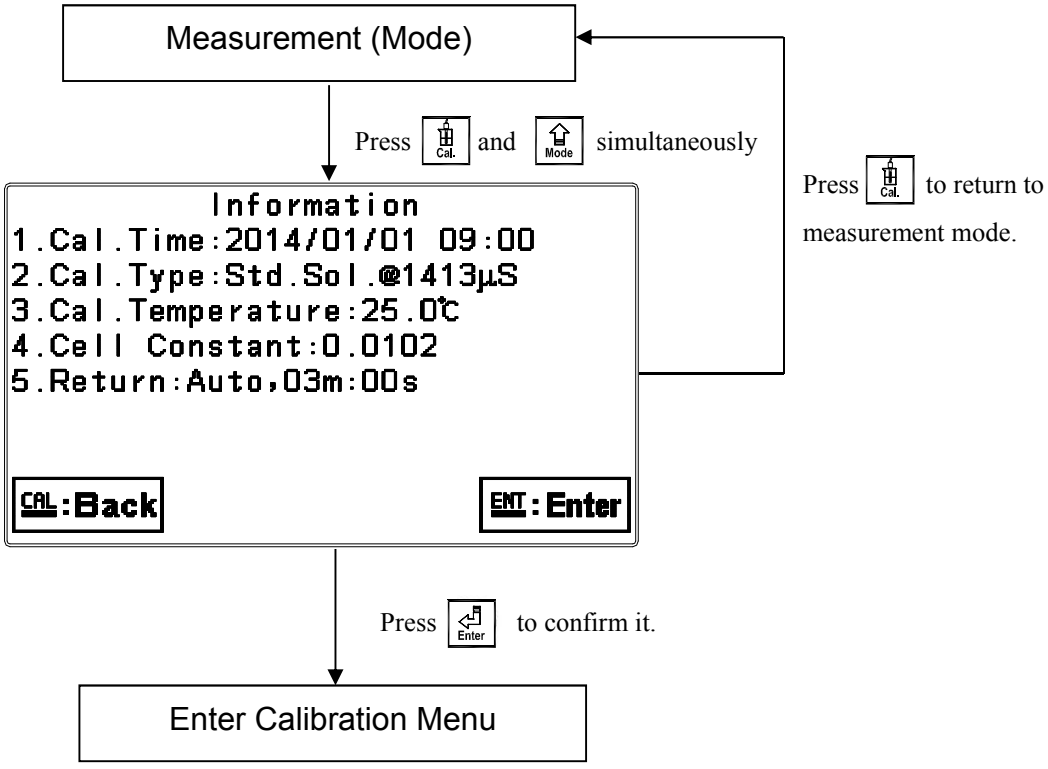
7. Calibration

Calibration Block Diagram



7.1 Calibration Menu

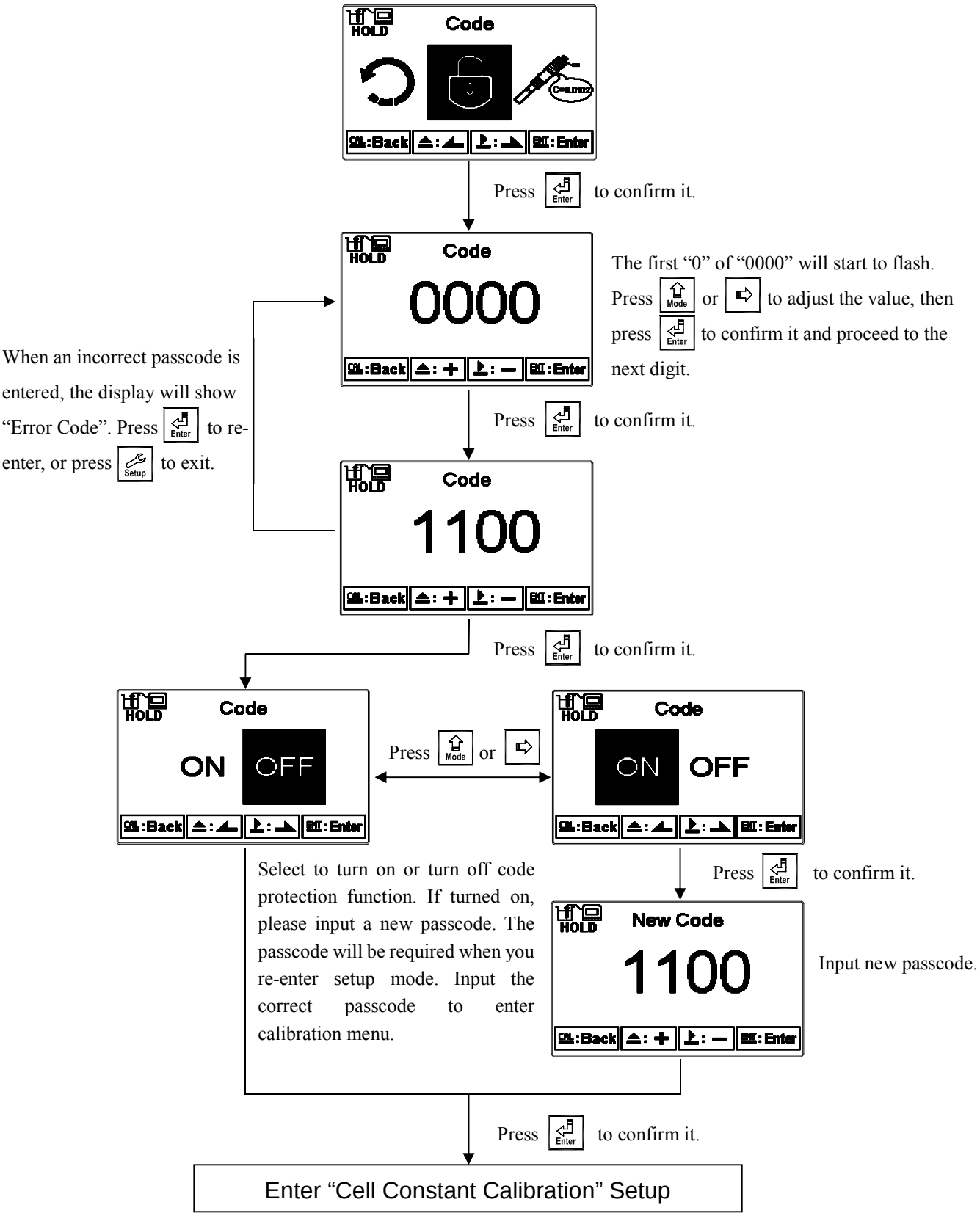
In measurement mode, press [Cal.] and [Mode] simultaneously to display current calibration settings overview. If re-calibration is not required, press [Cal.] to return to measurement mode. To re-calibrate, press [Enter] to enter calibration menu. (If the calibration time is "OFF", the clock function has been turned off.)



7.2 Calibration Security Code (Code)

In calibration menu, select "Code" and press [Enter] to enter passcode setting procedure.

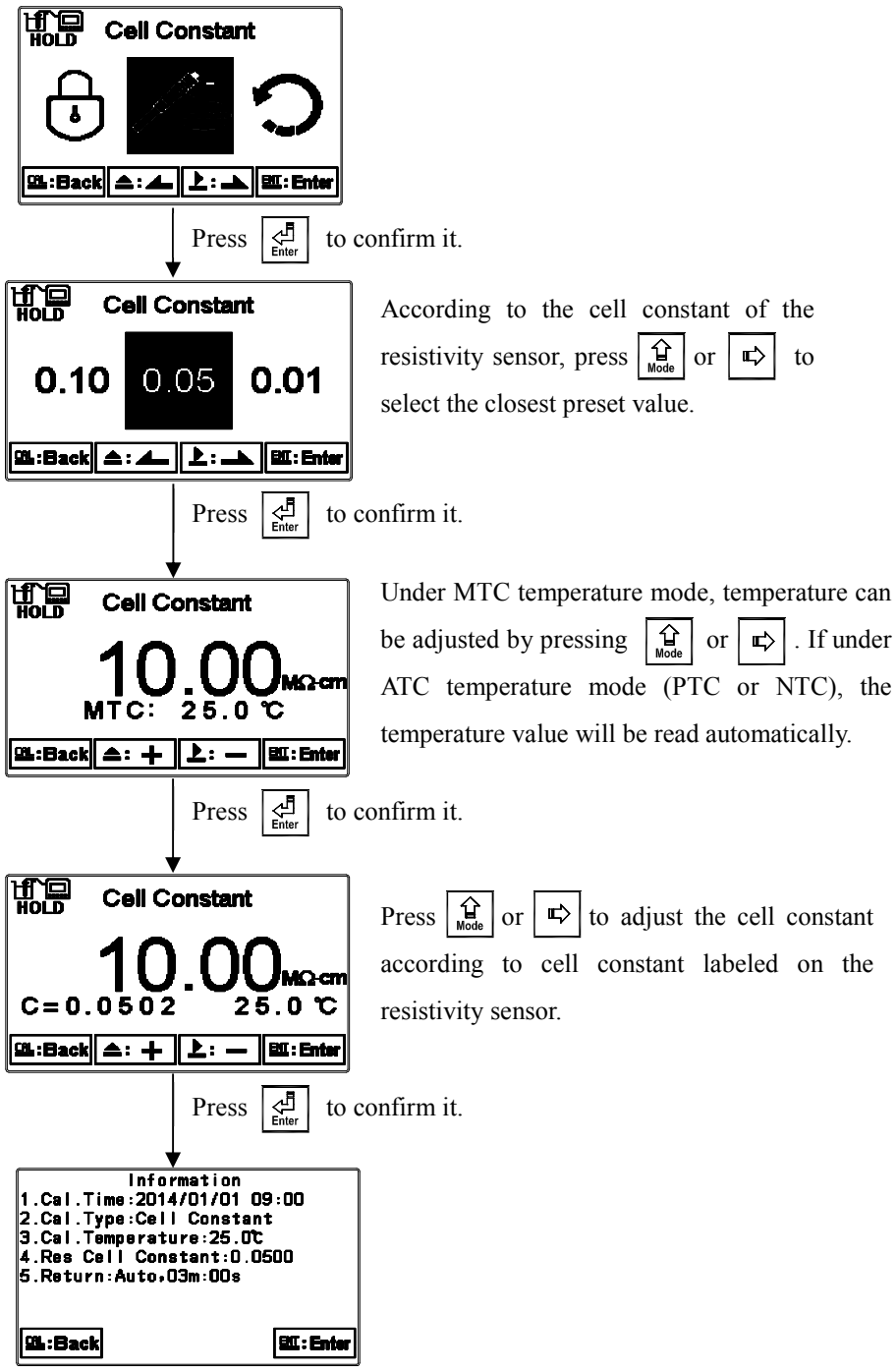
The preset calibration security code is 1100.



7.3 Cell Constant Calibration

7.3.1 Resistivity (Res.)

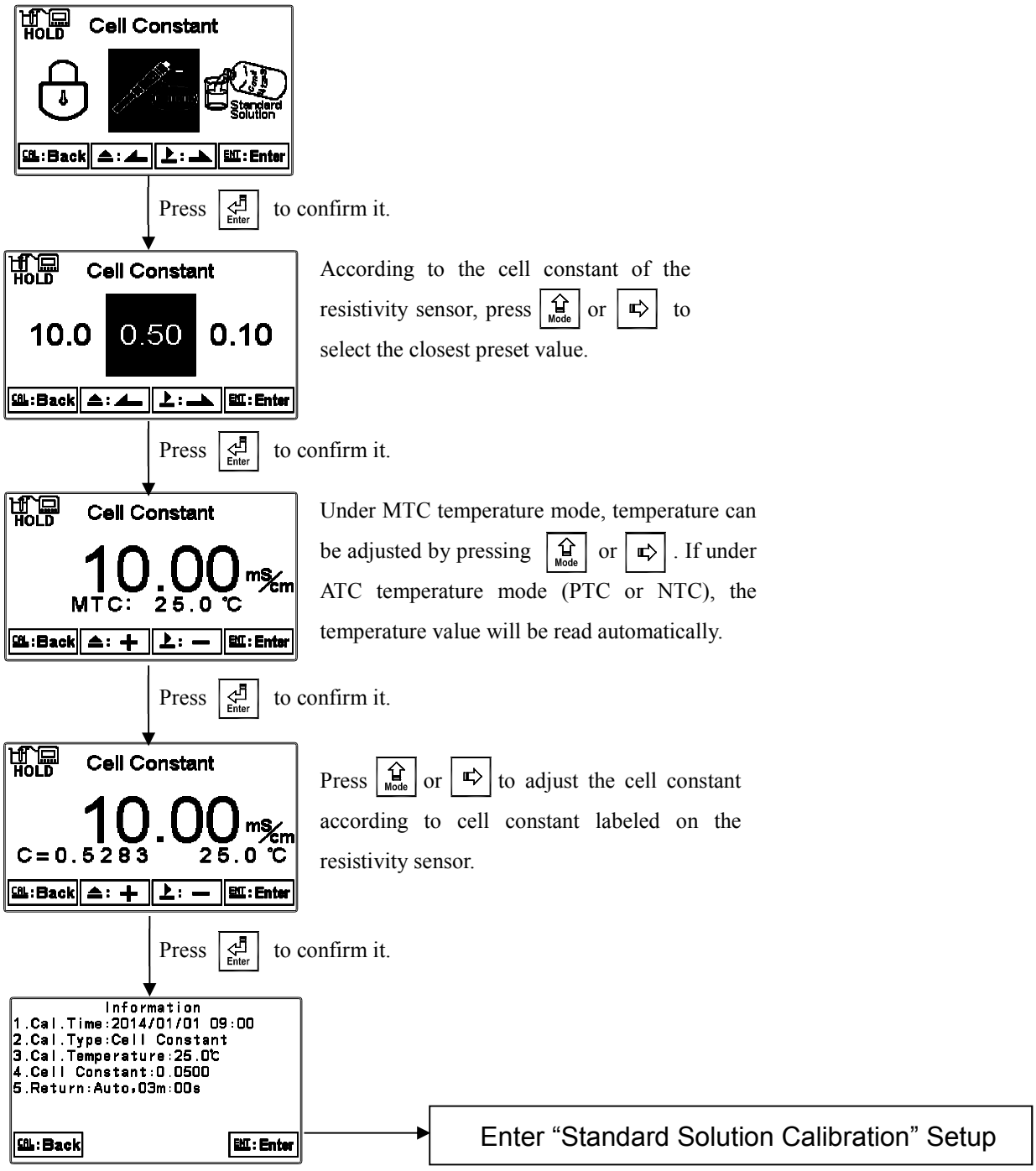
Select “Cell Constant”, then select the closest preset value to the known cell constant provided on the sensor. Press [Enter] to confirm and proceed to the next screen. The cell constant value will begin to flash. Press [Mode] or [⇨] to adjust the cell constant, which corrects the measurement value to the known standard solution value, then press [Enter] to confirm it.



7.3.2 Conductivity (Cond.)

Conductivity, Salinity, and TDS mode can be calibrated via the following cell constant calibration.

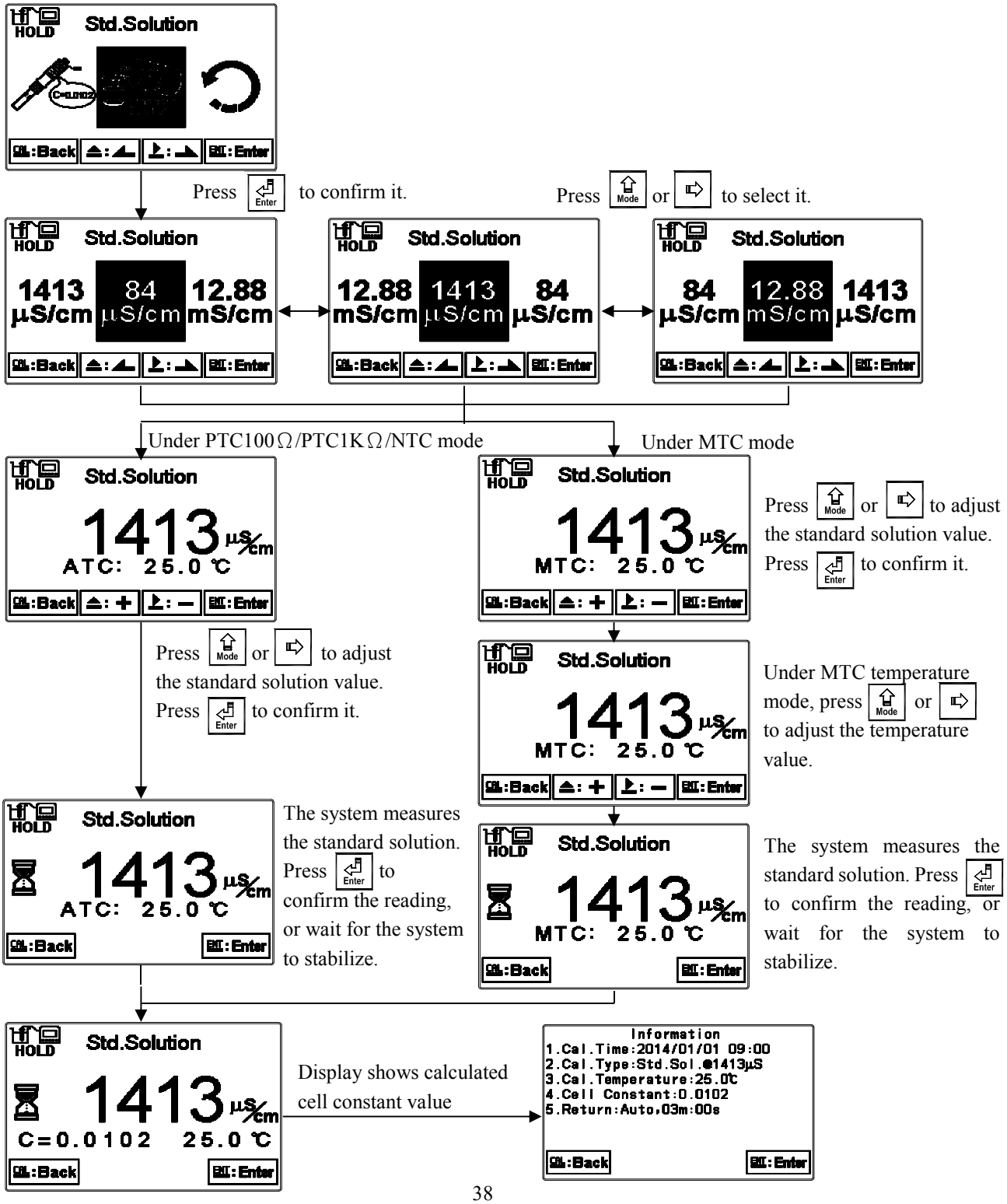
Select “Cell Constant”, then select the closest preset value to the known cell constant provided on the sensor. Press [Enter] to confirm and proceed to the next screen. The cell constant value will begin to flash. Press [Mode] or [⇨] to adjust the cell constant, which corrects the measurement value to the known standard solution value, then press [Enter] to confirm it.



7.4 Standard Solution Calibration (Std. Solution)

Known standard solution calibration is only applicable to conductivity measurement mode. Press [Mode] or [⇨] to select closest preset standard solution value: 84.0µS/cm, 1413µS/cm or 12.88mS/cm. Place the conductivity sensor into the standard solution and press [Enter] to enter calibration screen. Under ATC or MTC mode, the user may manually input conductivity value based on the measured temperature (see Appendix for conversion chart). Press [Enter] again to calibrate. The display will show ⌛ indicating calibration is in progress. Once calibration is complete, the cell constant will show. Press [Enter] to exit.

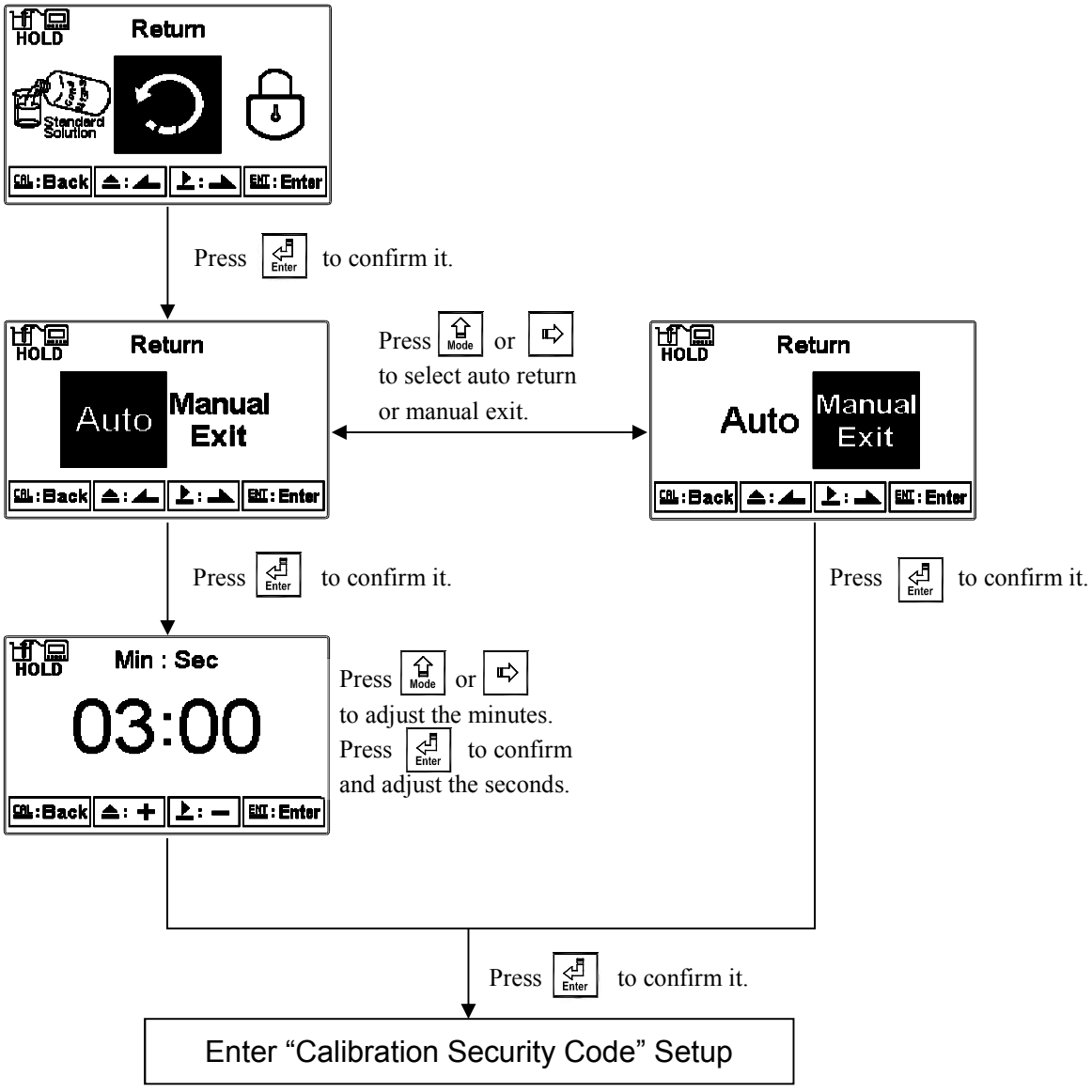
Note: "Standard Solution Calibration" has a 0˚C～31˚C limit. Please refer to section 7.3.2, "Cond." for out of range calibration.



7.5 Automatic Return (Return)

In calibration menu, select “Return” and press Enter to set the instrument to automatically exit the menu after a period of user inactivity. “Manual Exit” requires the user to exit manually, while “Auto” will set the menu to automatically exit and return to measurement mode after a period of time of user inactivity.

Note: The return function of setup menu and calibration menu are independent settings.



8. Error Messages (Error Code)

Message	Reason	Dispositions
Error1	The readout is unstable during calibration.	1. Replace the standard solution. 2. Calibrate the sensor after maintenance or replacement is complete.
Error2	1. The sensor cell constant exceeds upper or lower limit. 2. The temperature is out of range.	3. Replace the standard solution. 4. Calibrate the sensor after maintenance or replacement is complete.
Error3	Incorrect passcode **ERROR CODE**	Re-enter passcode
Error5	Serious error that does not permit any further measurements	Please contact service engineer.

Appendix: Calibration Solution

°C	Conductivity	84μS@25°C	1413μS@25°C	12.88mS@25°C
0			776	7.15
5		65	896	8.22
10		67	1020	9.33
15		68	1147	10.48
16		70	1173	10.72
17		71	1199	10.95
18		73	1225	11.19
19		74	1251	11.43
20		76	1278	11.67
21		78	1305	11.91
22		79	1332	12.15
23		81	1359	12.39
24		82	1386	12.64
25		84	1413	12.88
26		86	1440	13.13
27		87	1467	13.37
28		89	1494	13.62
29		90	1521	13.87
30		92	1548	14.12
31		94	1575	14.37

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