CX3000
Cond/Resistivity/Salinity
Transmitter/Controller

Form: INSTRCX3000-Rev A

CX3000 Cond/Resistivity/TDS Transmitter ESSENTIAL INSTRUCTIONS

READ THIS BEFORE USING YOUR CX3000 TRANSMITTER!

Thank you for choosing the CX3000 Cond/Resistivity/TDS transmitter. This transmitter is a user-friendly microprocessor based transmitter for conductivity, resistivity and TDS measurement. As with all electronic instruments, it is essential to follow all directions for optimal performance. In particular, you must properly install, use and maintain the CX3000 to ensure that it will continue to operate within its specifications.

• Follow all warnings, cautions and instructions supplied with the transmitter. Please contact Sensorex with any product questions or concerns.

• Install the transmitter as specified in this manual, following all applicable local and national codes.

• Do not attempt to repair your CX3000 transmitter or use any replacement parts from any other supplier.

• If you find any errors in this manual, please report them to Sensorex.

• Please complete the WARRANTY REGISTRATION located at the back of this manual and fax to Sensorex

About This Document

This manual contains instructions for the installation, operation and care of the CX3000 Cond/Resistivity/TDS transmitter. The following list provides notes concerning revisions of this document.

Rev Level	Date	Notes
A	10/2012	1st revision of manual.

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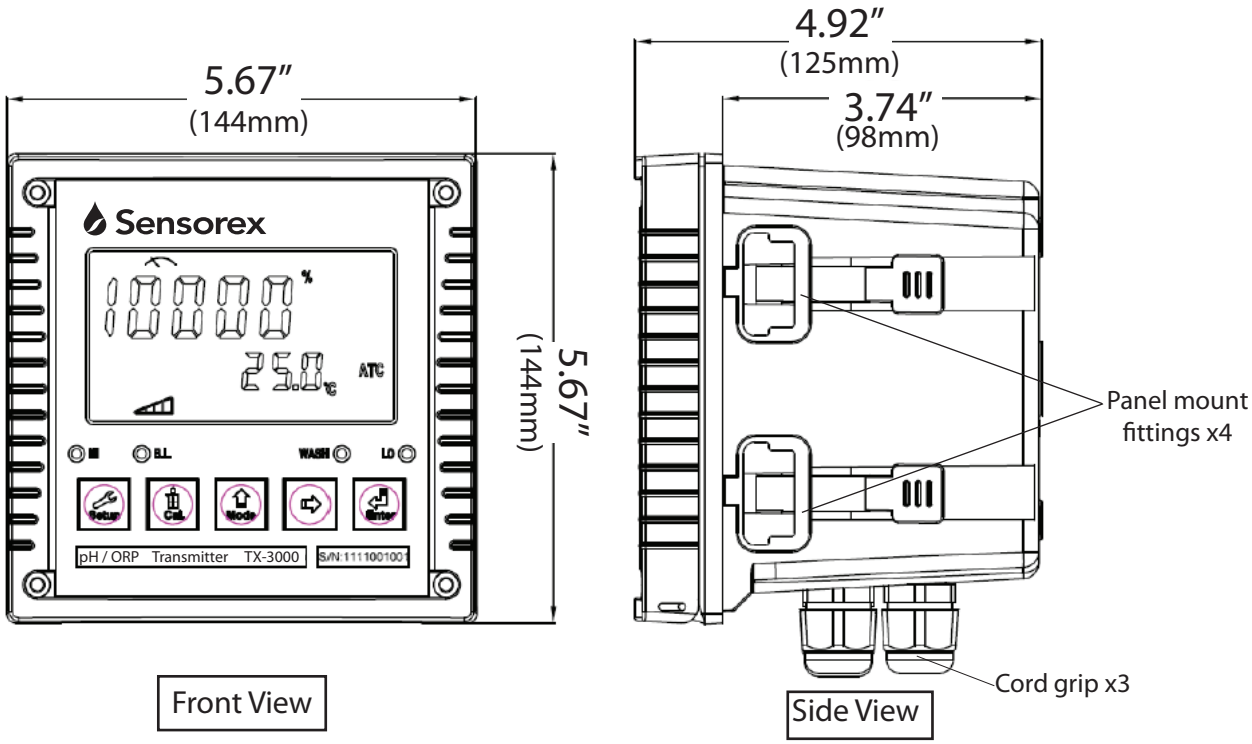
Part 1 Specifications

CX3000 Specifications

Measuring modes:	**Resistivity/Conductivity/Salinity/Temp.**	
Ranges:	**Resistivity**	**0.00 -20.00MΩ/cm**
	Conductivity	**0.000µS/cm-200.0 mS/cm in 6 ranges / Auto**
	Salinity	**0.0 -70.0 ppt**
	Temp.	**-30.0 to130.0°C**
Resolution:	**Resistivity**	**0.01 MΩ/cm**
	Conductivity	**0.001 µS/cm**
	Salinity	**0.1 ppt**
	Temp.	**0.1°C**
Accuracy:	**Resistivity**	**±1% (±1Digit)**
	Conductivity	**±1% (±1Digit)**
	Salinity	**±1% (±1Digit)**
	Temp.	**±0.2°C (±1Digit)**
Measuring Unit	**0.01, 0.1, 1.0, 10.00 cm-1 fixed, freely selectable 0.0050~19.99cm-1**	
Temp Comp	**NTC30KΩ or PT1000 auto recognized or Manual adjustment**	
Temp Coeff	**Linear compensation from 0.00~20.00% Non-Linear compensation for natural water**	
Ambient Temp.	**0~50°C**	
Storage Temp.	**-20~70°C**	
Display:	**LCD display with illumination function**	
Analog output 1:	**Isolated DC 0/4~20mA corresponding to main measurement, max. load 500Ω**	
Analog output 2	**Isolated DC 0/4~20mA corresponding to Temp., max.load 500Ω**	
Settings	1(HI) - Contact 240 V AC, 30V DC, 5.0A Max - programmable ON/OFF (SPST) 2(LO) - Contact 240 V AC, 30V DC, 5.0A Max - programmable ON/OFF (SPST) WASH - Contact 240 V AC, 30V DC, 5.0A Max - programmable ON (0-9999 sec), OFF (0-999.9 hrs)	
Power Supply	**100V~240VAC±10% 50/60Hz (software selectable)**	
Mounting Installation	**Panel, or wall**	
Box Dimensions:	**144 mm × 144 mm × 115 mm (H×W×D)**	
Panel Cut Out Dims:	**138 mm × 138 mm (H×W)**	
Weight:	**0.8 kg**	
Certifications:	**IP 65 (NEMX 4X), CE**	

Part 1 Specifications (cont.)

CX3000 Specifications - Dimensional Specs



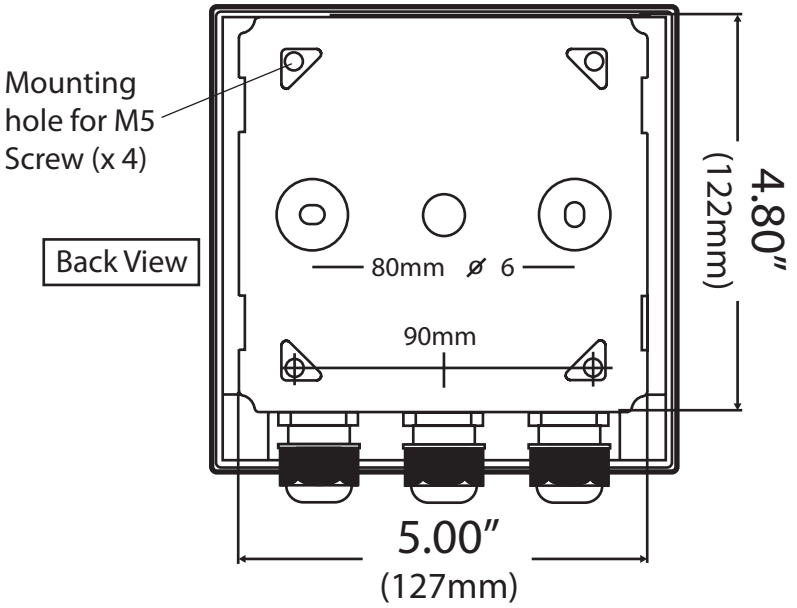


FIG 1-1

Part 2 Installation Precautions

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 controller before wiring input, output connections, and remove it before opening the transmitter housing.

Install the transmitter in a well ventilated area and avoid direct sunlight.

The material of signal cable should be special coaxial cable. Sensorex 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 realy contacts of the controller are designed for alarm and control function. Due to the safety and concern, please be sure to connect current with sufficient relay to load power, in order to ensure the operation safety of the instruments. (Please see chapter 4.3-Electrical connection diagram)

Part 3 Assembly and Installation

3.1 Transmitter installation: This transmitter can be installed by panel mounting, wall mounting and pipe mounting.

Panel Mounting: Cut a square hole of 5.4"(138mm) x 5.4"(138mm) on the panel, and then insert the transmitter directly into the panel. Attach the mounting bracket from the rear, so that it attaches to groove.

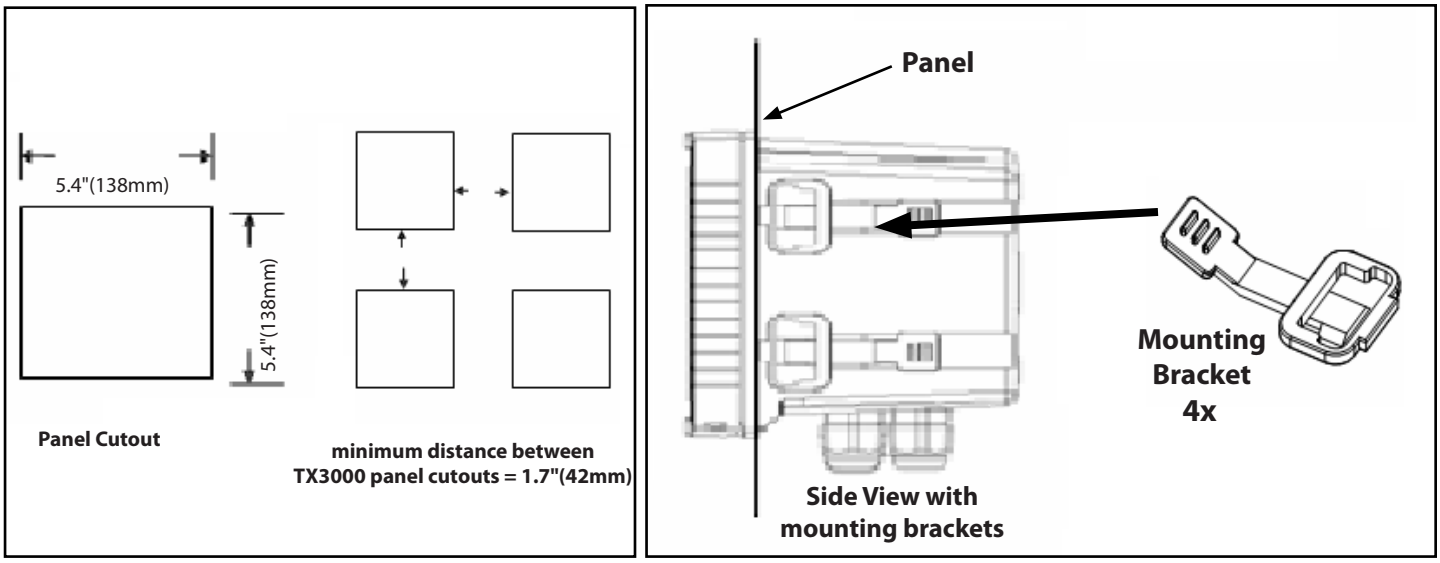
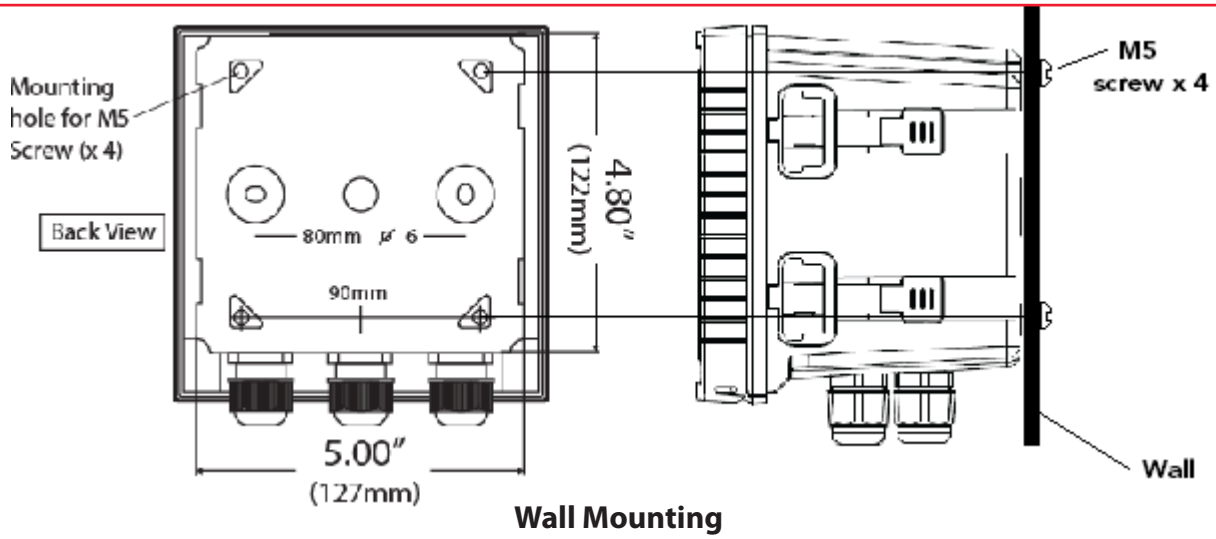


FIG 3-1

Part 3 Assembly and Installation (cont.)

Wall Mounting: Use 4 each M5 screws to attached to mounting holes shown below.



Wall Mounting

FIG 3-2

Part 4 CX3000 Overview

4.1 Rear Panel:

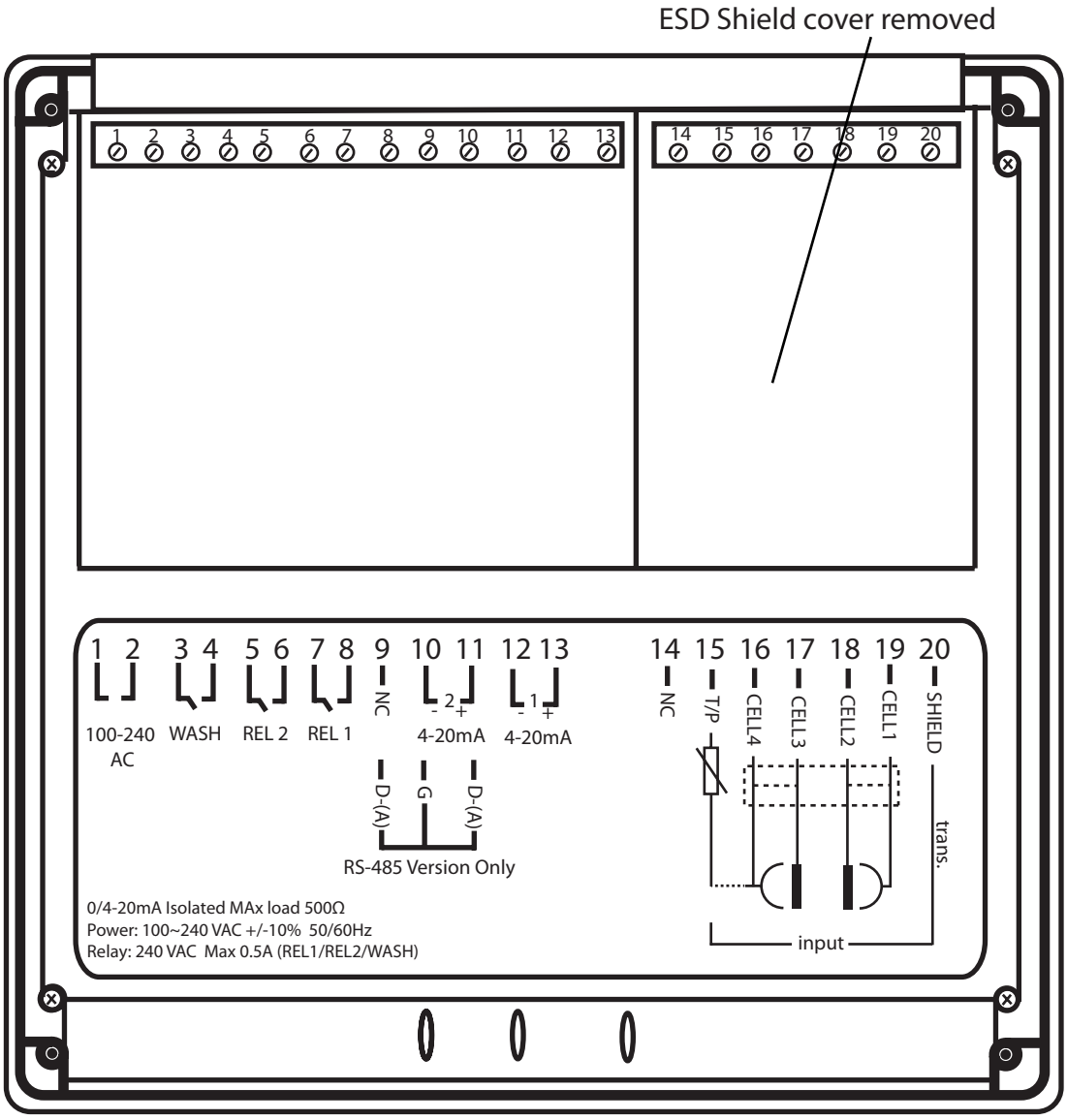


Figure 4.1

Part 4 CX3000 Overview (cont.)

4.2 General

The CX30000 requires 100-240V AC power (50/60 Hz selectable).

Important Notes:

1. Use wiring practices that conform to all national, state, and local electrical codes.
2. DO NOT run sensor cables or instrument 4-20 mA output wiring in the same conduit that contains AC power wiring. AC power wiring should be run in a dedicated conduit to prevent electrical noise from coupling with the instrumentation signals.

4.3 Power

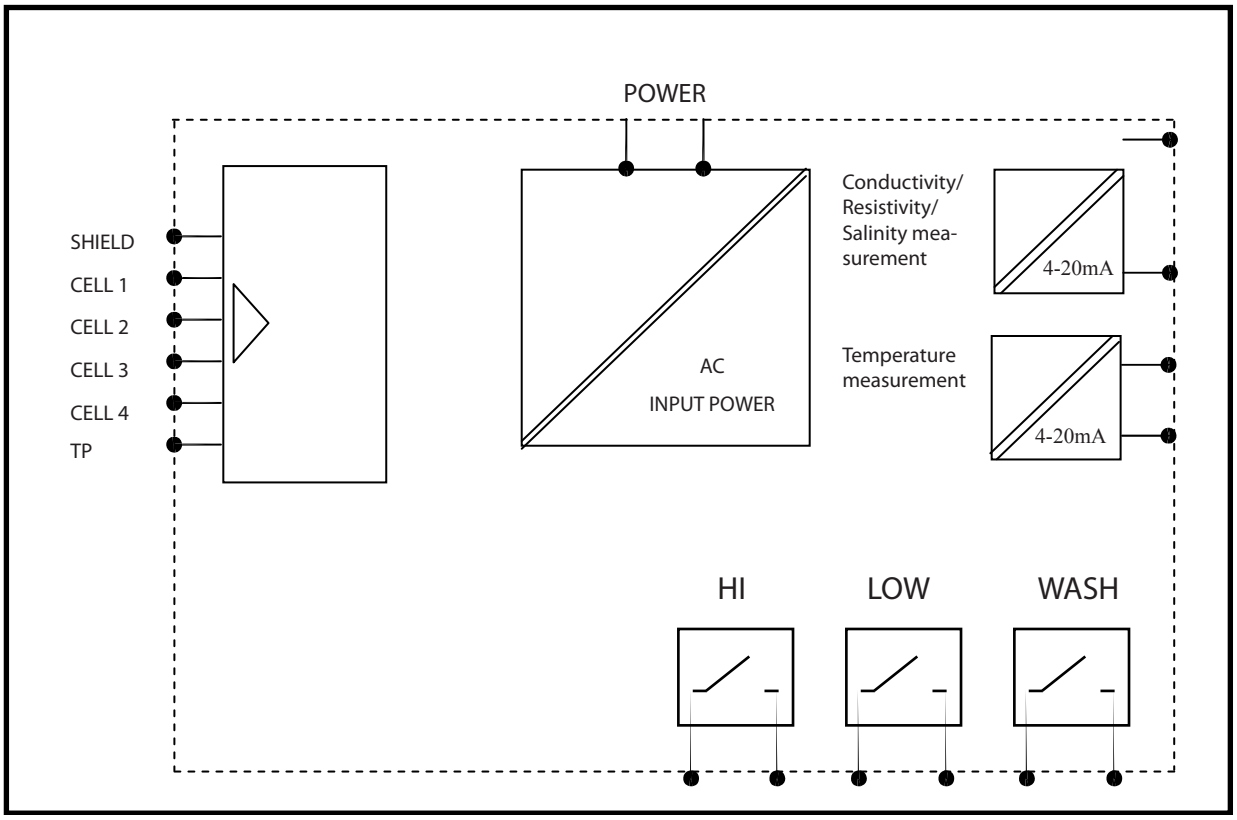


Figure 4.2

Part 4 CX3000 Overview (cont.)

4.3 Power (cont.)

Power: Connect AC power to terminals 1 & 2. Power cord not included.

Relays: Connect relays as shown. Relay 2 connects to terminals 5 & 6. Relay 1 connects to terminals 7 & 8. 240V AC, 30V DC, max 5.0A. Total current load should not exceed 5 amps at 240 VAC, 30V DC. Consider maximum in-rush current for devices connected to the CX3000 controller. If the current load can exceed 5 amps, please use and appropriate use a slave relay.

4-20mA Outputs: Connect 10 & 11 to 4-20mA input (10 = -, 11 = +). This is the conductivity or resistivity or Salinity output. Connect 12 & 13 to 4-20mA input (12 = -, 13 = +). This is the temperature output.

Sensor Connections:
Remove ESD shield and install wires. Replace ESD shield after wires are connected .

2 contact sensor - connect sensor wires to terminal 17 & 18. Place a jumper wire from 17 to 16 and from 18 to 19. Connect shield wire to terminal 20.

4 contact sensor - connect sensor wires to terminal 16-19. Connect shield wire to terminal 20.

Temperature sensor - connect temperature sensor wires to terminals 15 & 16.

Part 4 CX3000 Overview (cont.)

4-4 Description of terminal function:

2-CONTACT Sensor Wiring

SHIELD (20) - Connected to the shield wire of the cable
CELL 1 (19) - Jumper to #18
CELL 2 (18) - Red wire of Sensorex cable (Cond)
CELL 3 (17) - Black wire of Sensorex cable (Cond)
CELL 4 (16) - Jumper to #17 + White wire Sensorex (TC)
T/P - Green wire of Sensorex cable (TC)

4-CONTACT Sensor Wiring

(20) - Connected to the shield wire of the cable
(19) - CELL 1
(18) - CELL 2
(17) - CELL 3
(16) - CELL 4 & TC
(15) - TC

(11) 4~20mA(+)terminal : Master measurement current output terminal +, for external recorder or PLC control
(12) 4~20mA(-)terminal : Master measurement current output terminal -, for external recorder or PLC control

(13) 4~20mA(+)terminal: Temperature current output terminal +, for external recorder or PLC control
(14) 4~20mA(-)terminal: Temperature current output terminal -, for external recorder or PLC control

(7,8)REL 1 : External relay terminal High Point control
(5,6)REL 2 : External relay terminal Low Point control External wash relay terminal
(3,4)WASH : External wash relay terminal
(1,2) 100~240AC : Power supply terminal

Part 5 CX3000 Configuration

5.1 Front Panel

The CX30000 keypad is designed for ease-of-use. See graphic below for keypad function.

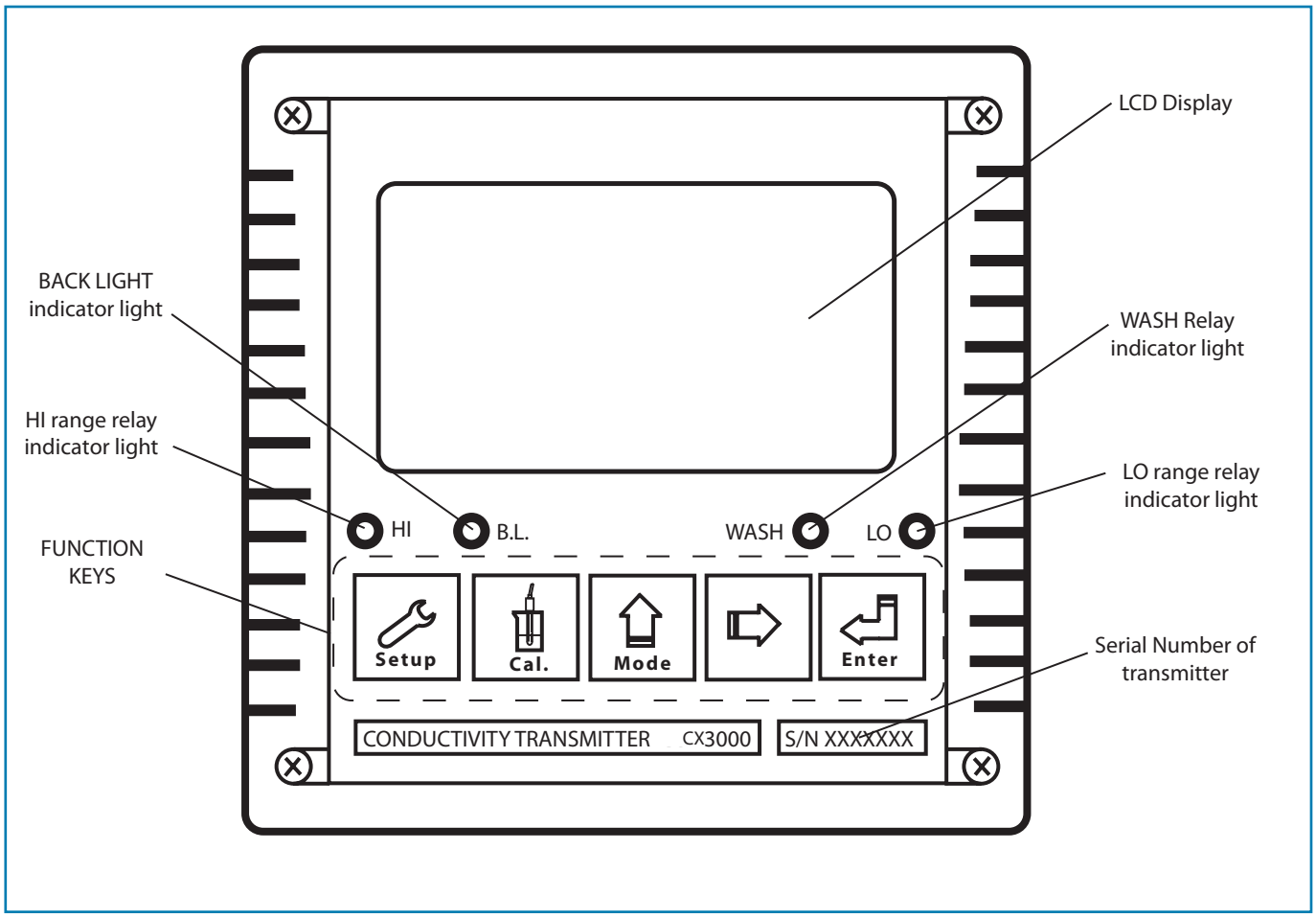
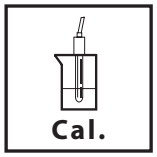


Figure 5-1

5.2 Function Keys:

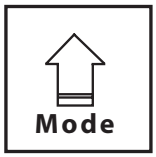
In the parameter set-up mode, pressing this key allows you exit parameter set-up mode and back to Measurement mode.



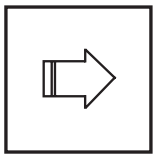
In the Calibration mode, pressing this key allows you exit Calibration mode and back to Measurement mode.

Part 5 CX3000 Configuration(cont.)

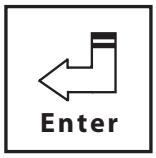
5.2 Function Keys:



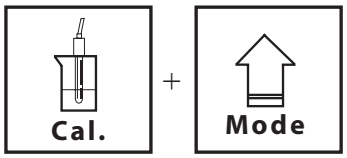
In the parameter set-up mode and Calibration mode, pressing this key to increase the value or to scroll to other function.



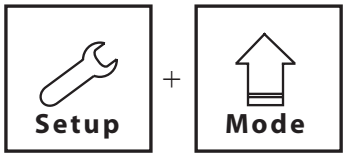
In the parameter set-up mode and Calibration mode, pressing this key to decrease the value or to scroll to other function.



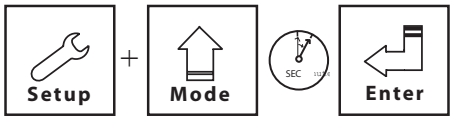
Key for confirmation; pressing this key is essential when modifying data value or selecting the parameter setting items in the window.



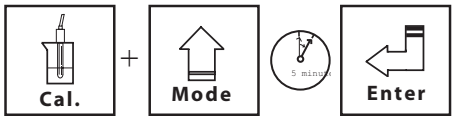
In the Measurement mode, pressing these two keys simultaneously allows you enter Calibration mode.



In the Measurement mode, pressing these two keys simultaneously allows you to enter parameter set-up mode.



In the Measurement mode, press the ***"SETUP"*** and ***"MODE"*** keys simultaneously for five seconds, and then press ENTER until you see a clock signal appearing on the display then stop pressing all keys to restore factory default settings.



Restore factory default calibration's settings. In the Measurement mode, press the ***"CAL"*** and ***"MODE"*** keys simultaneously for five seconds, and then press ***"ENTER"*** until you see a clock signal appearing on the display; then stop pressing all keys to restore factory default settings.

Part 5 CX3000 Configuration(cont.)

5.3 LED indicators:

HI: High set point indicator light; when the high set point is reached, the REL1 indicator will light.

B.L.: Light sensor; in the automatic display backlit mode, the lamp will light or go out depending on environmental brightness.

WASH: Washing device indicator light; when the washing device is started up, the indicator will light.

LO: Low set point indicator light; when the low set point is reached, the REL2 indicator will light.

Part 5 CX3000 Configuration(cont.)

5-4 Display Icons:

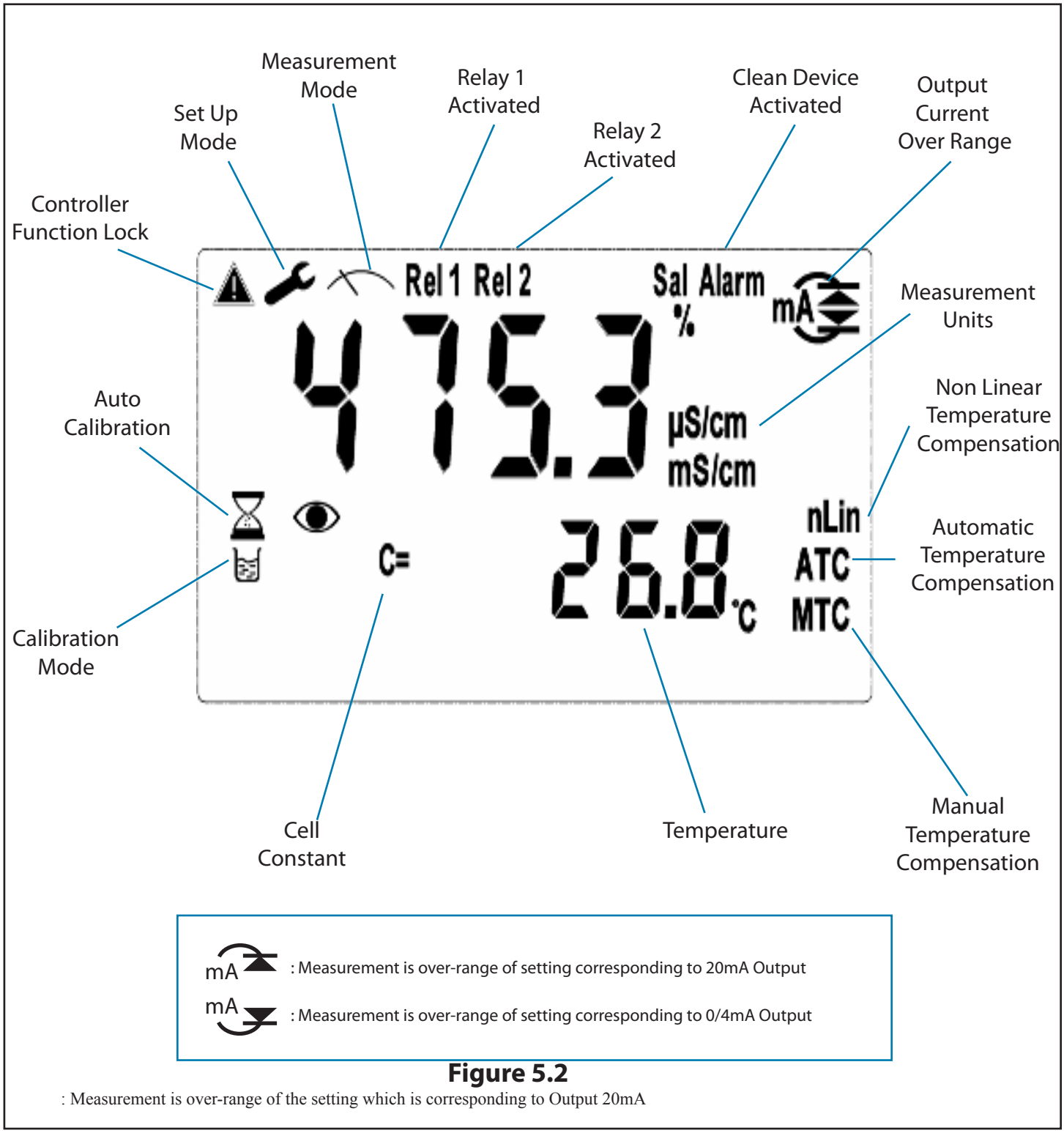
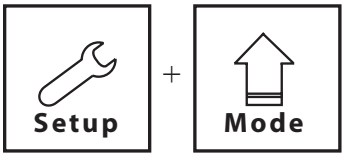


Figure 5.2

: Measurement is over-range of the setting which is corresponding to Output 20mA

Part 5 CX3000 Configuration(cont.)



Set-up mode:
In the measurement mode, pressing the SETUP and MODE keys simultaneously allows you enter the parameter set-up mode. You can return to the measurement mode at any time by pressing the ***"SETUP"*** key .

Security Code Settings:
In the set-up mode, you can set up the code by following the steps below The original code is 1111. You can change the code to any 4-digit code you desire by following the same procedure as you used to enter the "1111" code.

Part 6 CX3000 Operation

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

6.2 Set-up mode:
PRESS ***"SET UP"*** AND ***"MODE"*** SIMULTANEOUSLY
Please refer to the set-up instructions in Chapter 7, and press ***"SETUP"*** key to return to measurement mode.

6.3 Calibration mode:
PRESS ***"CAL"*** AND ***"MODE"*** SIMULTANEOUSLY
Please refer to the calibration instruction in Chapter 8, and press ***"CAL"*** key to return to measurement mode.

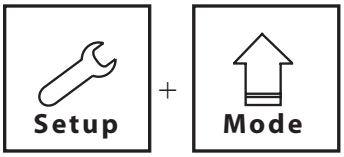
6.4 Reset:
6.4.1 Master reset:
In the Measurement mode, press the ***"SETUP"*** and ***"MODE"*** keys simultaneously for five seconds, and then press the "ENTER" key until you see a clock signal appearing on the display. Release all keys and then factory default settings will be restored.

Factory defaults:
Measurement mode: *Cond Temperature*
Temperature compensation: *NTC*
High point alarm: *AUTO, SP1= 100.0 mSpH, db1= 0.10 mS/cm*
Low point alarm*: AUTO, SP2 =00.10 uS/cm, db2= 00.10 uS/cm*
Wash time: *ON = 0 sec, OFF0.0 hrs, db = 0 sec*
Cond current output: *4~20 mA, 0.000uS/cm~199.9mS/cm*
TP current output: *4~20 mA, 000.0~100.0˚C*
Backlit Display: *AUTO, b.L =0, SEnS=0*
Code set-up: *OFF*

6.4.2 Calibration reset:
In the Measurement mode, press the ***"CAL"*** and ***"MODE"*** keys simultaneously for five seconds, and then press the "ENTER" key until you see a clock signal appearing on the display. Release all keys and then factory default calibration settings will be restored.

Factory defaults:
Cell Constant: 1.0000
Standard Solution: 1413uS/cm
Calibration mode: Single-Point Calibration

Part 7 CX3000 Settings



7.1 Set-up mode

In the measurement mode, pressing the ***"SETUP"*** and ***"MODE"*** keys simultaneously allows you enter the parameter set-up mode. You can return to the measurement mode at any time by pressing the key ***"SETUP"*** key.

7.2 Security

In the set-up mode, you can set up the code by pressing the key ***"MODE"*** , and confirm by pressing the ***"ENTER"*** key . The original code is 1111.

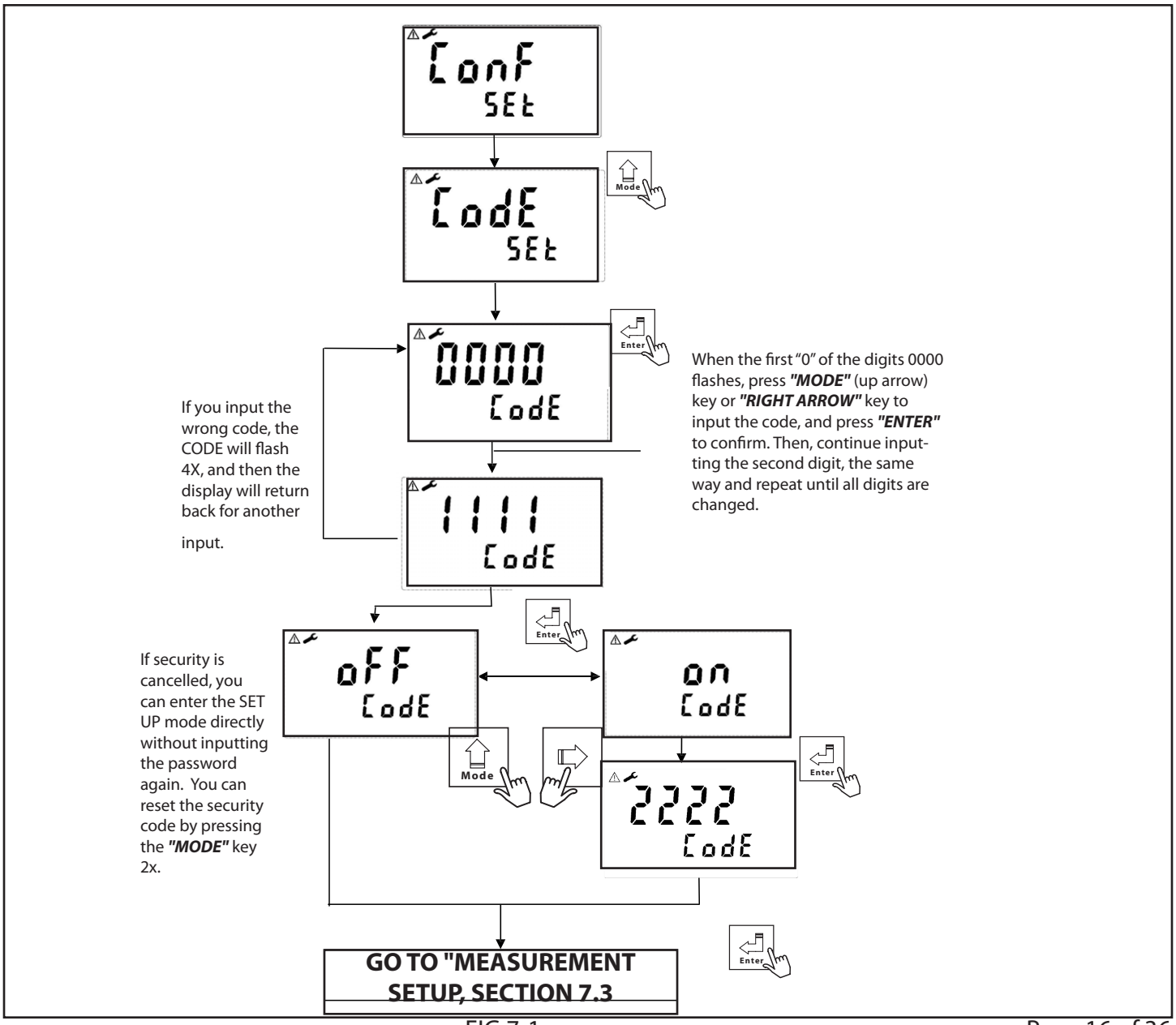


FIG 7-1

Part 7 CX3000 Settings(cont.)

7.3 Measurement Unit Mode

In the measurement unit mode, you can choose units for conductivity (Cond), resisitivity (RES) or salinity (SALT).

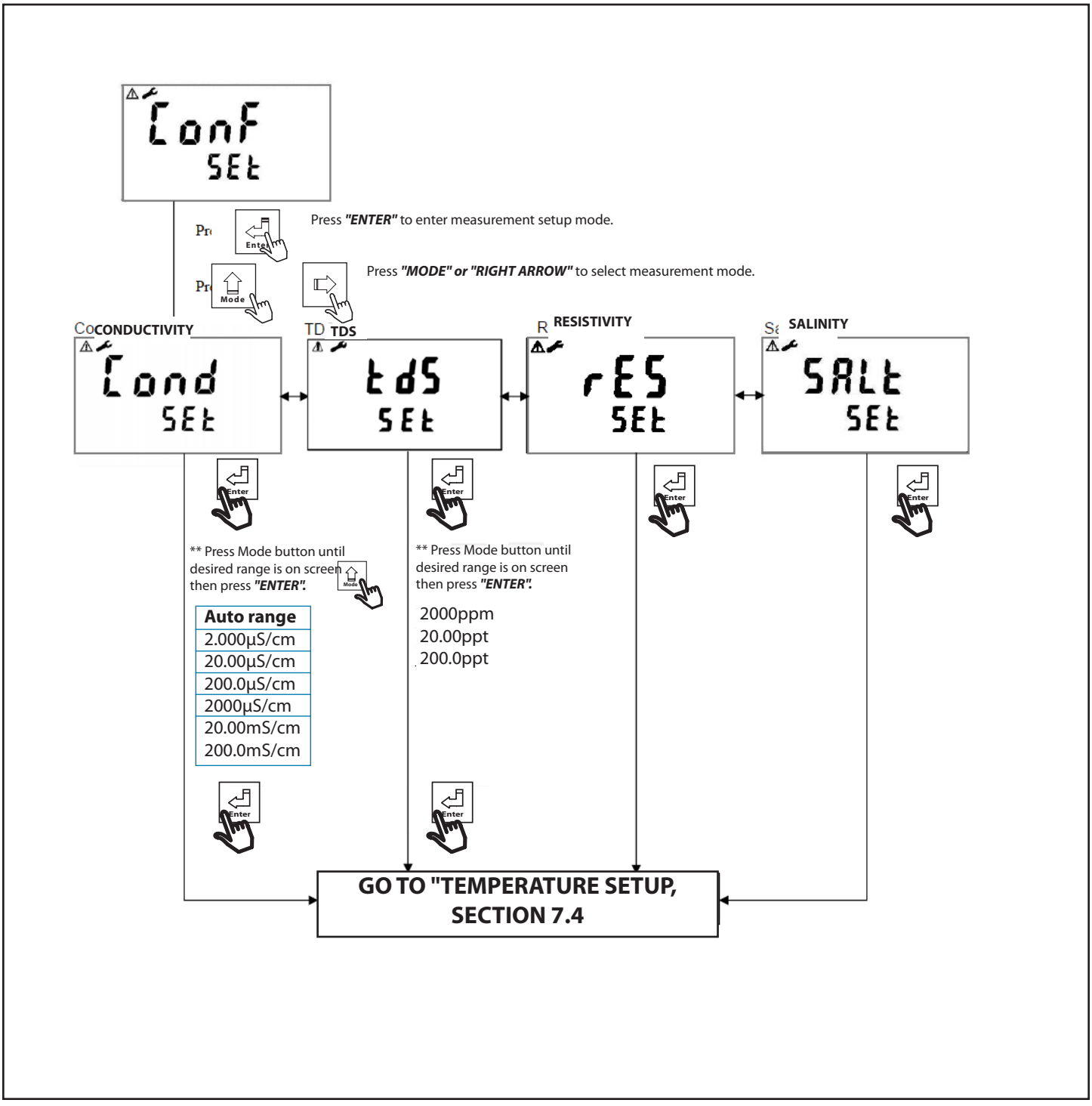


FIG 7-2

Part 7 CX3000 Settings(cont.)

7.4 Temperature measurement mode

In the Temperature measurement unit mode, you can choose the type of temperature sensor (NTC 30K) or PTC (1000 Ω RTD)

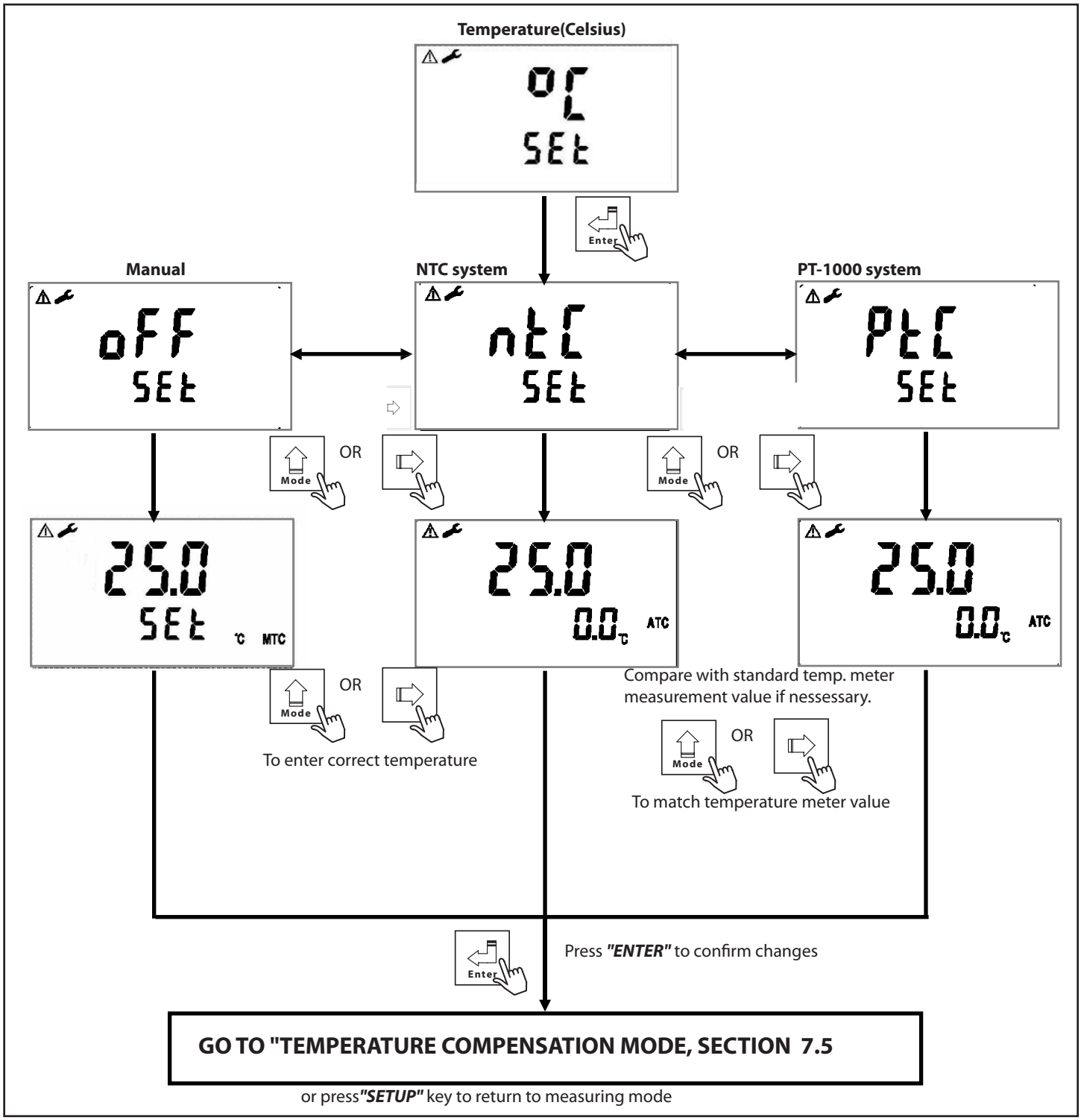


FIG 7-3

Part 7 CX3000 Settings(cont.)

7.5 Temperature Compensation Mode

In the temperature compensation mode, you can choose linear compensation range from 0.00% to 20.00% or non-linear for resistivity compensation.

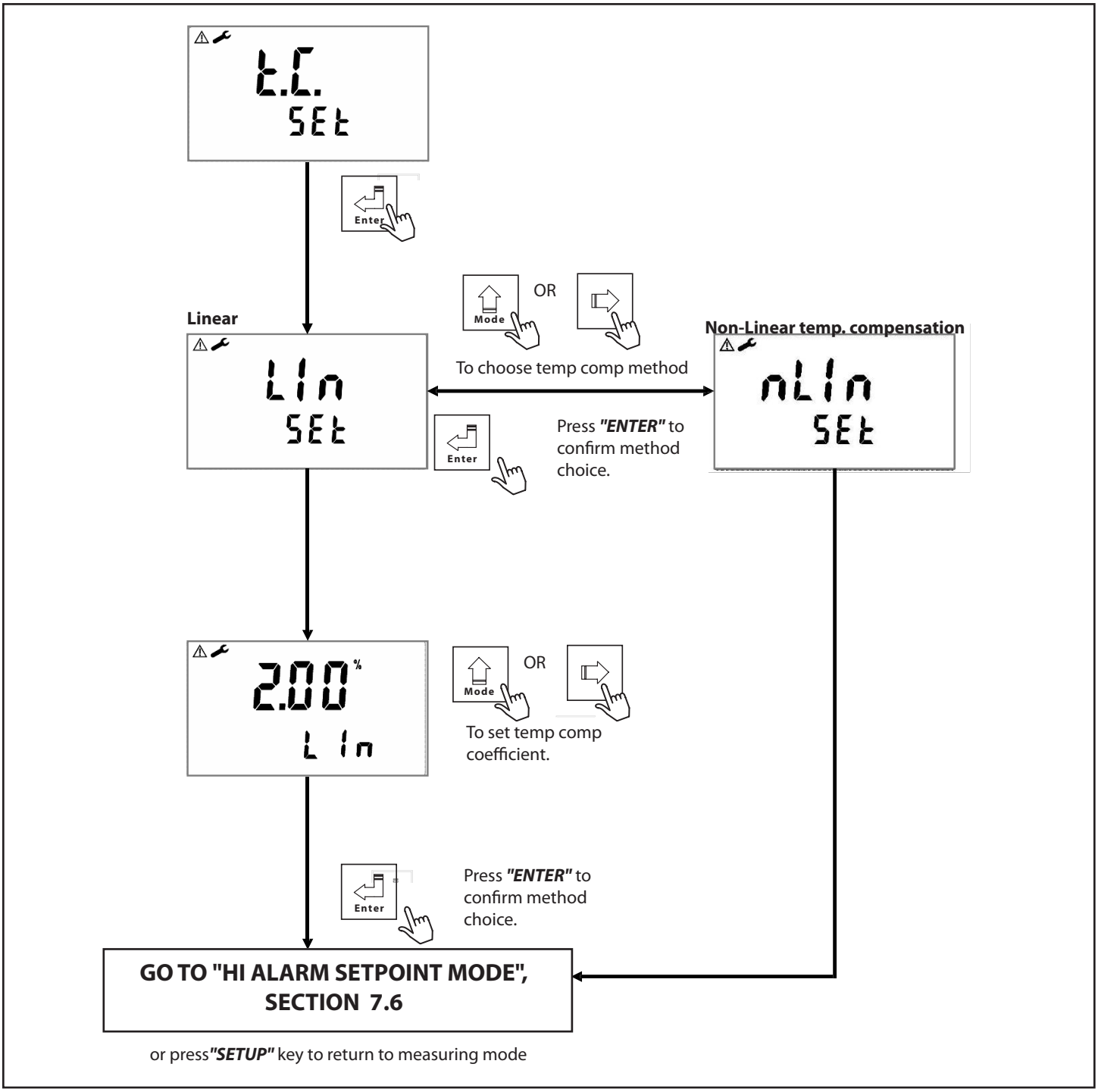


FIG 7-4

Part 7 CX3000 Settings(cont.)

7.5 Standby Mode

In the standby mode, you can choose Auto or ON for standby. Auto will set the return to MEASUREMENT mode to 3 minutes if no keys are touched. Choosing ON for standby requires you to press ***"SETUP"*** key to return to MEASUREMENT mode.

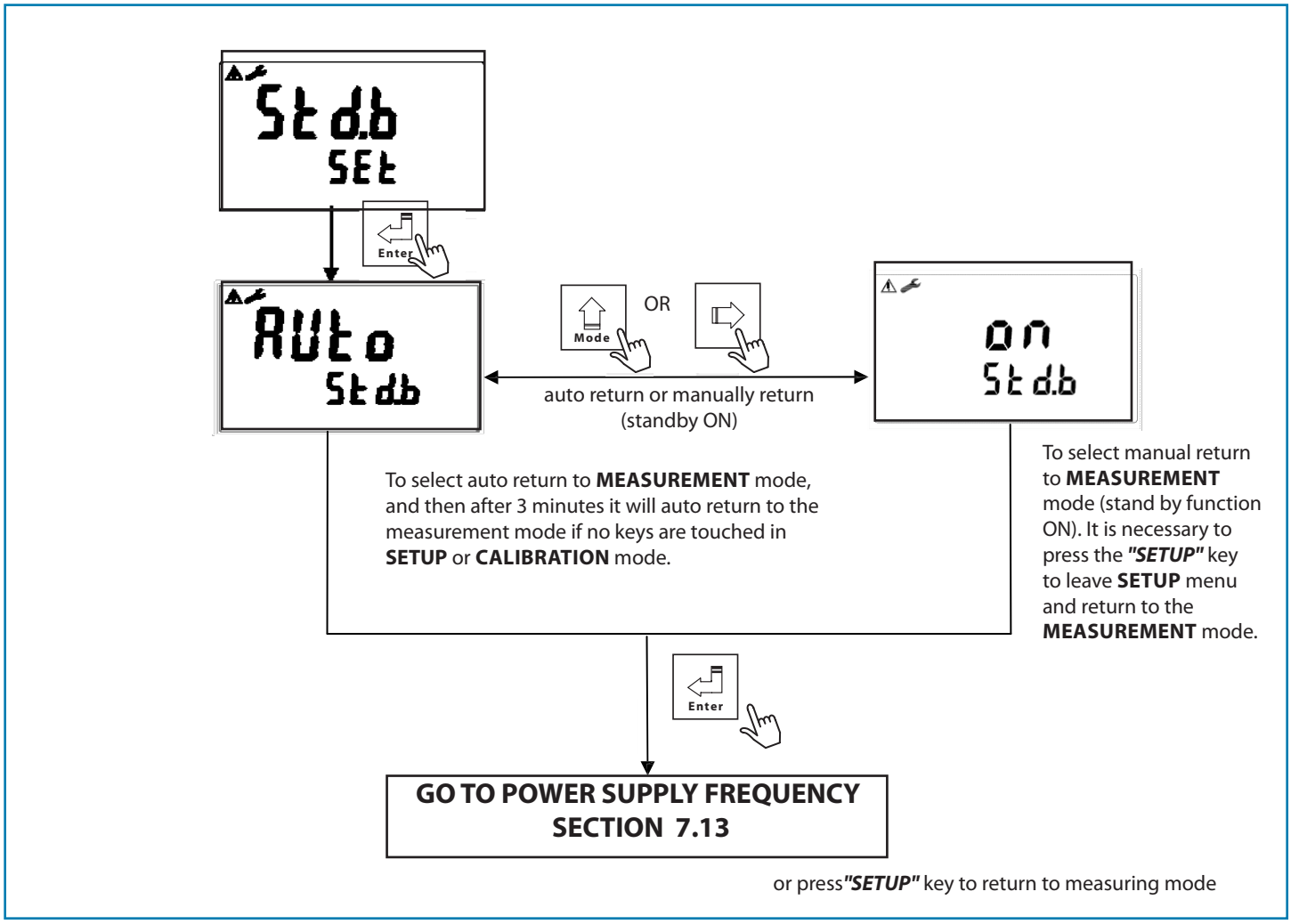


FIG 7-5

Part 7 CX3000 Settings(cont.)

7.7 HI POINT SETTING

Set Hi (REL1) setpoint threshold(TH) and dead band value (DB). The range of threshold and deadband are:

Resistivity:	0.00MΩ~19.99MΩ	**Deadband:**	0.00MΩ~19.99MΩ
Conductivity:	0.000µs~199.9mS	**Deadband:**	00.00µs ~199.9 mS
Salinity:	0.0ppt~70.0ppt	**Deadband:**	0.0ppt~7.0ppt

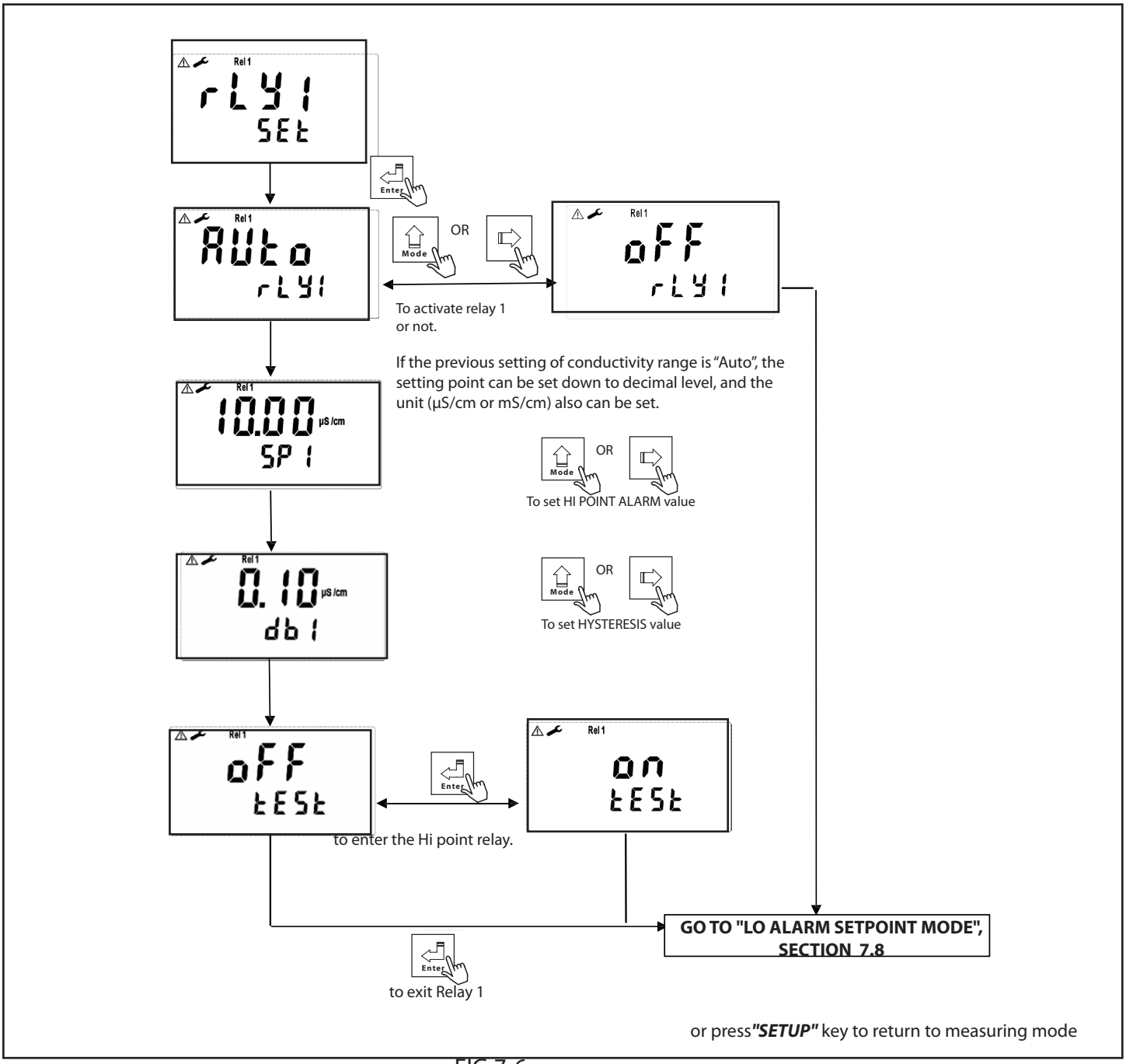


FIG 7-6

Part 7 CX3000 Settings(cont.)

7.8 LO POINT SETTING

Set Lo (REL2) setpoint threshold(TH) and dead band value (DB). The range of threshold and deadband are:

Resistivity:	0.00MΩ~19.99MΩ	**Deadband:**	0.00MΩ~2.00MΩ
Conductivity:	0.000µs~199.9mS	**Deadband:**	00.00µs ~199.9 mS
Salinity:	0.0ppt~70.0ppt	**Deadband:**	0.0ppt~7.0ppt

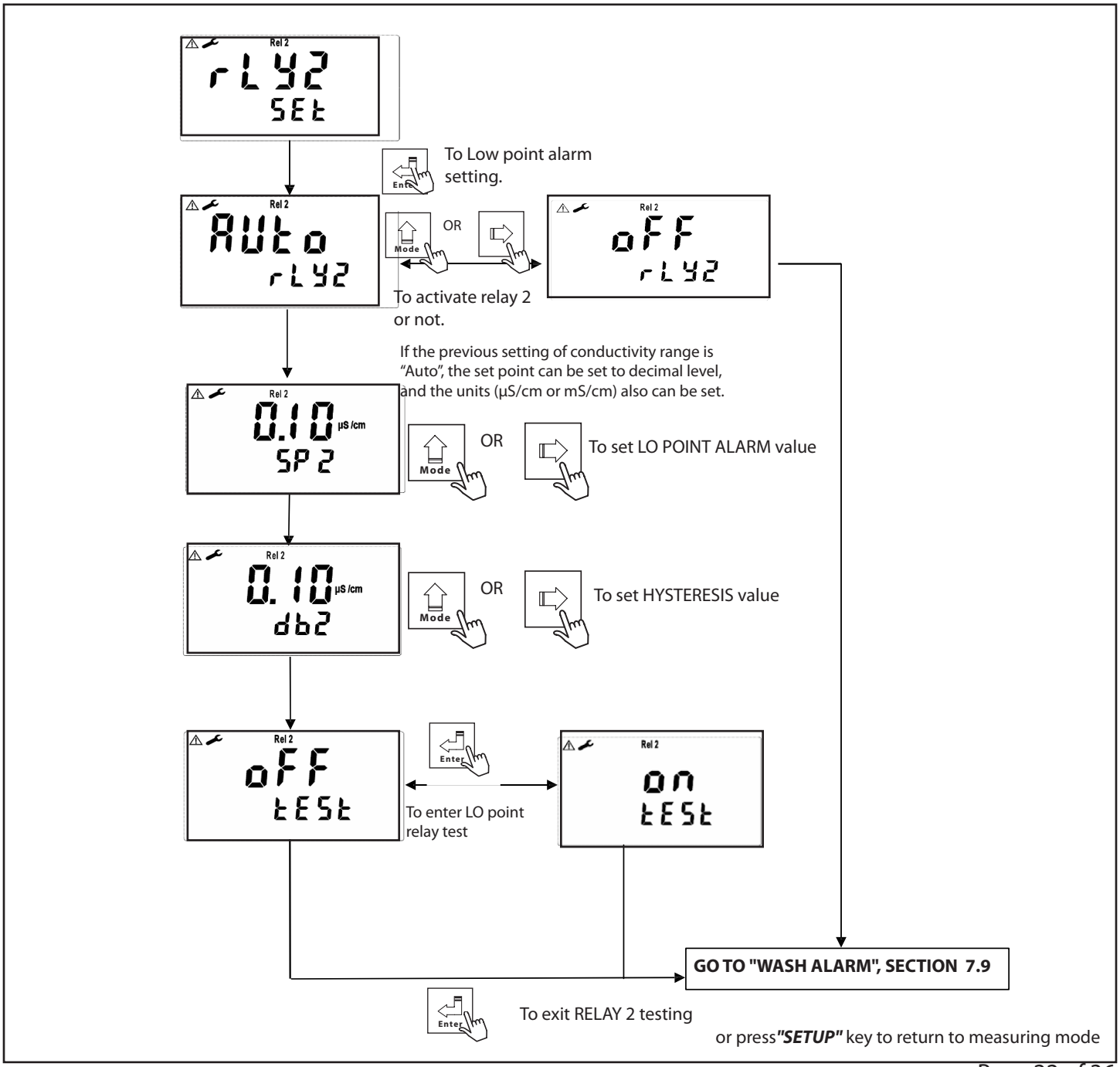


FIG 7-7

Part 7 CX3000 Settings(cont.)

7.9 WASH Alarm -

Set the automatic starting time and turnoff time of the washing function. If any value is set to be 0, the transmitter will automatically stop this function.

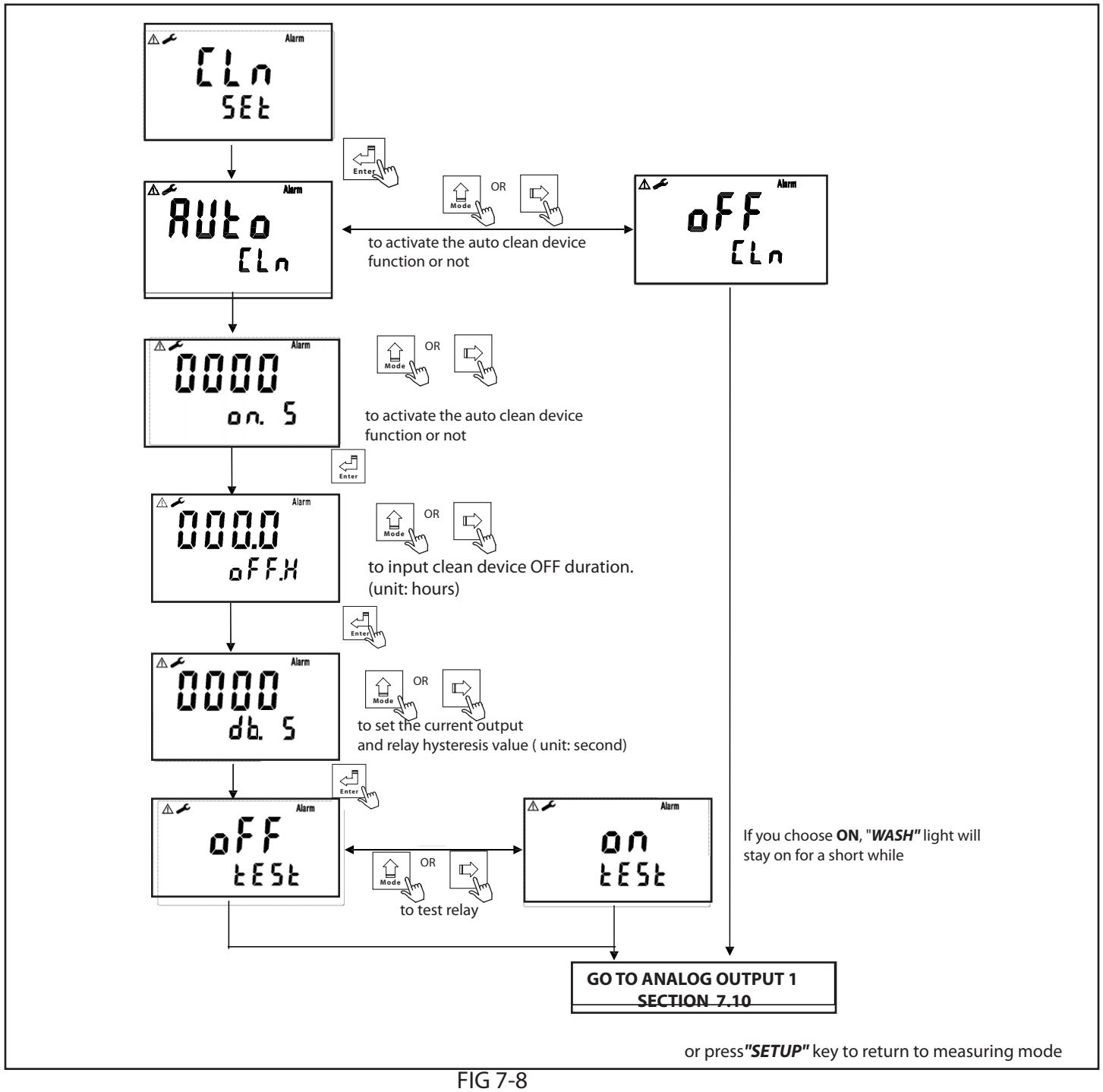


FIG 7-8

Part 7 CX3000 Settings(cont.)

7.10 Analog Output 1 (Conductivity/Resistivity/Salinity)

This mode allows you to set the analog output as 4-20mA or 0-20mA for Conductivity/Resistivity/Salinity.

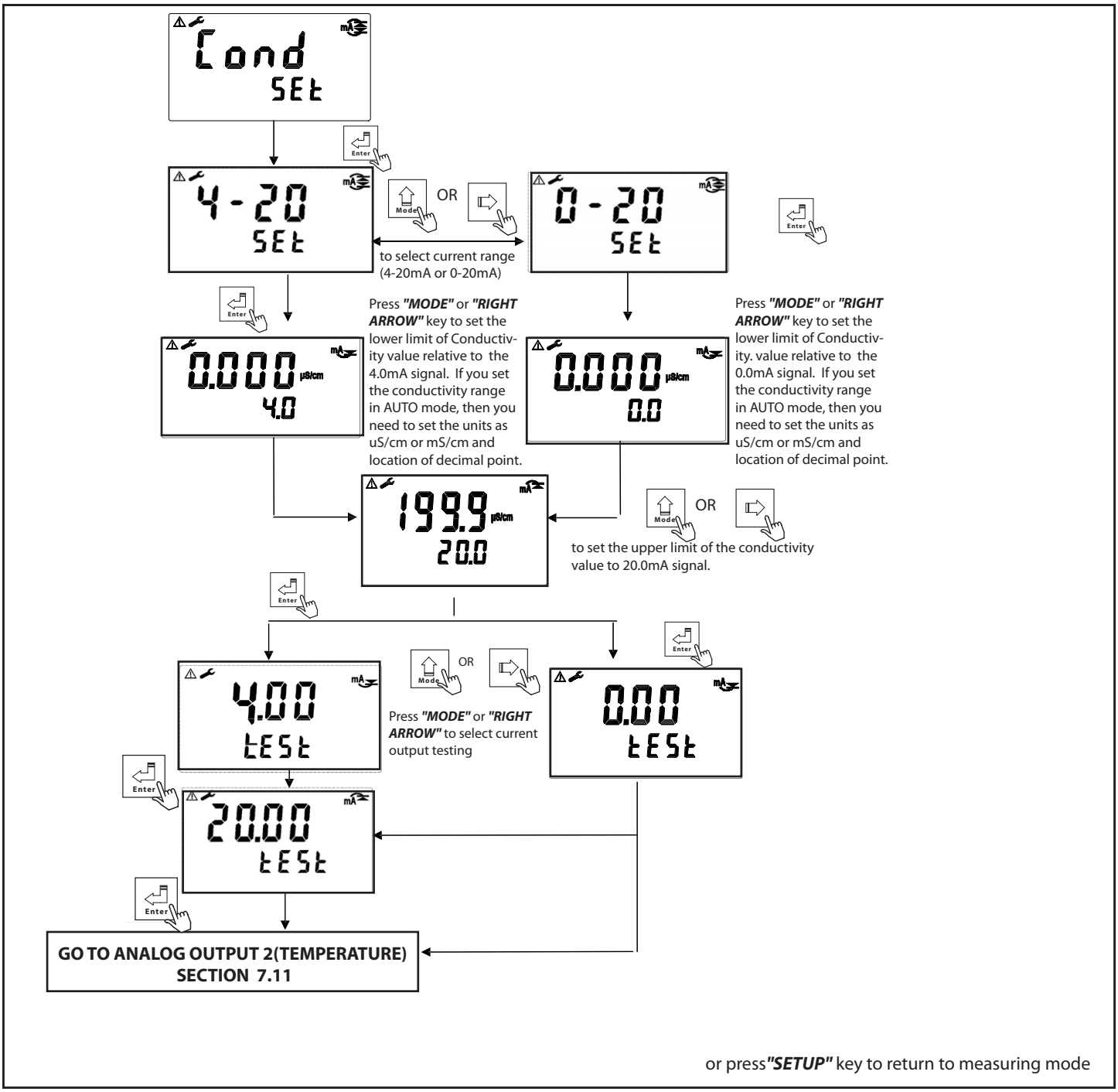


FIG 7-9

Part 7 CX3000 Settings(cont.)

7.11 Analog Output 2 (Temperature)

This mode allows you to set the analog output as 4-20mA or 0-20mA for temperature (deg C only).

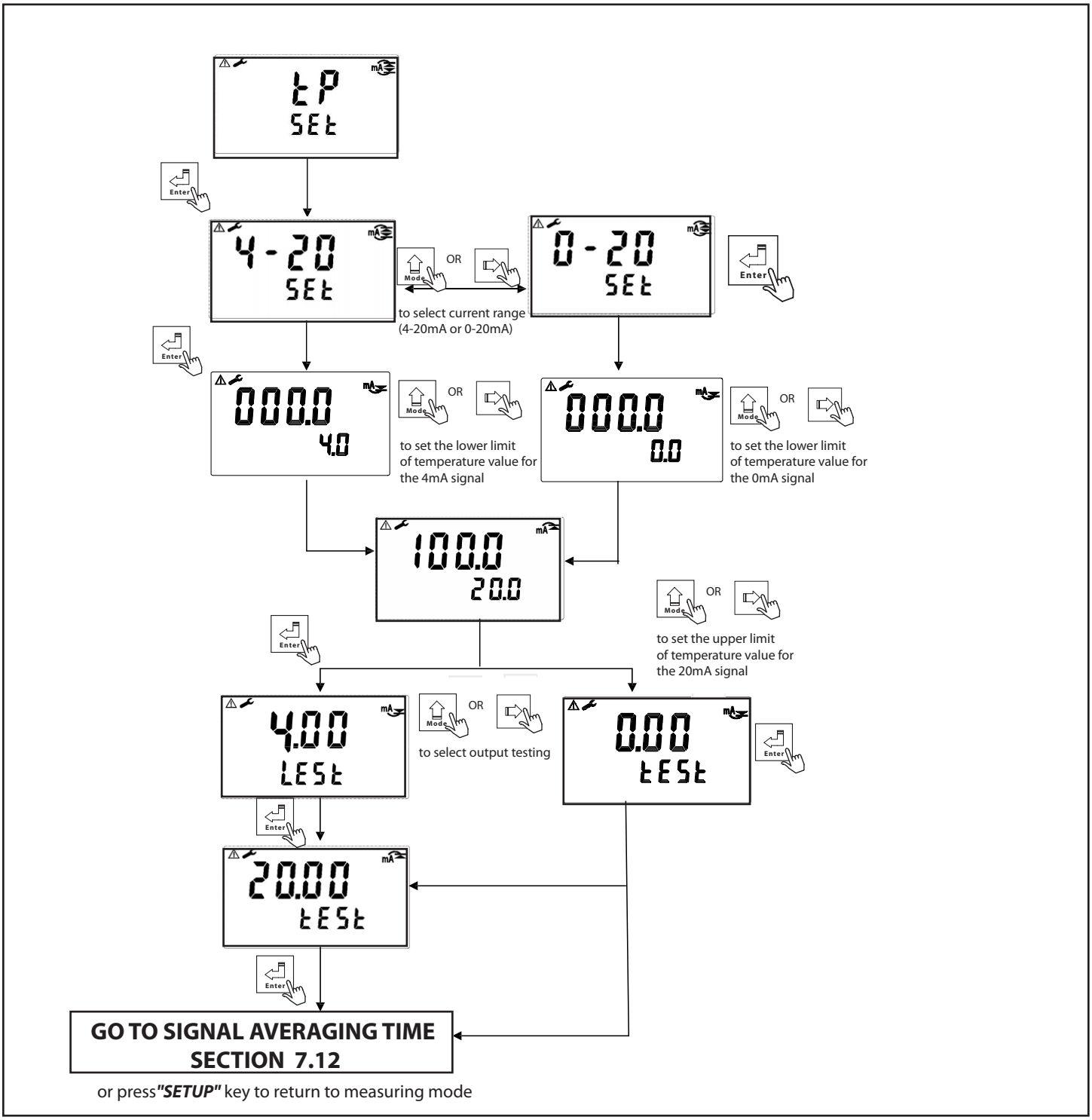


FIG 7-10

Part 7 CX3000 Settings(cont.)

7.12 Signal Averaging

This mode allows you to set the signal averaging time (0-60 seconds) to increase stability of displayed signal

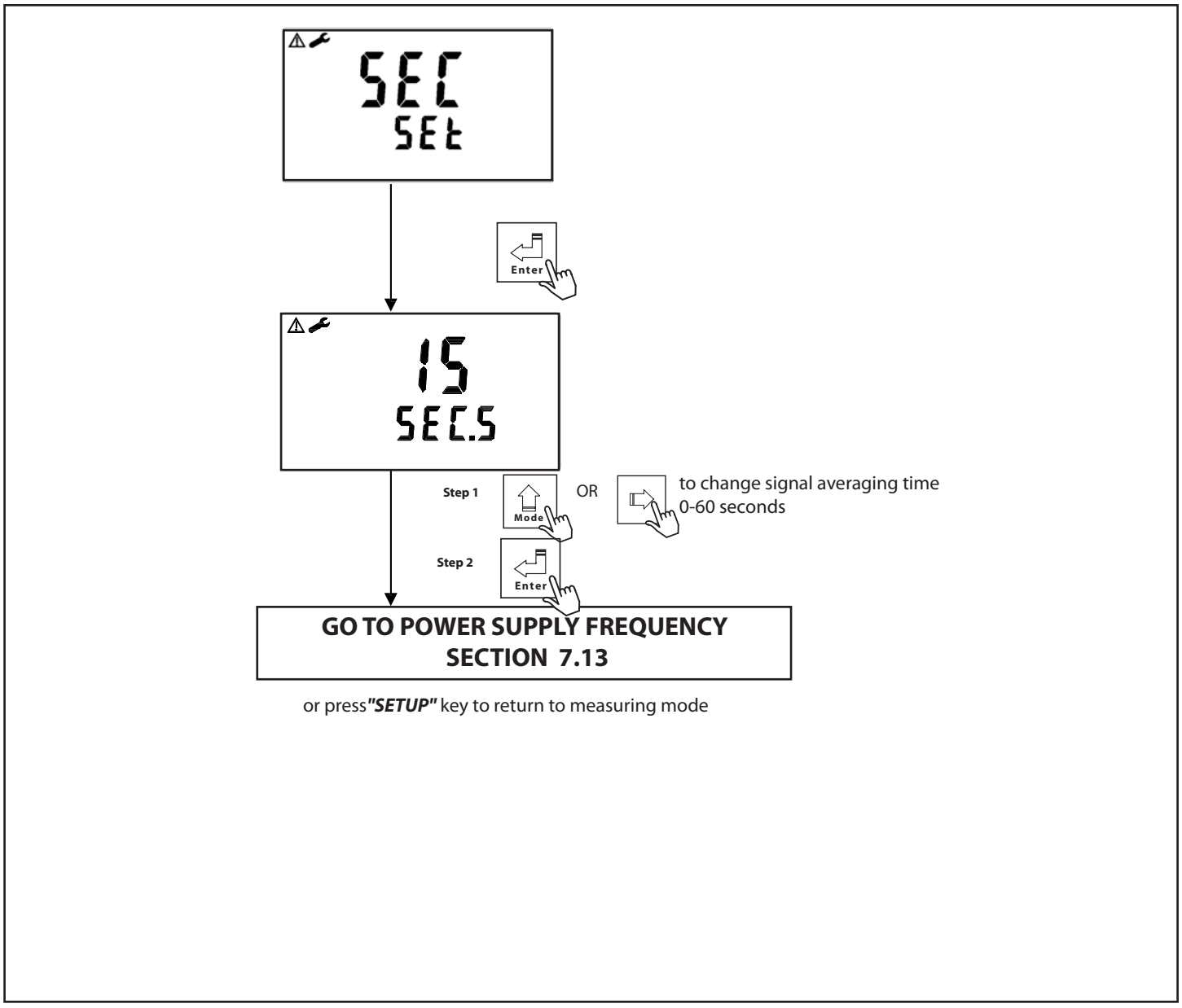


FIG 7-11

Part 7 CX3000 Settings(cont.)

7.13 Power Supply Frequency Mode

This mode allows you to set the power supply frequency (U.S. 60HZ, Others 50Hz)

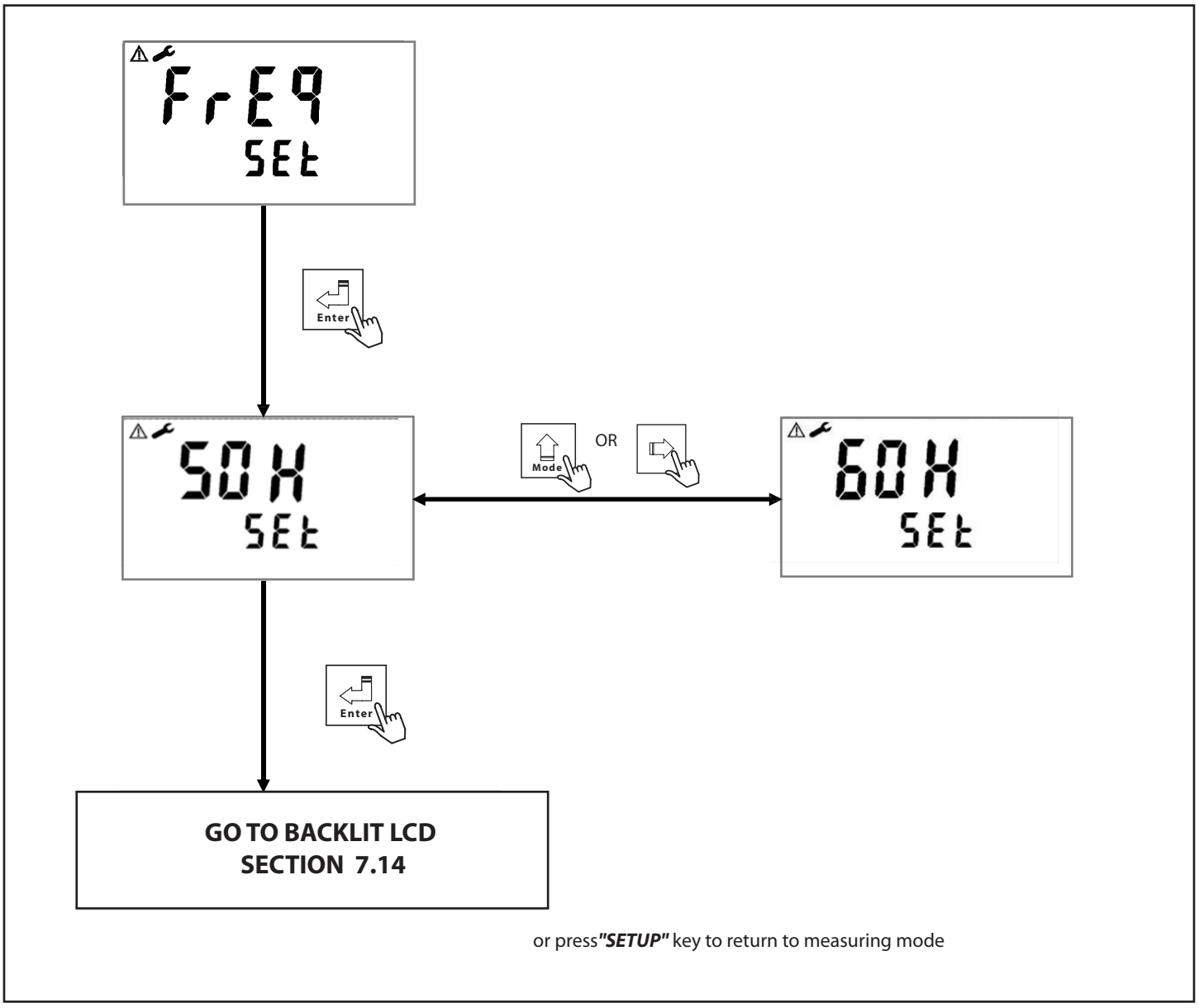


FIG 7-12

Part 7 CX3000 Settings(cont.)

7.14 Backlit LCD Mode

This mode allows you to set the Backlit LCD to AUTO, On or OFF. In the AUTO mode it allows for setting of the LCD brightness and light sensor sensitivity.

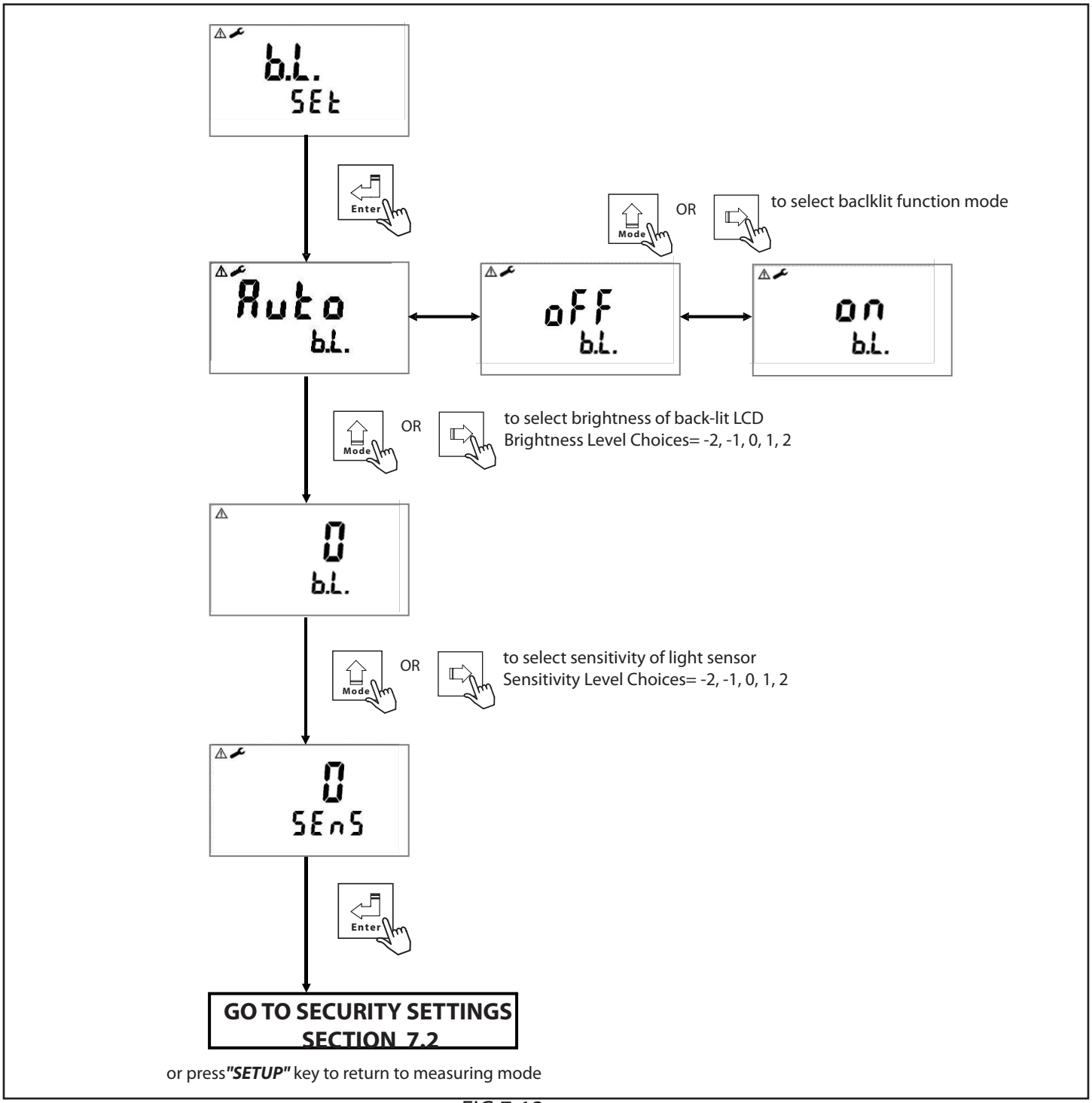


FIG 7-13

Part 8 CX3000 Calibration

8.1 Calibration Flow Charts

8.11 Calibration Flow Chart for Conductivity

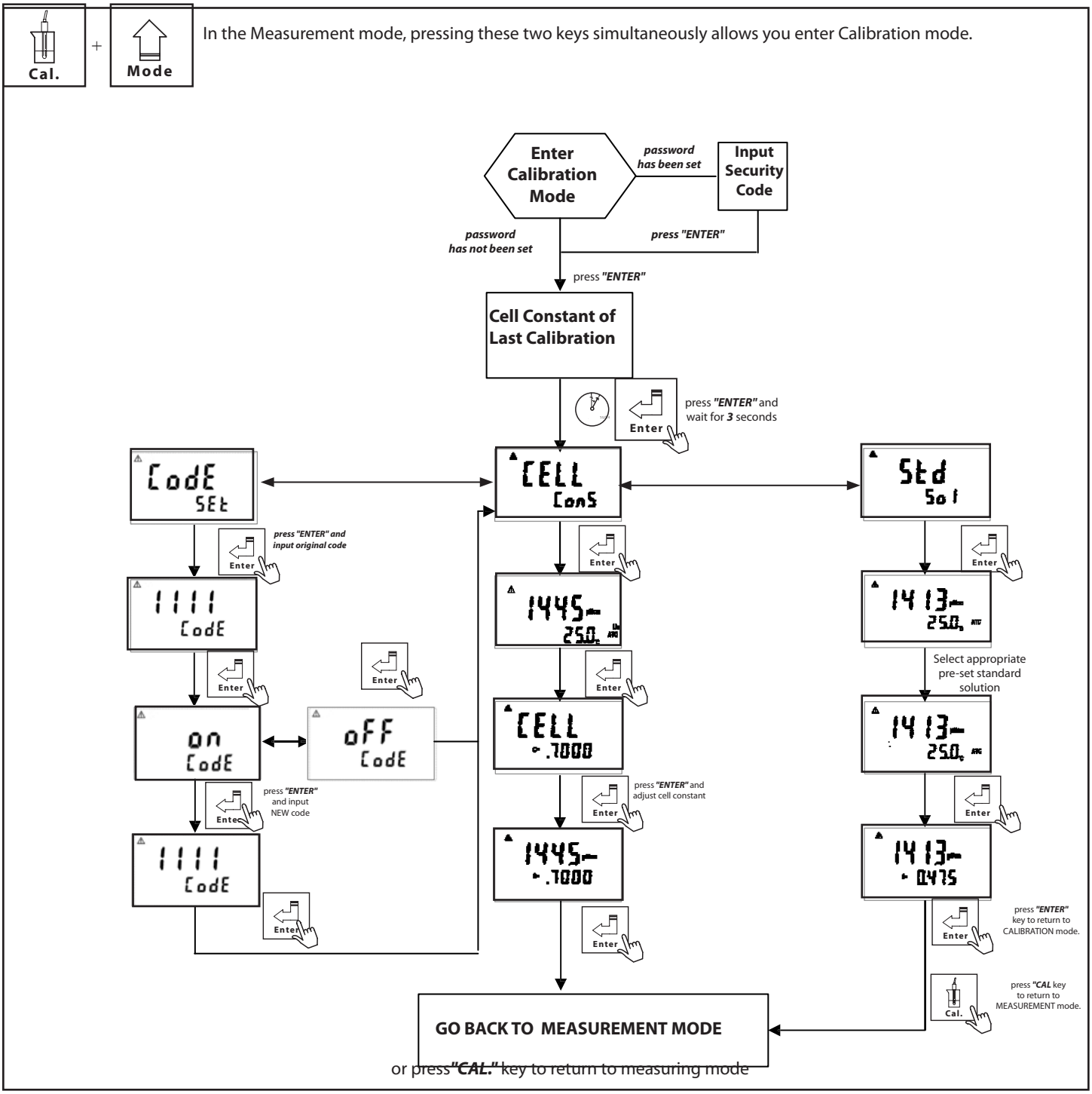


FIG 8-1

Part 8 CX3000 Calibration(cont.)

8.1 Calibration Flow Charts

8.12 Calibration Flow Chart for Salinity

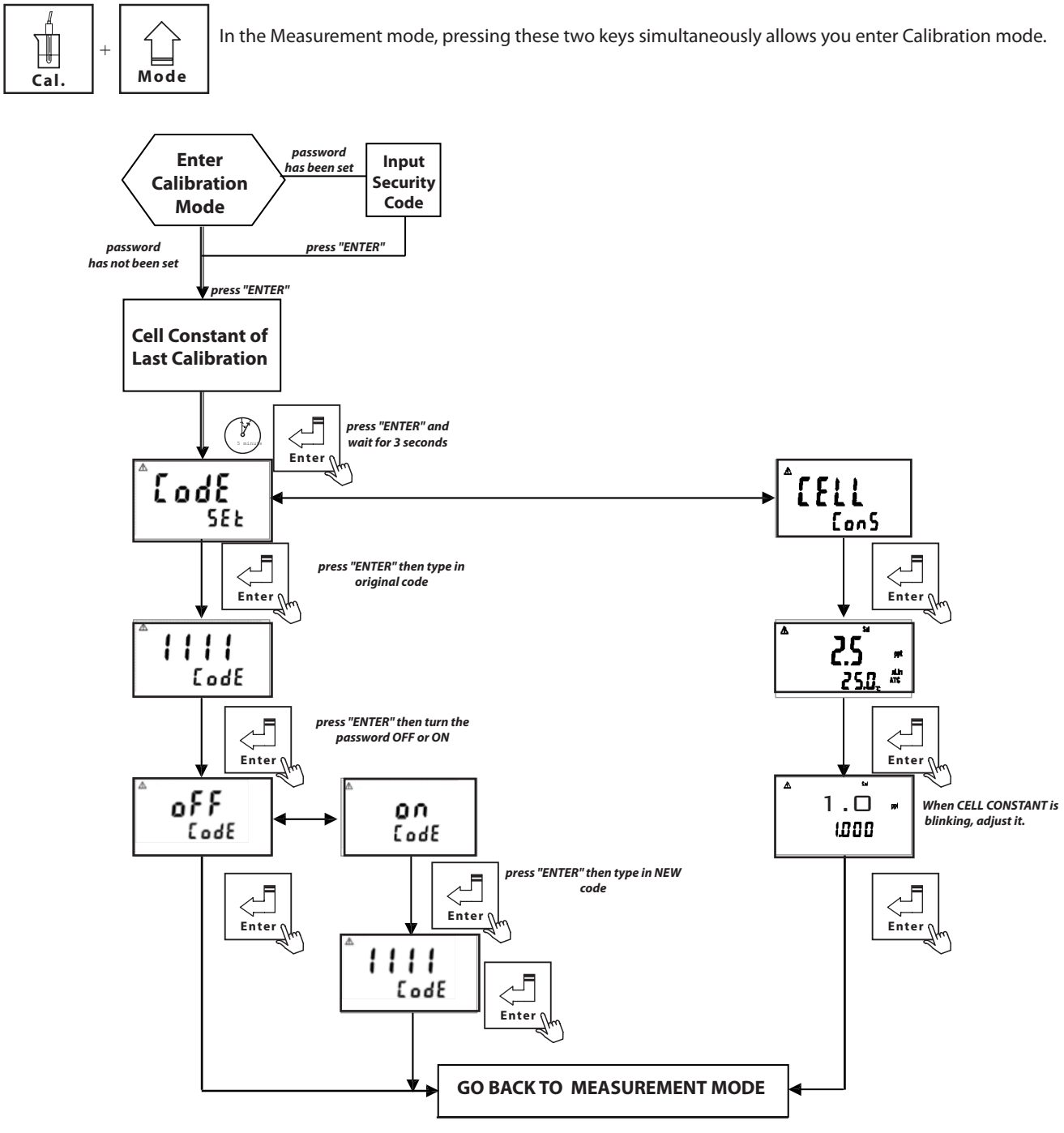
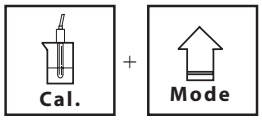


FIG 8-2

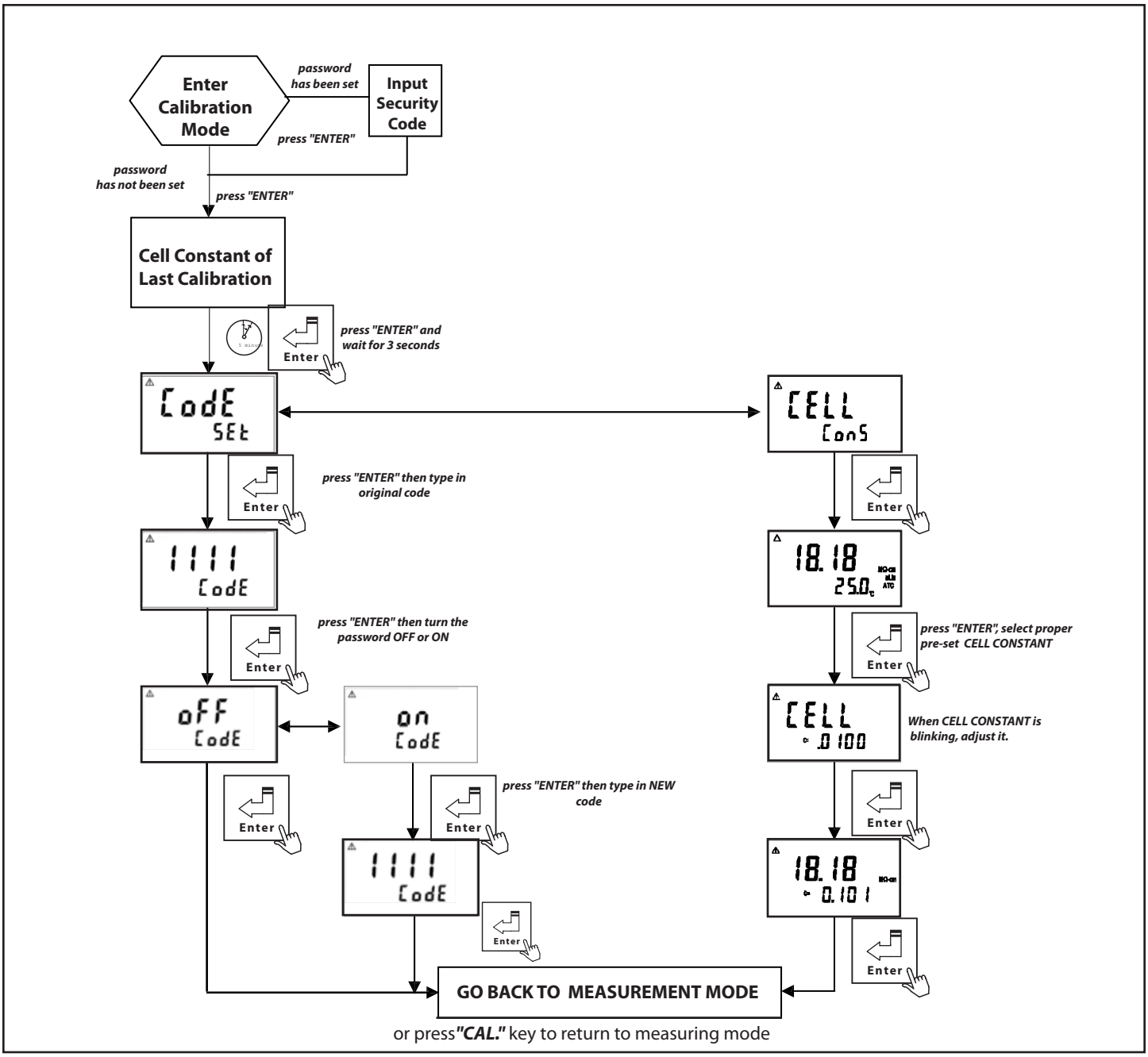
Part 8 CX3000 Calibration (cont.)

8.1 Calibration Flow Charts

8.13 Calibration Flow Chart for Resistivity



In the Measurement mode, pressing these two keys simultaneously allows you enter Calibration mode.

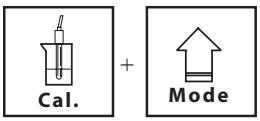


or press ***"CAL."*** key to return to measuring mode

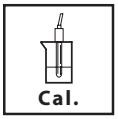
FIG 8-3

Part 8 CX3000 Calibration (cont.)

8.2 Entry of Calibration Mode

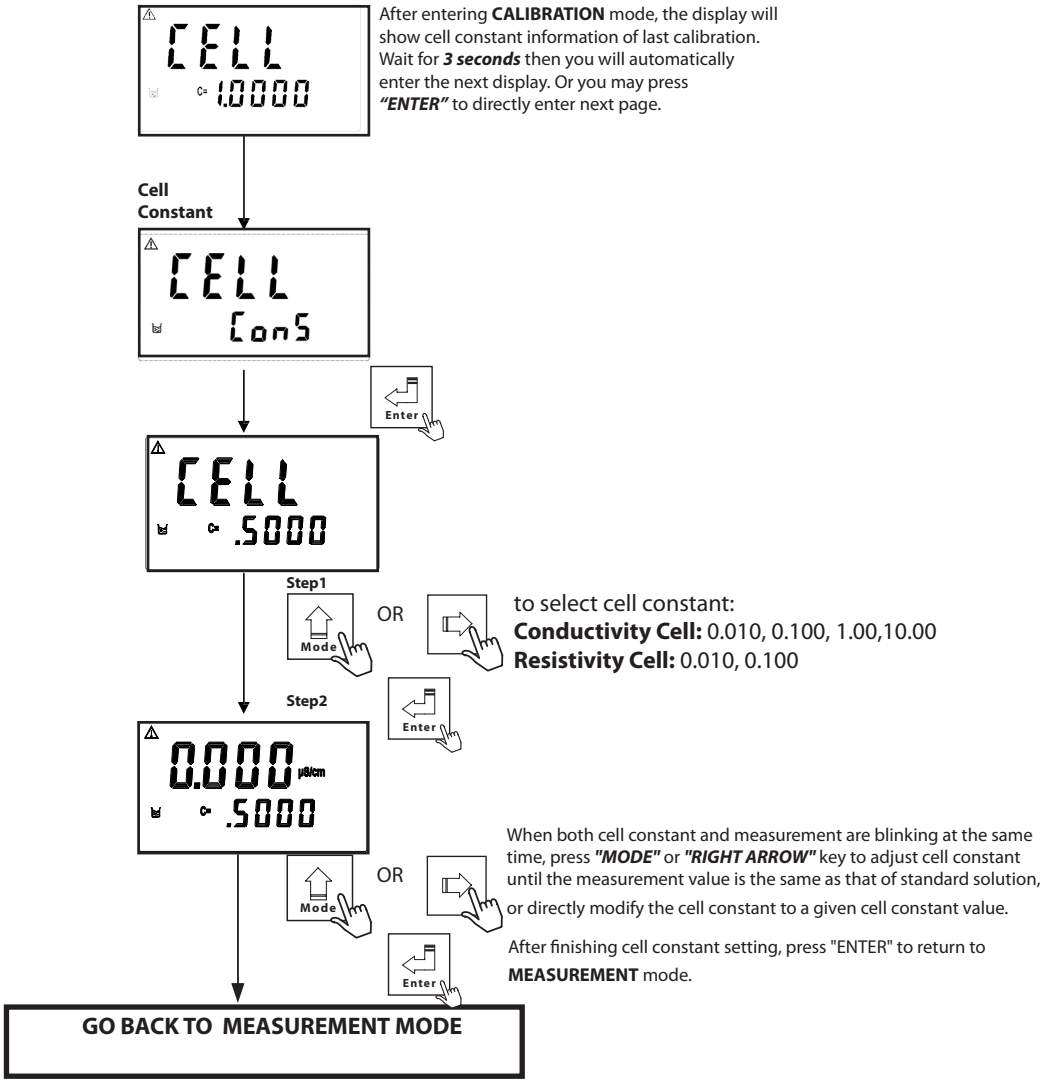


In the Measurement mode, pressing these two keys simultaneously allows you enter Calibration mode.



or press ***"CAL"*** key to return to measuring mode at any time

8.2.1 Setting the CELL CONSTANT

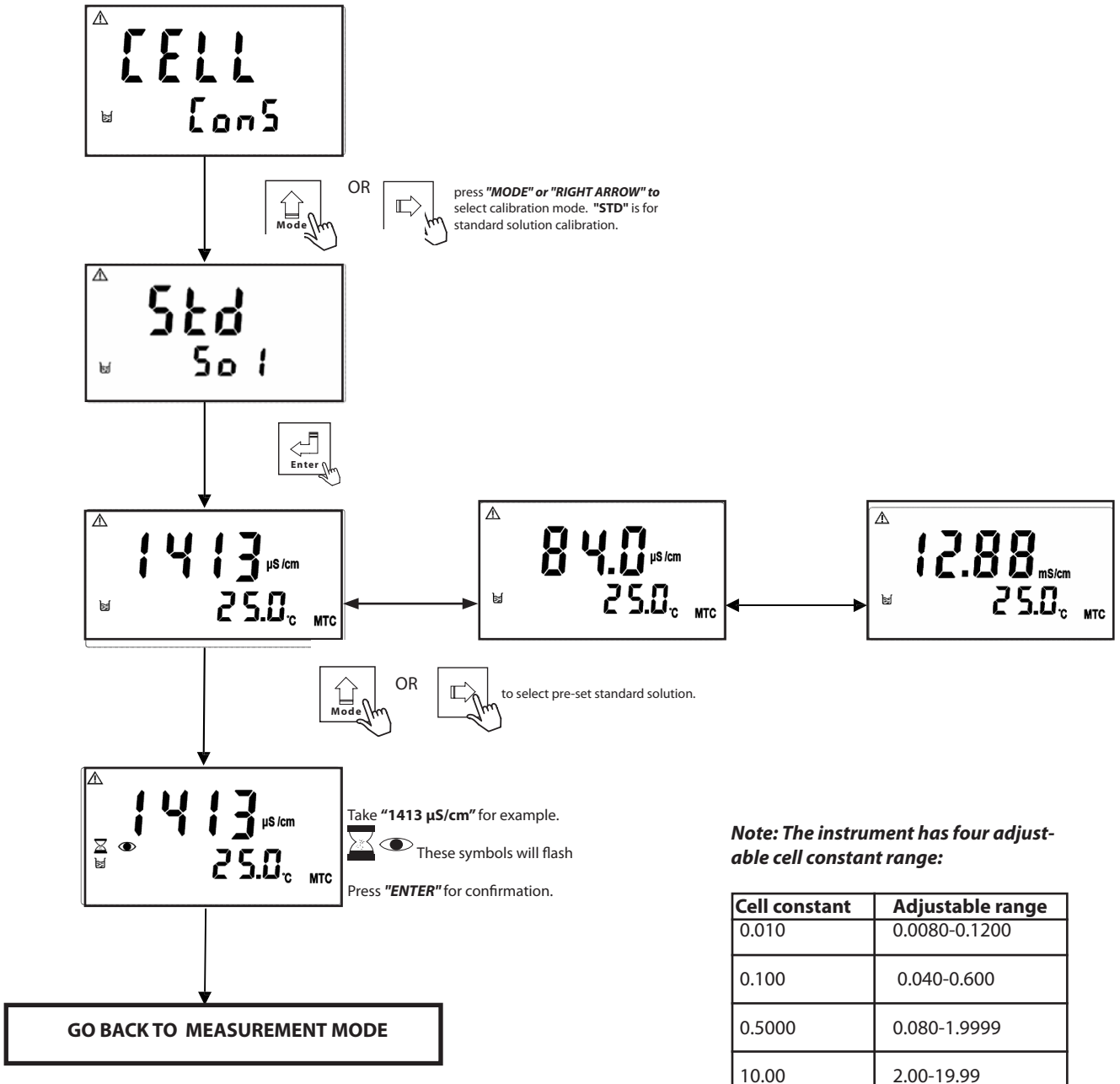


or press ***"CAL."*** key to return to measuring mode

FIG 8-4

Part 8 CX3000 Calibration (cont.)

8.2.2 Standard Solution Calibration



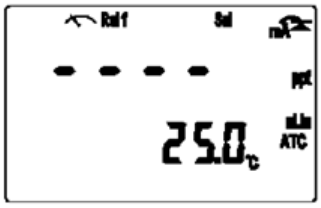
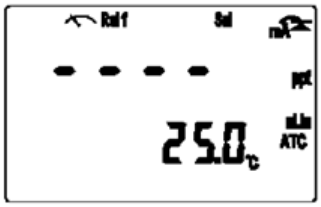
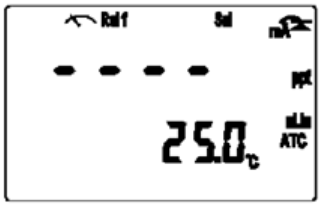
Note: The instrument has four adjustable cell constant range:

Cell constant	Adjustable range
0.010	0.0080-0.1200
0.100	0.040-0.600
0.5000	0.080-1.9999
10.00	2.00-19.99

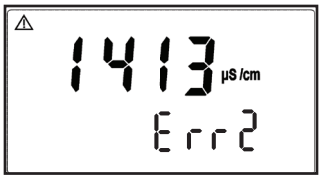
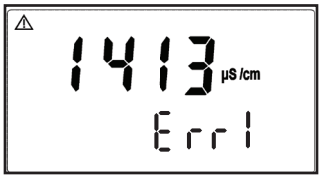
FIG 8-5

Part 9 CX3000 Troubleshooting (Error Messages)

9.1 Measurement Errors

Message	Reason	Action
	In resistivity measuring mode when the value is over the measuring range, the following figure will be appear (Measuring range: 00.00-19.99MΩ)	Please check the sensor's cable to see if it is broken. If it is ok, please check if the solution's resisitivity is over range.
	In conductivity measuring mode when the value is over measuring range, the following figure will be appear: (Measuring range: 00.00us-199.9ms	Please check the sensor's cable to see if it is shorted electrically. If it is OK, please check if the solution's conductivity is over range.
	In salinity measuring mode when the value is over the measuring range, the follow figure will be appear: (Measuring range: 0.0ppt~70.0ppt)	Please check the sensor's cable to see if it is broken. If it is OK, please check if the solution's salinity is over range.
	When temperature value is out of the display range, then the following figure will be appear: (Measuring range: -30°C -130°C)	Please check the sensor's temp cable to see if it is broken. If it is still normal, please check if the solution's temperature is over range.

9.2 Calibration Errors

Message	Reason	Action
	At calibration mode, calculated of RES cell constant over the range (19.99~0.0100), and the original saved cell constant will not change.	Please check if the sensor's cable is connected correctly. If normal, please call service people.
	During calibration, the measurement is not stable enough, and the original saved cell constant will not change.	Maintain the sensor or change a new sensor, and make another calibration.

Part 10 CX3000 Warranty and Product Returns

10.1 Warranty

The CX3000 Conductivity/Resistivity/Salinity transmitter/controller is supplied with a one-year warranty for material and workmanship from date marked on the product. No warranty, either expressed or implied, as to the useful life of the product is given. There are no implied warranties of merchantability or fitness for a particular purpose given in connection with the sale of any goods. In no event shall the seller be liable for consequential, incidental or special damages. The buyer's sole and exclusive remedy and the limit of the seller's liability for any loss whatsoever shall not exceed the purchase price paid by the purchaser for the product to which claim is made.

10.2 Return of Items

If repair is necessary and is not the result of misuse, contact Sensorex for a Return Material Authorization Number (RMA#). No product returns will be accepted without prior authorization. You will be asked for the serial number of the transmitter/controller and a description of the failure. Customers are responsible for incoming freight charges on returned products. Sensorex will pay all outgoing freight charges on warranted returns. If, after evaluation, the product is deemed damaged due to misuse, you will be contacted regarding repair charges.

Warranty Registration

Product / Model No. : _____

Serial No. : ☐☐☐☐☐☐☐☐
(located on label on side of transmitter)

Date of Purchase. : ☐☐☐☐☐☐☐☐
D D M M Y Y Y Y

SOLD BY:

Title: _____ First Name: _____ Last Name/Surname: _____

Address: _____

City: _____ State: _____ Zip/Postal Code:_____ Country: _____

Telephone: _____ Fax: _____ E-mail: _____

Warranty Terms and Conditions

1. Please complete the warranty card and fax to 714-894-4839 or e-mail to support@sensorex.com within 30 days of purchase.
2. The Warranty shall become void if any unauthorized repair, tampering or alteration is done on to the product.
3. Do not remove or alter the serial number on the product. This will again void the warranty.
4. The owner of the product must present a copy of this warranty card to request RGA service.
5. The Warranty does not cover:
   a) Accessories, consumable items, wear and tear parts, corrosion, rusting or stains
   b) Incoming shipping cost when sending product in for repair
   c) Use of wrong electrical supply/voltage
   d) Dropping or other impact
   e) Use not in accordance with product manual
6. SENSOREX warrants all products to be free of defects in materials and workmanship for one year from date marked on the product or based on the serial number. However, SENSOREX offers no warranty, either expressed or implied, as to the useful life of these products. There are no implied warranties of merchantability of fitness for a particular purpose given in connection with the sale of any goods. In no event shall SENSOREX be liable for con sequential, incidental or special damages. All responsibilities for items not provided in this box (software, monitors, electrodes or power supplies) are not the responsibilty of Sensorex. The buyer's sole and exclusive remedy and the limit of SENSOREX's liability for any loss whatsoever shall not exceed the purchase price paid by

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