TX3000 - pH/mV
Transmitter/Controller

Form: INSTRTX3000-Rev A

TX3000 pH/mV Transmitter ESSENTIAL INSTRUCTIONS
READ THIS BEFORE USING YOUR TX3000 pH/mV TRANSMITTER!

Thank you for choosing the TX3000 pH/mV transmitter. This transmitter is a user-friendly microprocessor based transmitter for pH and mV 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 TX3000 to ensure that it will continue to operate within its specifications.

• Follow all warnings, cautions and instructions marked on and 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 TX3000 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 or e-mail to Sensorex at fax: 714-894-4839, e-mail: support@sensorex.com

About This Document

This manual contains instructions for the installation, operation and care of the TX3000 pH/mV transmitter. The following list provides notes concerning revisions of this document.

Rev Level	Date	Notes
A	9/2012	1st revision of manual.

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Part 1　　Specifications

Measuring Range (pH)	-2.00 to 16.00pH, 0.01 pH resolution, +/- 0.01 accuracy, +/- 1 digit
Measuring Range (ORP/mV)	-1999mV to +1999mV, 1mV resolution, +/- 1mV accuracy, +/- 1 digit
Measuring Temperature Range	-30 to 130° C, 0.1° C resolution, +/- 0.2° C accuracy +/- 1 digit
Calibration Mode	Any Tech or NIST buffers up to 2 points
Analog Output 1	Isolated DC 0/4-20mA corresponding to pH or ORP, maximum load 500Ω
Analog Output 2	Isolated DC 0/4-20mA corresponding to temperature, maximum load 500Ω
Display	Large LCD display with environment light sensor auto/manual illumination function
Weight	approx. 1.75lb (0.8kg)
Dimensions	5.7"(144mm) x 5.7"(144mm) x 4.5"(115mm)
Mounting Options	Wall mount, panel mount, pipe mount
Panel Cut Out Dimensions	5.4"(138mm) x 5.4"(138mm)
Relays	1(HI) - Contact 110,240 VAC, 0.5A Max - programmable ON/OFF 2(LO) - Contact 110,240 VAC, 0.5A Max - programmable ON/OFF WASH - Contact 110,240 VAC, 0.5A Max - programmable ON (0-9999 sec), OFF (0-999.9 hrs)
Ambient/Storage Temperature	0-50° C / -20-70° C
Temperature Compensation	NTC 30K Ω or 2-wire Pt1000 RTD auto, manual
Power Requirement	100-240 VAC, 50/60 Hz, software selectable
Voltage Output	DC +/-12V(to power external transmitter, if required)
Certification	IP 65 (NEMA 4X), CE

Part 1   Specifications (cont.)

TX3000 Specifications - Dimensional Specs

Front View

Side View

Panel mount fittings x4

Cord grip x3

Back View

Mounting hole for M5 Screw (x 4)

5.67"
(144mm)

5.67"
(144mm)

4.92"
(125mm)

3.74"
(98mm)

4.80"
(122mm)

5.00"
(127mm)

80mm ∅ 6

90mm
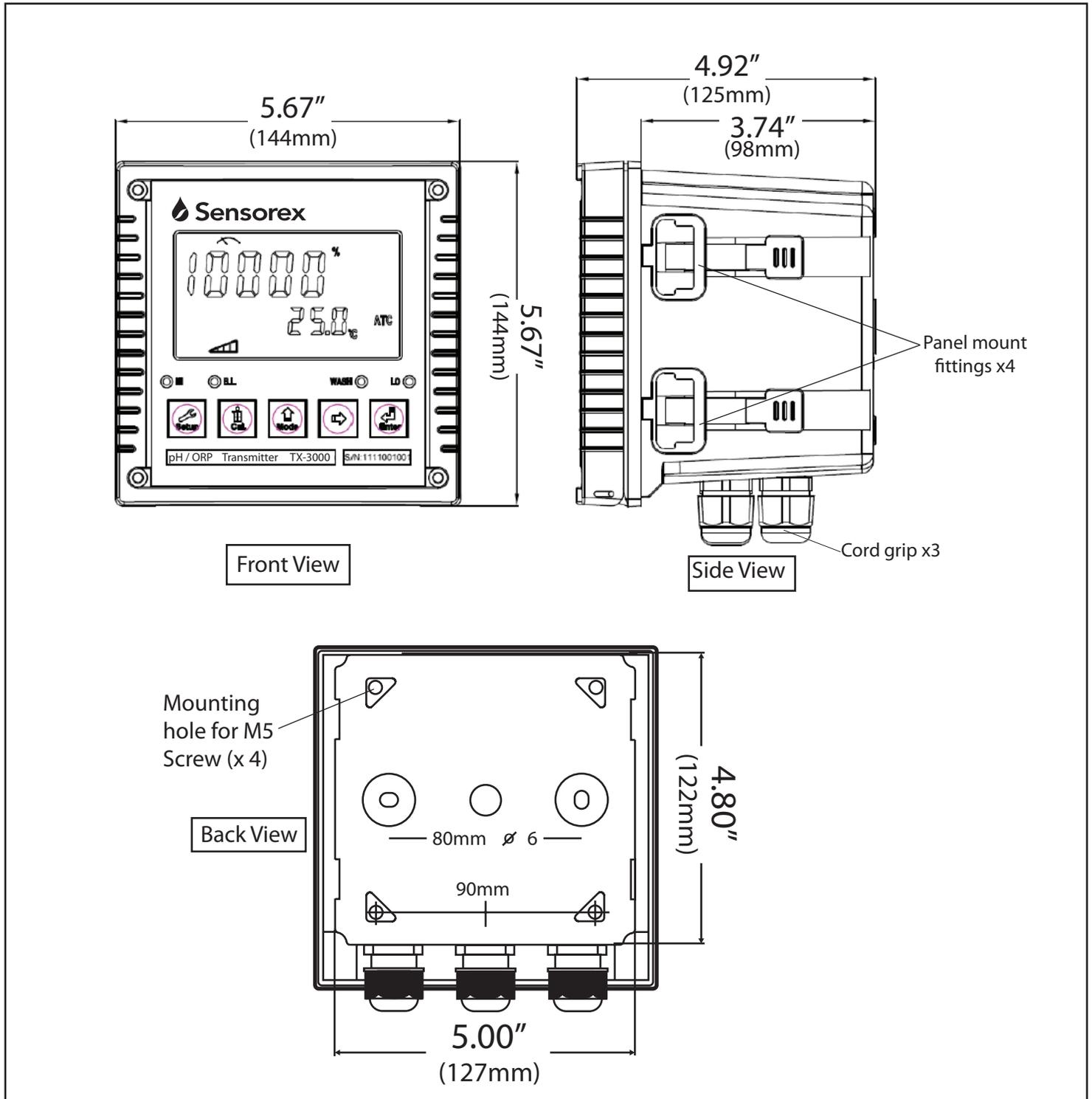
Part 2　　Installation Precautions

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

- Make sure to remove AC power from the transmitter before wiring input and output connections and before opening the transmitter housing.
- Install the transmitter in a well ventilated area. Avoid installing in areas receiving 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 the transmitter is for alarm or control function. You must connect to an external relay which can withstand enough current to ensure safe operation of the transmitter. Please refer to chapter 4.2"Terminal Functions"

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.

5.4"(138mm)

5.4"(138mm)

Panel Cutout

minimum distance between TX3000 panel cutouts = 1.7"(42mm)

Panel

Mounting Bracket 4x

Side View with mounting brackets
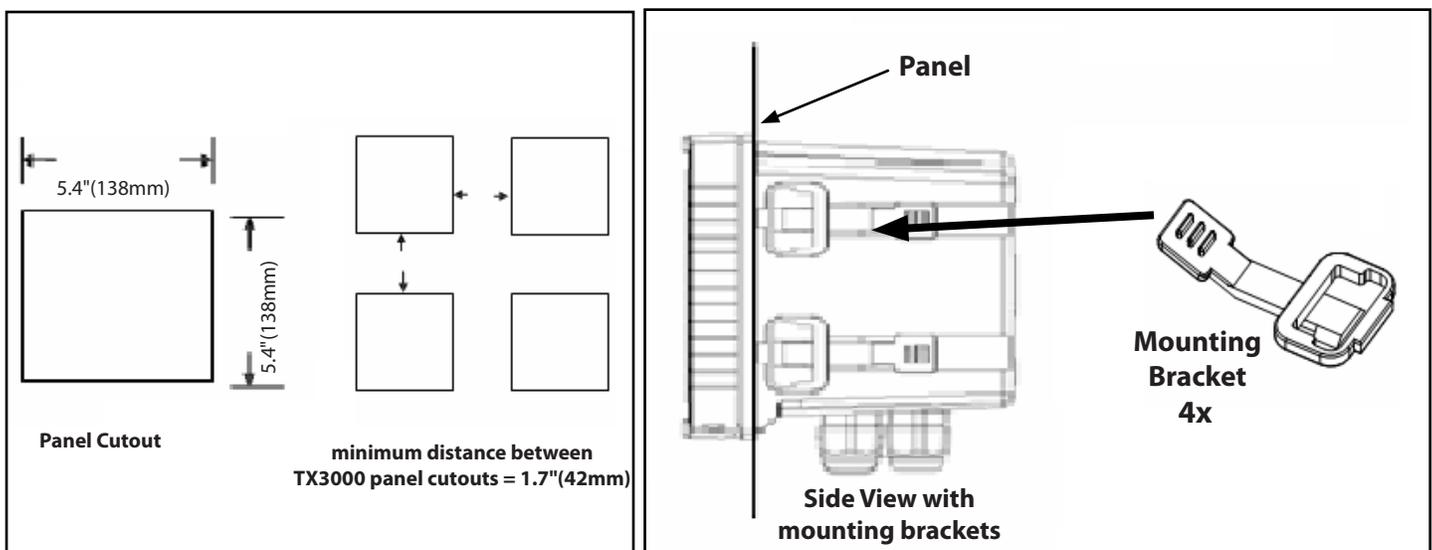
FIG 3-1

Part 3   Assembly and Installation (cont.)

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

Wall Mounting
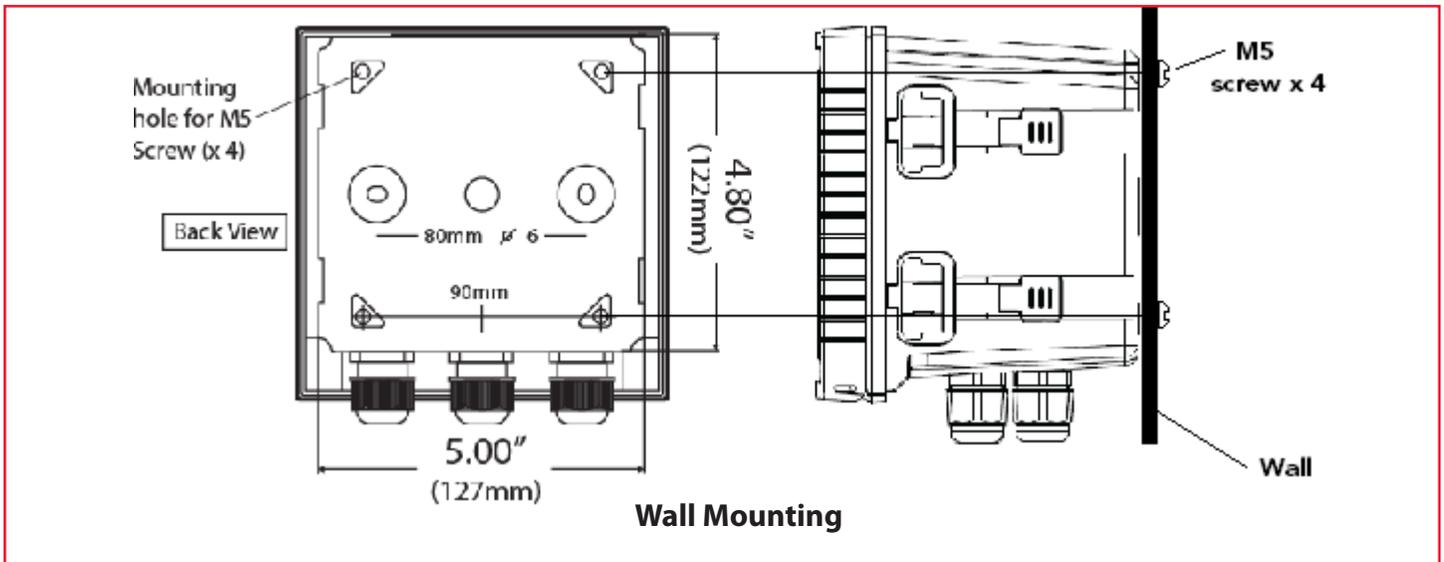
FIG 3-2

3.2 Coaxial Cable Preparation: Cut coaxial cable plastic jacket off. This will reveal the braided shield wire. Twist the braid together to reveal black noise reducing layer. Remove the black noise reducing layer even to the braid (See Fig 3-3). Cut some of clear layer away to expose copper center core.
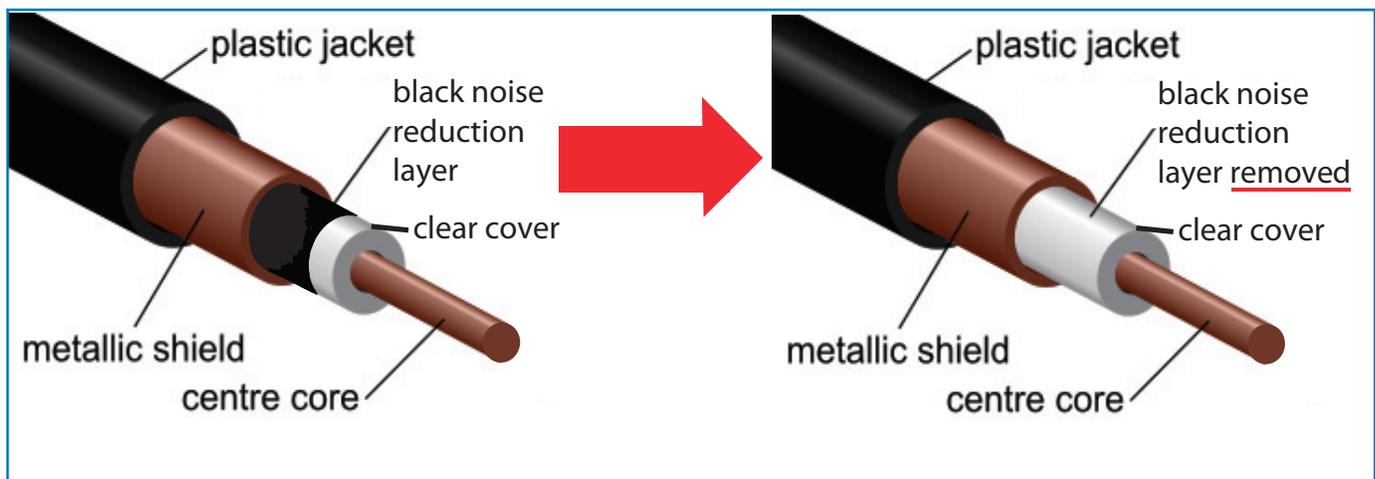
FIG 3-3

Part 4   TX3000 Overview

4.1 Rear Panel:

ESD Shield cover removed
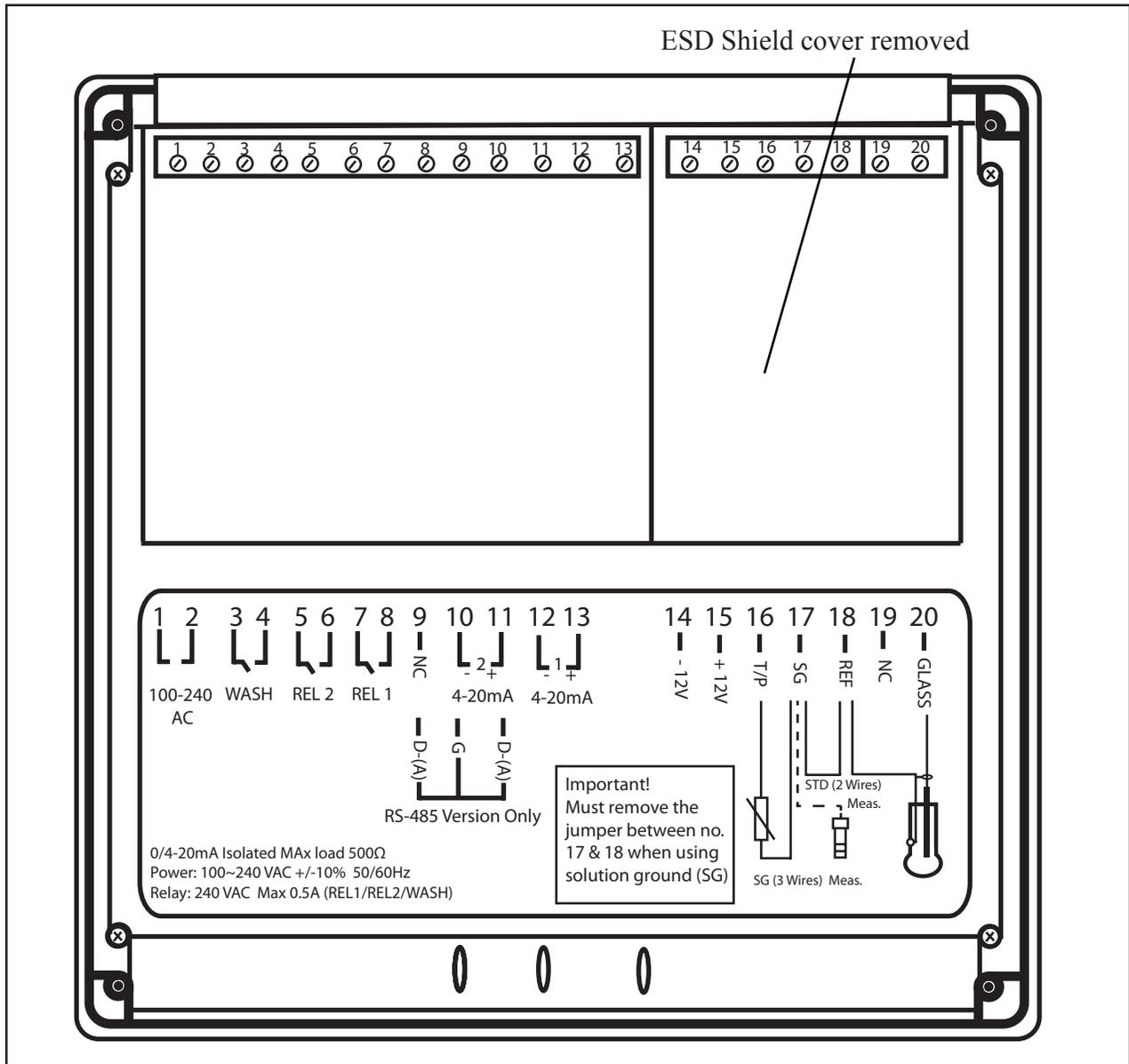
FIG 4-1

Part 4   TX3000 Overview (cont.)

4.2 Terminal Functions:
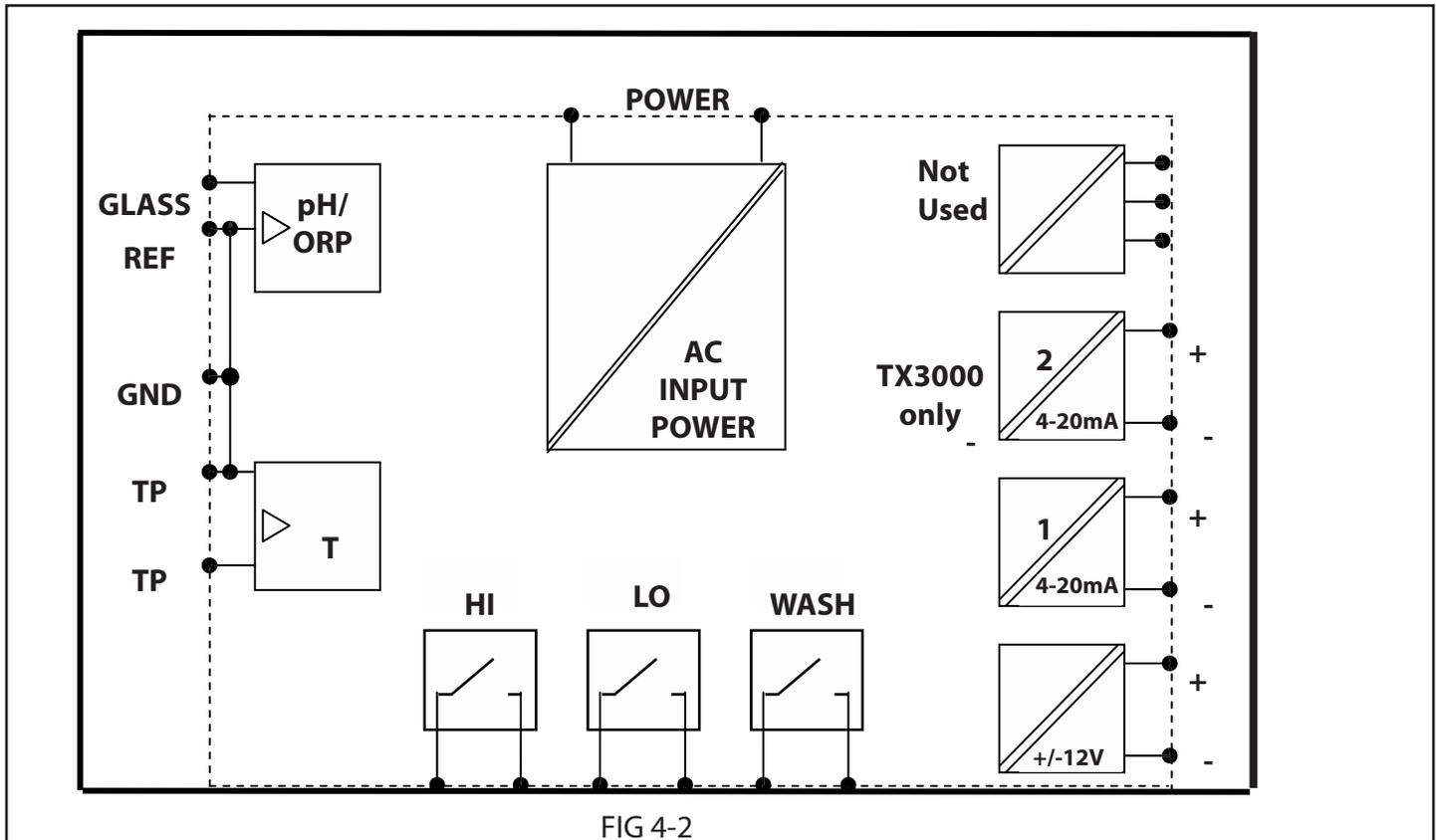
FIG 4-2

4.3 Description of terminal function:

1 & 2 - 100~240AC: Power supply terminal
3 & 4 - WASH: External wash relay terminal
5 & 6 - REL2: LO, External relay terminal low control
7 & 8 - REL1: HI, External relay terminal high control
9   - N/C
10   - 4~20mA – terminal /G: Temperature current output terminal -
11   - 4~20mA – terminal /G: Temperature current output terminal +
12   - 4~20mA - terminal: Master measurement current output terminal -
13   - 4~20mA - terminal: Master measurement current output terminal +
14 & 15 +/- 12V output
16   - T/P: temperature probe
17   - SG : Connect the other end of temperature probe, or used as ±12V ground potential. In two-wire distributing
         system, there should be a short circuit between this terminal and REF (a short circuit jumper is attached from
the factory)
18   - REF: Coaxial shield connecting pH/ORP electrode signal wire
19   - NC: NC
20   - GLASS: Coaxial inner conductor= pH/ORP electrode signal wire

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Part 5   Configuration

5.1 Front Panel:
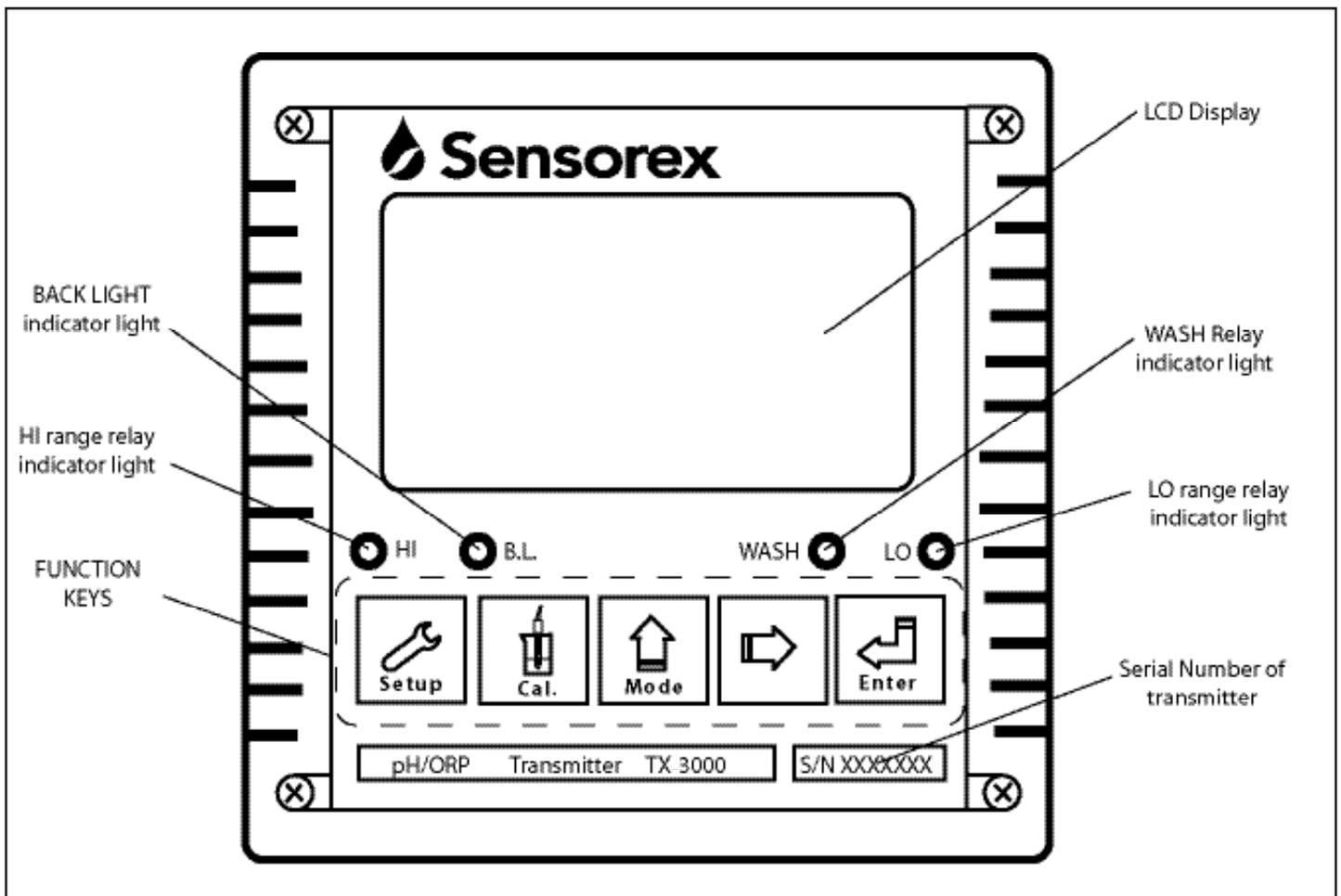
FIG 5-1

Part 5   Configuration (cont.)

5.2 Function Keys:

Setup	In the parameter set-up mode, pressing this key allows you to exit parameter set-up mode and go back to Measurement mode.
Cal.	In the Calibration mode, pressing this key allows you exit Calibration mode and back to Measurement mode.
Mode	In the parameter set-up mode and Calibration mode, press this key to increase the value or to scroll to other function.
	In the parameter set-up mode and Calibration mode, press this key to decrease the value or to scroll to other function.
Enter	Key for confirmation; pressing this key is essential when modifying data value or selecting the parameter setting items in the window.
Cal. + **Mode**	**CALIBRATION MODE** In the Measurement mode, pressing these two keys simultaneously allows you to enter Calibration mode.
Setup + **Mode**	**FUNCTION SET-UP MODE** In the Measurement mode, pressing these two keys simultaneously allows you to enter parameter set-up mode.
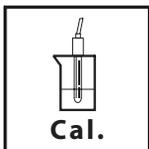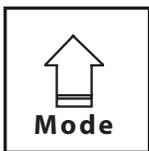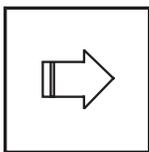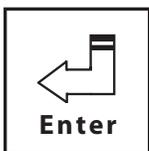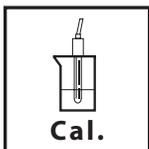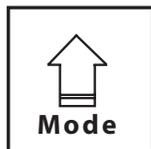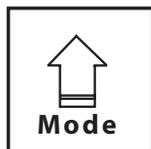
Part 5   Configuration (cont.)
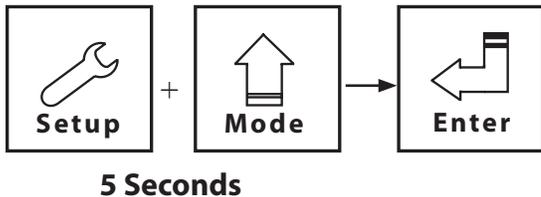
Master Reset-Restore factory default parameter's settings
In the Measurement mode, press the "SETUP" and "MODE" keys simultaneously for five seconds, and then press the "ENTER" key until you see a clock signal appearing on the display. Release all keys and then factory default settings will be restored.

| Setup | + | Mode | → | Enter |
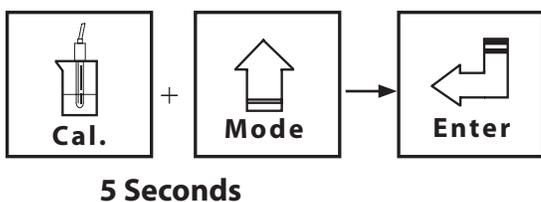
5 Seconds

Calibration Reset-Restore factory default calibration settings
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.

| Cal. | + | Mode | → | Enter |

5 Seconds

5.3 LED indicators:

HI: High set point indicator light; when the high setting 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 high setting point is reached, the REL2 indicator will light.

Part 5   Configuration (cont.)

5-4 Display Icons:
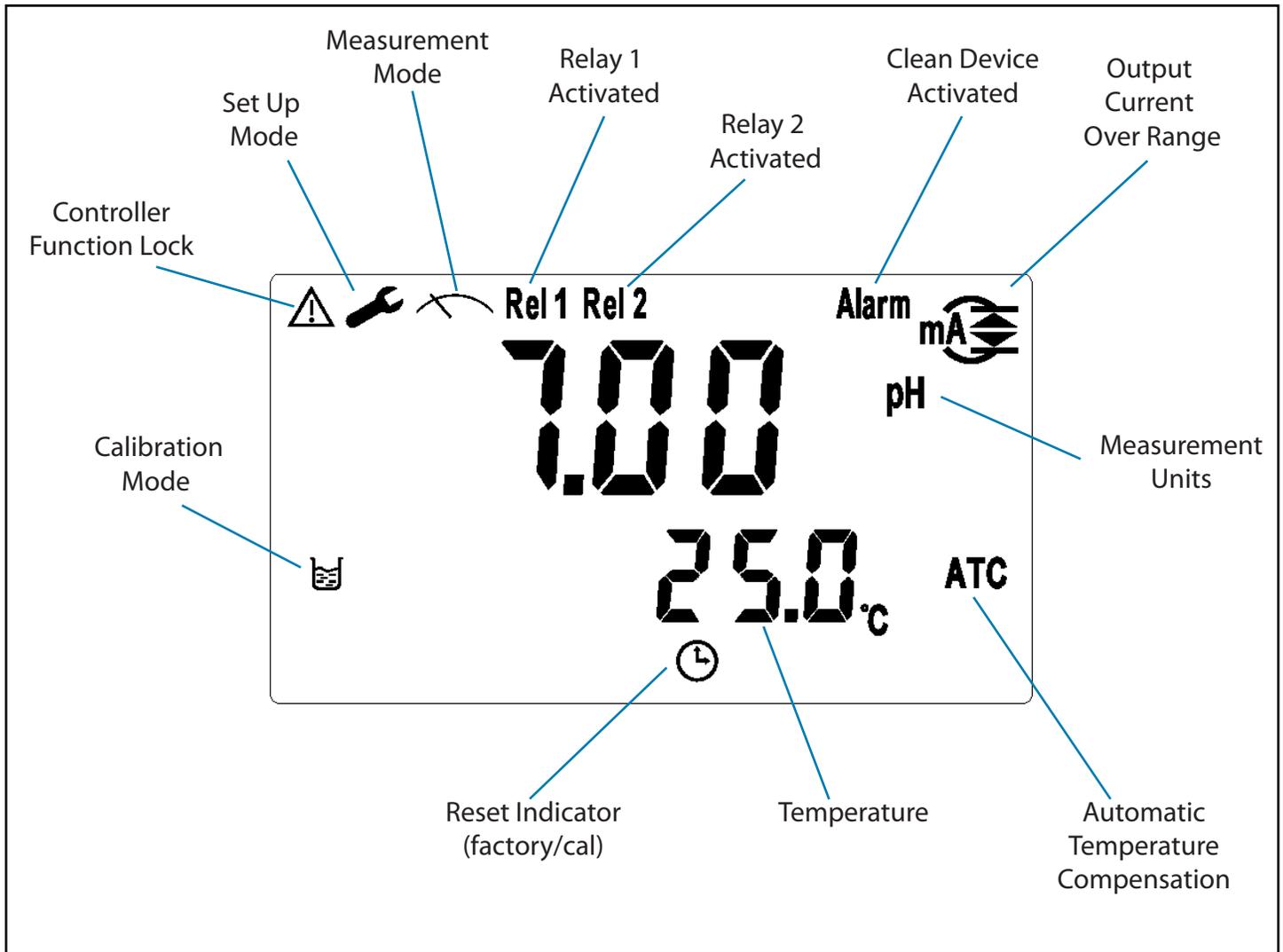
FIG 5-2

Part 6   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: pH
Temperature compensation: MTC 25℃
High point alarm: AUTO, SP1= 10.00 pH,db1= 0.10 pH
Low point alarm: AUTO, SP2 =04.00 pH,db2= 0.10 pH
Wash time: OFF
pH/ORP current output: 4~20 mA, 02.00~12.00pH
TP current output: 4~20 mA, 000.0~100.0˚C
Backlit Display: OFF
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:
OS value: 0 mV SLOPE value: 100.0 %
Calibration mode: Two-Point Calibration: Ct1

Part 7   Settings

Setup + **Mode**

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.

ConF SEt

Mode

GO TO "MEASUREMENT SETUP, SECTION 7.3

CodE SEt

Enter

If you input the wrong code, the CODE will flash 4X, and then the display will return back for another input.

To cancel security code, press *"MODE"* 2X

0000 CodE Alarm

When the first "0" of the digits 0000 flashes, press *"MODE"* (up arrow) key or "right arrow" key to input the code, and press *"ENTER"* to confirm. Then, continue inputting the second digit, the same way and repeat until all digits are changed.

Setup

Enter

2222 CodE

Enter

1111 CodE

Enter

oFF CodE

on CodE

Part 7   Settings (cont.)

7.3 Measurement Setting
In the measurement mode, you can choose between pH and ORP settings.

ConF
SEt

Enter

PH
SEt

Select pH or ORP. pH is
the default setting.

Mode

orP
SEt

Enter   OR PRESS "SET-UP" KEY
TO RETURN TO
MEASUREMENT MODE

**GO TO "TEMPERATURE SETUP,
SECTION 7.4**
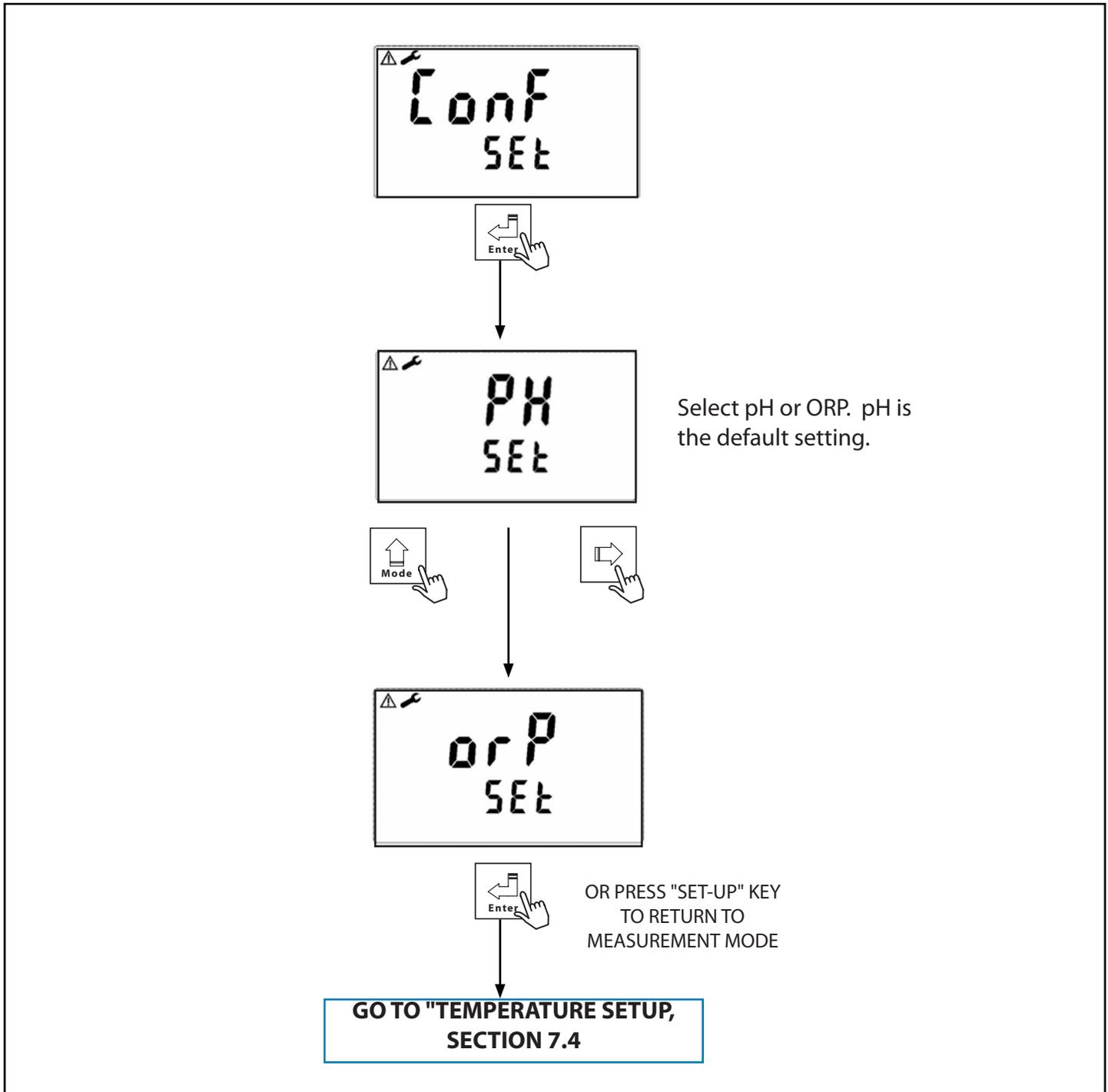
Part 7 Settings (cont.)

7.4 Temperature Settings

In the Temperature mode you will set the ATC, On or OFF, set the temperature sensor type (PTC or NTC) and calibrate/adjust the temperature..

Use a standard thermometer to test the actual temperature of the solution, and press **"MODE"** or **"RIGHT ARROW"** key to input the correct temperature value. Press "ENTER" to confirm.

If necessary, compare with the actual temperature value tested by standard thermometer. Press **"MODE"** or **"RIGHT ARROW"** key to input the modified value. Press **"ENTER"** to confirm.

Follow same steps to left.

GO TO "STANDBY SETUP, SECTION 7.5

OR PRESS "SET-UP" KEY TO RETURN TO MEASUREMENT MODE

Part 7   Settings (cont.)

7.5 Standby Mode
To select manual operation for going back to measurement mode or to select auto return to measurement mode.

To select auto return to measurement mode-- after 3 minutes it will auto return to the measurement mode if no keys are touched in setup or calibration mode.

OR

To manually return to measurement mode (stand by function ON), press **"SETUP"** key to leave setup menu and return to measurement mode.

GO TO "HI POINT ALARM SETUP, SECTION 7.6

FIG 7-4
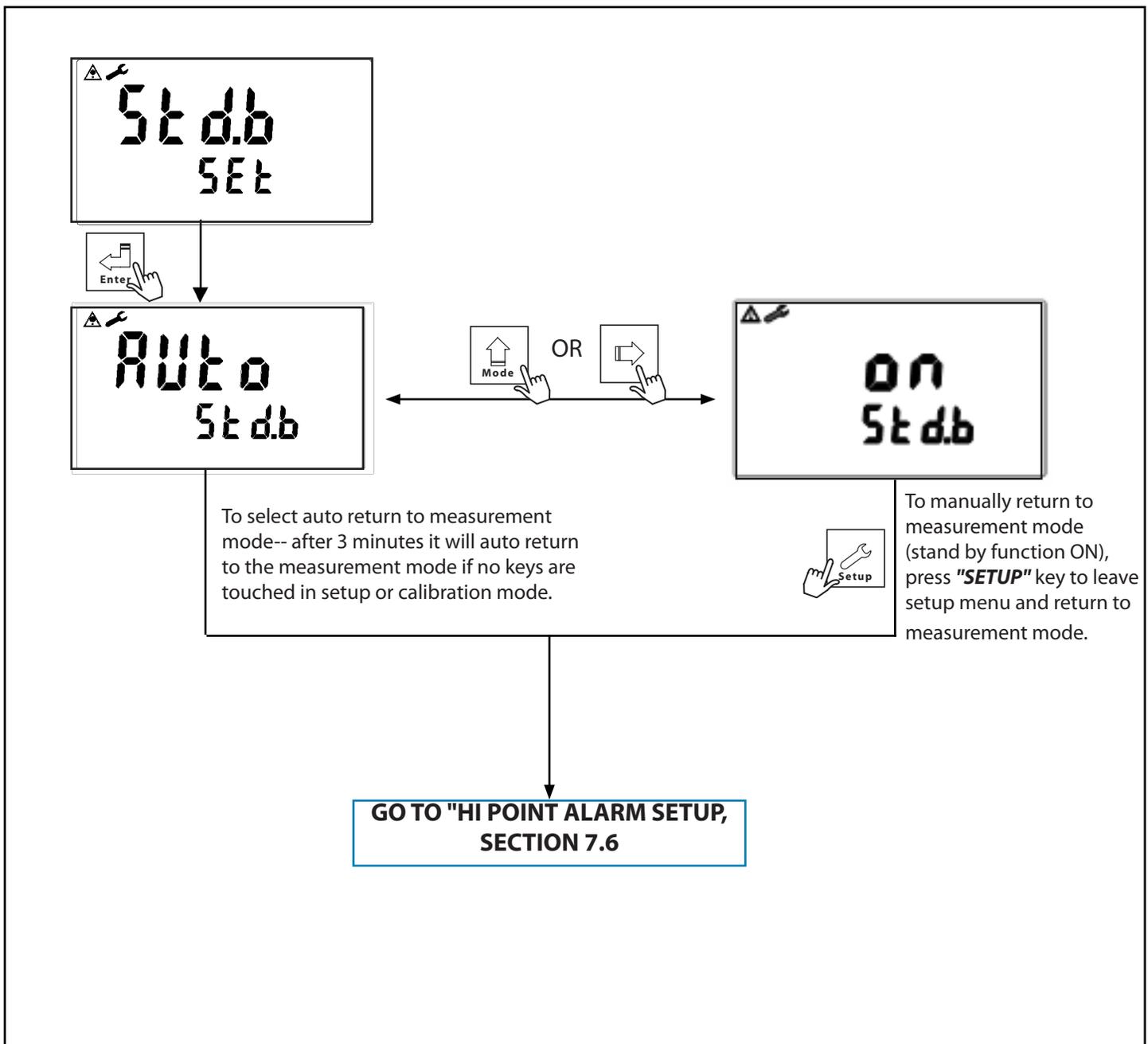
Part 7   Settings (cont.)

7.6 Hi Alarm -
 Set the **TH (THRESHOLD**) and **DB (DEADBAND)** of **Hi (REL1**). The range for TH is -2.00~16.00pH/-1999~1999mv; while the range for DB is 0.00~2.00pH /0~200mv.

OR   To choose ON or OFF

Press **"ENTER"** to confirm choice

OR   To choose ON or OFF

Press **"ENTER"** to confirm choice

OR   To choose ON or OFF

Press **"ENTER"** to confirm choice

OR

Press **"MODE"** or **"RIGHT ARROW"** to test REL1 light

Choose "ON", "HI" will light up

OR PRESS "SET-UP" KEY TO RETURN TO MEASURE-MENT MODE

GO TO "LO POINT ALARM SETUP, SECTION 7.7
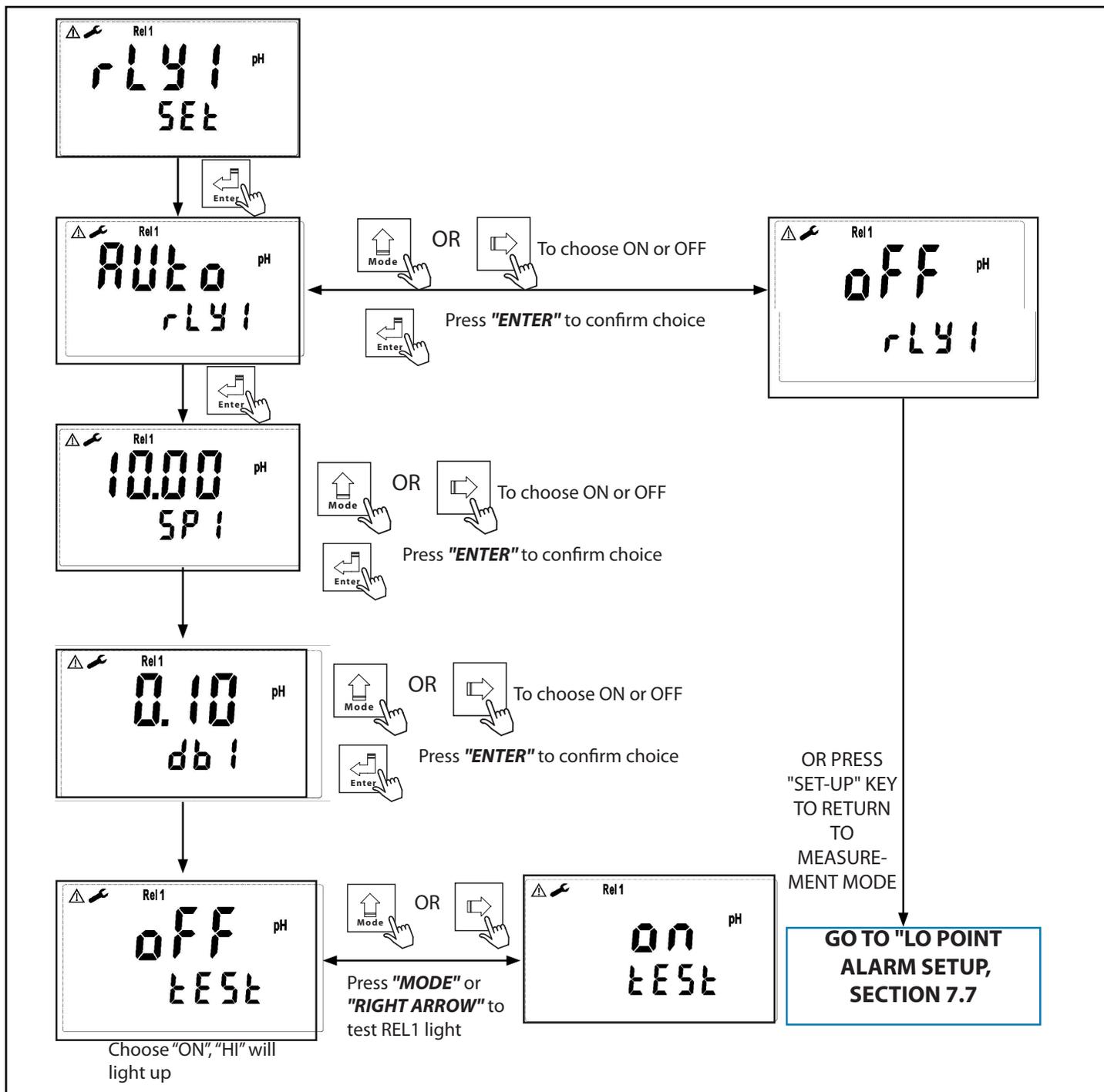
Part 7　　Settings (cont.)

7.7 LO Alarm -
 Set the TH (THRESHOLD) and DB (DEADBAND) of Lo (REL2). The range for TH is -2.00~16.00pH/-1999~1999mv; while the range for DB is 0.00~2.00pH/ 0~200mv.

OR
To activate RELAY 2 or not
Press **"ENTER"** to confirm choice

OR
To set desired alarm point
Press **"ENTER"** to confirm choice

OR
To set hysteresis value
Press **"ENTER"** to confirm choice

OR
Press **"MODE"** or **"RIGHT ARROW"** to test REL2 light

Choose "ON", "LO" will light up

OR PRESS "SET-UP" KEY TO RETURN TO MEASUREMENT MODE

GO TO "WASH" ALARM SETUP, SECTION 7.8
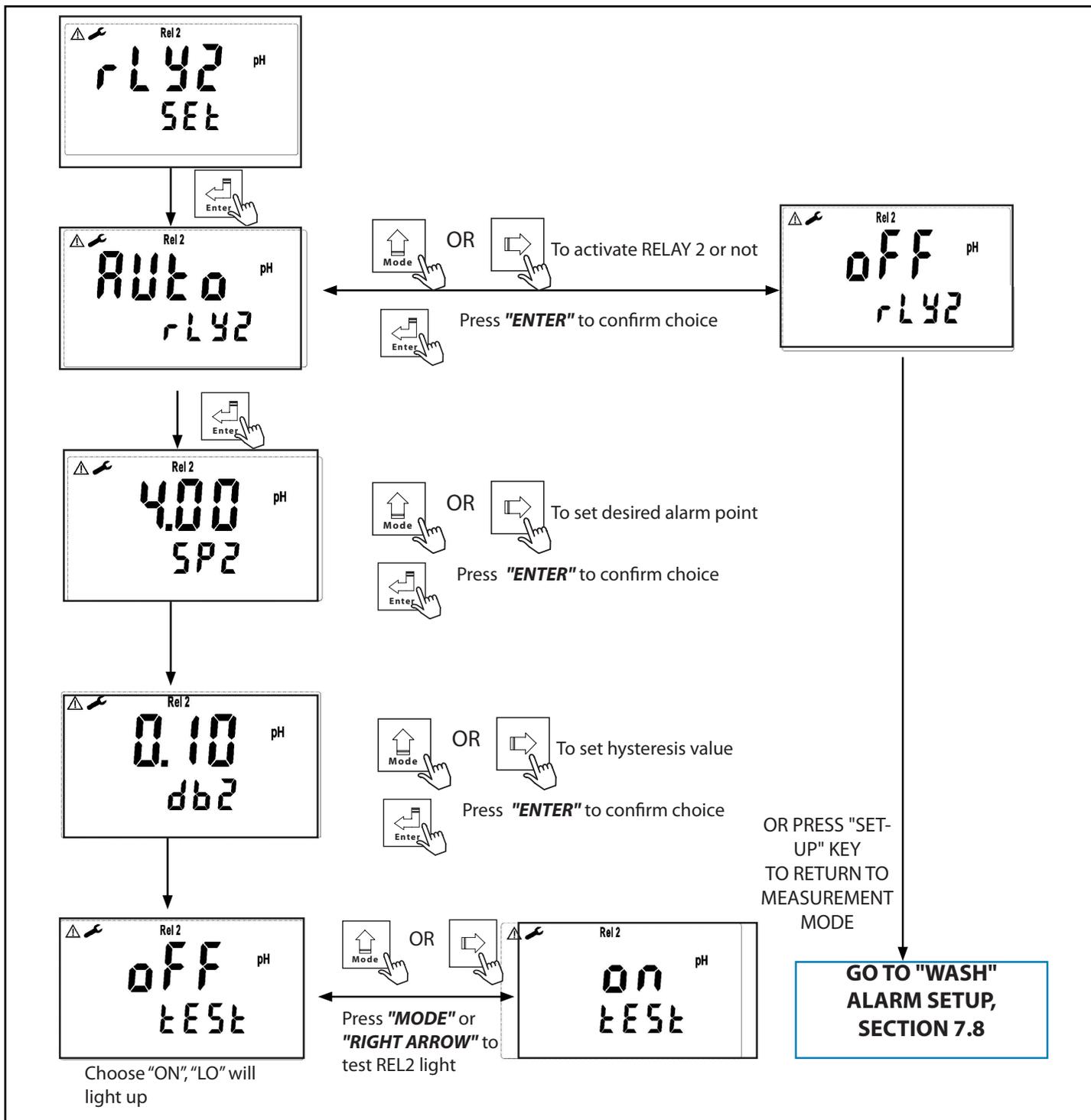
Part 7   Settings (cont.)

7.8 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.

OR To Set Start of Washing (unit = seconds)

Press **"ENTER"** to confirm choice

OR To Set Start off time of Washing (unit = hours)

Press **"ENTER"** to confirm choice

OR To Set current loop output and relay hysteresis (unit = seconds)

Press **"ENTER"** to confirm choice

OR PRESS "SET-UP" KEY TO RETURN TO MEASUREMENT MODE

Press **"MODE"** or **"RIGHT ARROW"** to test WASH light

Choose "ON", "WASH" will light up

GO TO "Analog output 1 (pH/ORP)"SETUP SECTION 7.9

FIG 7-7

Part 7　Settings (cont.)

7.9 Analog output 1 (pH/ORP):
The user can adjust the relative relationship between the pH /ORP measurement range and the output current per their requirements.

FIG 7-8
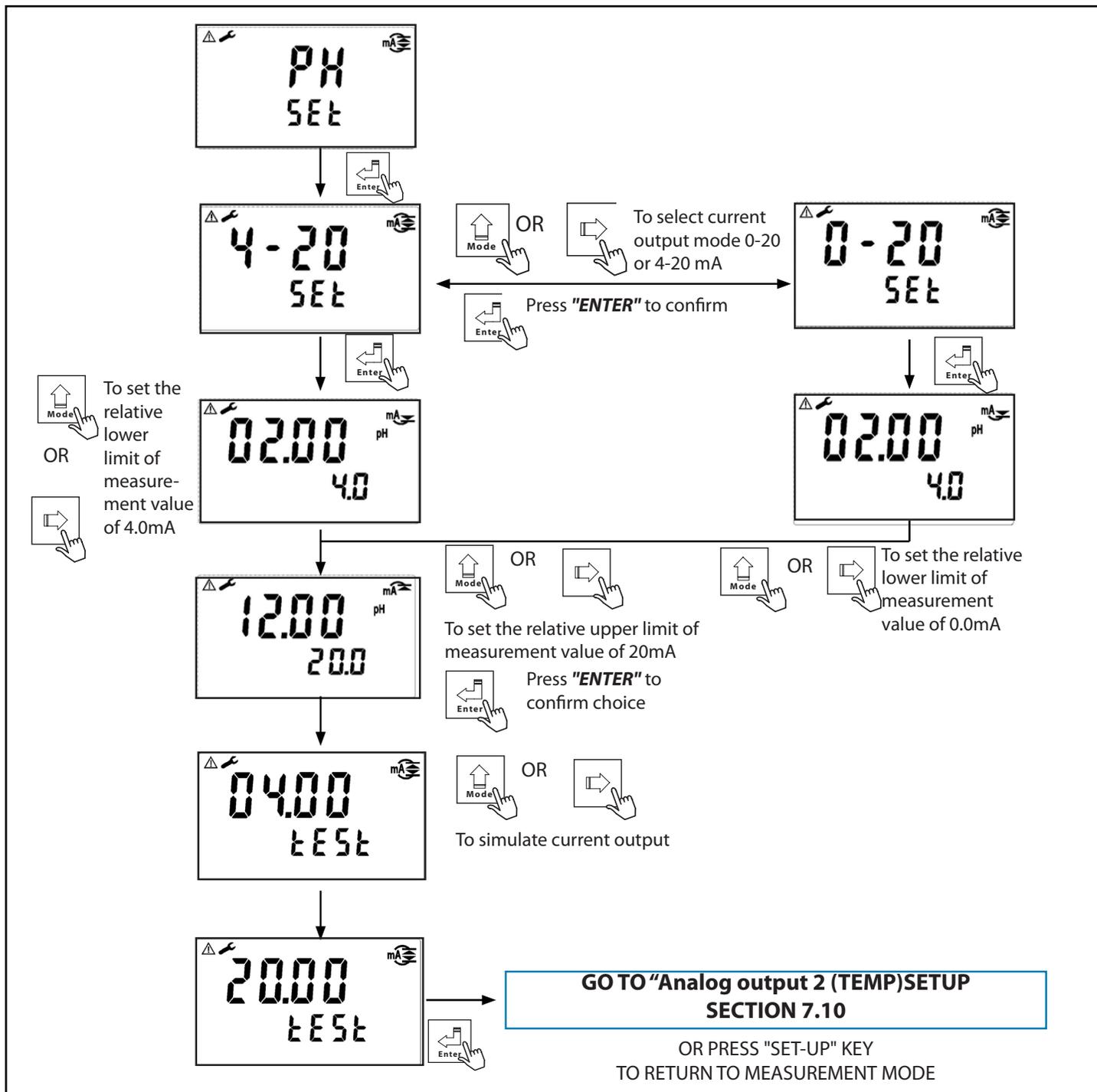
Part 7   Settings (cont.)

7.10 Analog output 2 (Temperature):

The user can adjust the relative relationship between the TEMP measurement range and the output current according to their requirements.

To select current output mode 0-20 or 4-20 mA

Press **"ENTER"** to confirm choice

To set the relative lower limit of measurement value of 4.0mA

To set the relative upper limit of measurement value of 20mA

To set the relative lower limit of measurement value of 0.0mA

Press **"ENTER"** to confirm choice

To simulate current output

GO TO "SAMPLE AVERAGE" SETUP SECTION 7.11

OR PRESS "SET-UP" KEY TO RETURN TO MEASUREMENT MODE

Part 7   Settings (cont.)

7.11 Sample Average Mode:

Enter the setup of Sample average of measurements. You may select the number of sample to be averaged each time to give increased measurement stability.
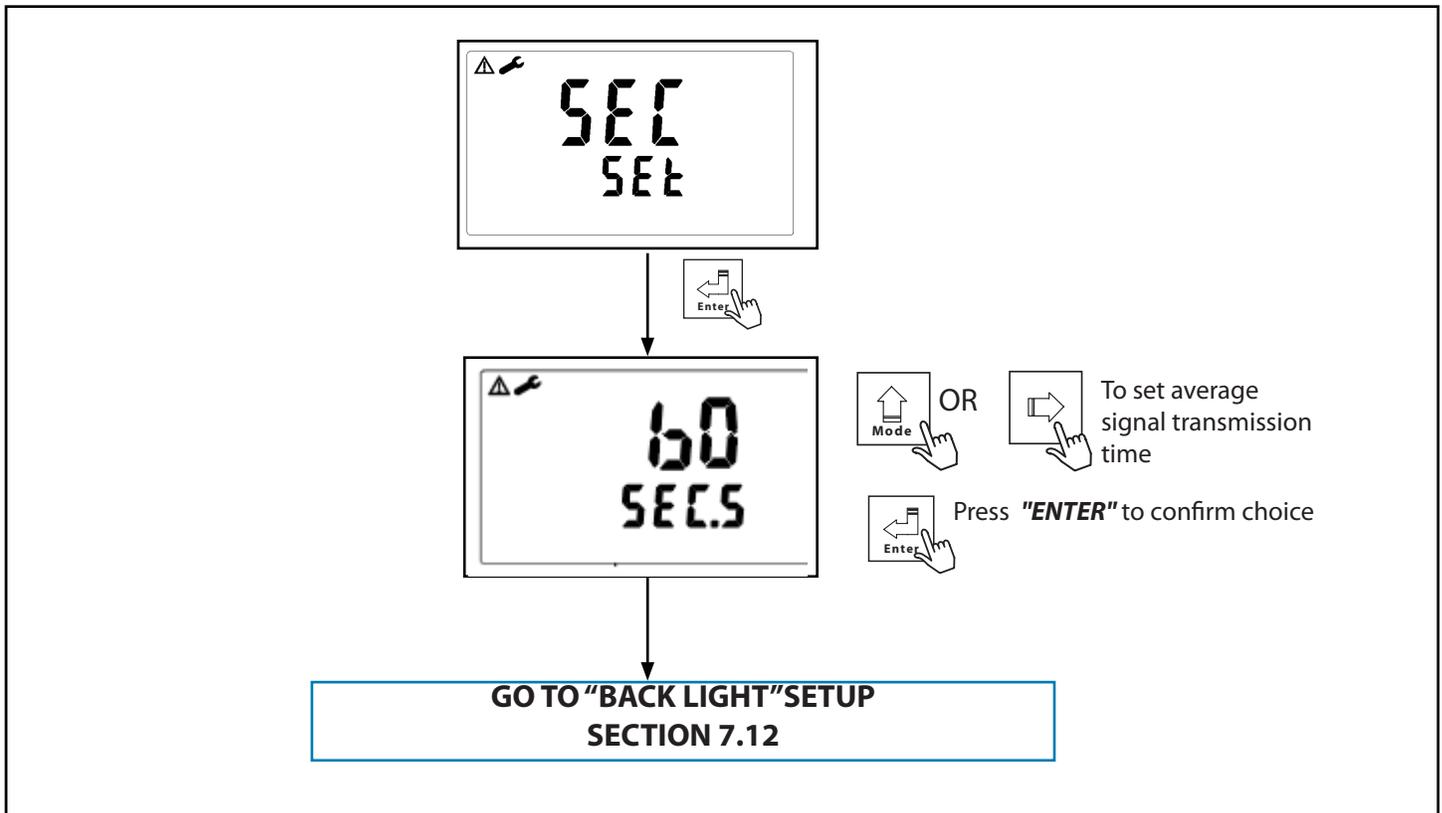
FIG 7-10

Part 7   Settings (cont.)

7.12 LCD Backlight:
Turn LCD backlight on or off or adjust intensity of backlight

OR   To to select automatic, manual or off

b.L.
SEt

on
b.L.

oFF
b.L.

Press **"ENTER"** to confirm choice

Auto
b.L.

0
b.L.

OR

To select brightness level (-2, -1, 0, 1, 2)

Press **"ENTER"** to confirm

0
b.L.

OR

To select brightness level (-2, -1, 0, 1, 2)

Press **"ENTER"** to confirm

Press **"ENTER"** to confirm choice

Press **"ENTER"** to confirm

0
SEnS

OR

To select sensitivity level of optical sensor (-2, -1, 0, 1, 2)

Press **"ENTER"** to confirm

RETURN TO MEASUREMENT MODE

Part 8   Calibration

8.1 Calibration Security:

8.1.1 Code authorization: There is a two level password protection built in to the TX3000. The code authorization of parameter setting is prior to the code authorization of calibration setting. Therefore, you can unlock the calibration with your "parameter set-up" password, or directly with your calibration set-up password.

8.1.2 Setting Code : See Section 7.2

8.2 Entering Calibration Mode:

In Measurement mode press "CAL" and "MODE" keys simultaneously. This will bring you to OS screen. You can press "CAL" key at any time to return to Measurement mode.

NOTE:
Ct1: Calibration mode for TECH buffers, 4.01, 7.00, 10.00
Cn1: Calibration Mode for NIST buffers: 1.68, 4.01, 6.86, 9.18
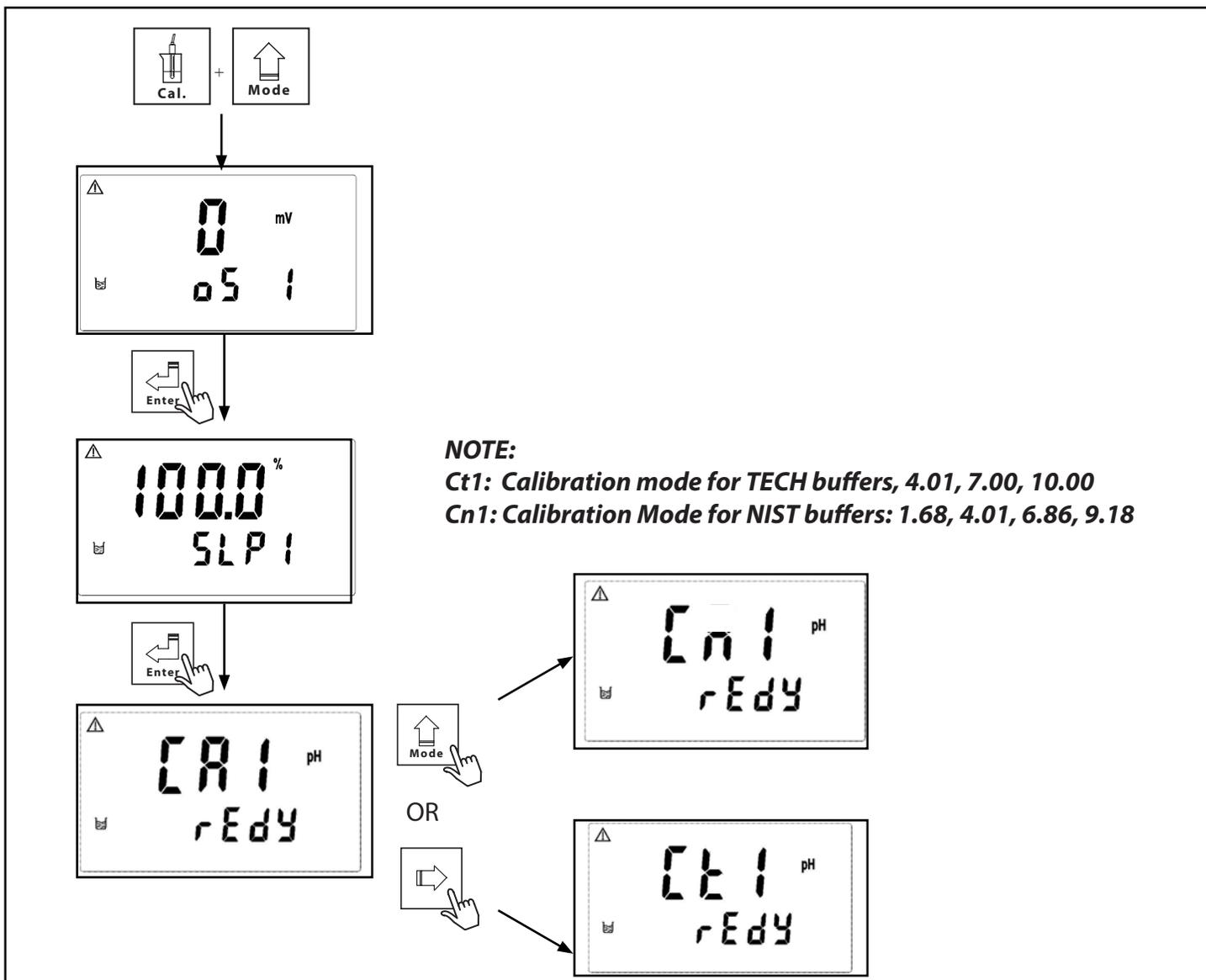
Part 8   Calibration (cont.)

8.3 2- Point Calibration (Any Buffer): Follow instructions in section 8.2 to enter Calibration mode until you reach "CA1 Redy" screen.

When measuring standard buffer's mV value, the ⊠ sign begins to flash. After receiving a stable reading, the display shows a similar pH value.

Press **"MODE"** or **"RIGHT ARROW"** key to modify display value until it matches the standard buffer value.

Press **"CAL"** key to exit for completion of single point calibration.

When measuring 2nd standard buffer's mV value, the ⊠ sign begins to flash. After receiving a stable reading, the display shows a similar pH value.

Press **"MODE"** or **"RIGHT ARROW"** key to modify display value until it matches the standard buffer value.

Note: Single point calibration only modifies the OS offset. The slope(SLP) still stays as the last slope calibration.

FIG 8-2

Part 8   Calibration (cont.)

8.4 2- Point Calibration (TECH BUFFERS): Follow instructions in section 8.2 to enter Calibration mode until you reach "Ct1 Redy" screen.

When measuring standard buffer's mV value, the sign begins to flash. After receiving a stable reading, the display shows a similar pH value.

Go to 2nd point automatically.

Press "CAL" key to exit and complete 1-point calibration.

When measuring second standard buffer's mV value, the sign begins to flash. After receiving a stable reading, the display shows the second calibration point pH value.

CONTINUE TO NEXT PAGE   **CONTINUE TO NEXT PAGE**

Part 8   Calibration (cont.)

CONTINUED FROM
PREVIOUS PAGE

CONTINUED FROM
PREVIOUS PAGE

To finish TX3000 Tech Buffer
2-point calibration

⚠ **4.01** pH

25.0 ℃   MTC

⚠ **PASS**

CAL

⚠ **0** mV

o S

Enter

⚠ **100.0** %

SLP

Cal.

⚠ **10.00** pH

25.0 ℃   MTC

Press **"CAL"** key to exit calibration mode and return to measurement mode

FIG 8-3A

Part 8   Calibration (cont.)

**8.5 Calibration of Pre-set NIST buffers (Cn1):** Use NIST buffers and follow instructions in section 8.4 (same as Ct1).

8.6 ORP Calibration: It is unnecessary to make regular calibration of ORP electrodes. it is only necessary to use ORP Buffer to check the electrode or adjust the deviation of electrical potential. Press **"CAL" + "MODE"** keys simultaneously to adjust ORP zero-point electrical potential.

Clean the electrode completely, and put it into the mV standard solution (B225 - Zobell's Solution) Check the difference between the readout and buffer solution.

Press **"MODE"**   or **"RIGHT ARROW"** key to set the digit until it is equal to the buffer's standard mV value. Then, press **"ENTER"** key to save it or press **"CAL"** key to return to the measurement mode.
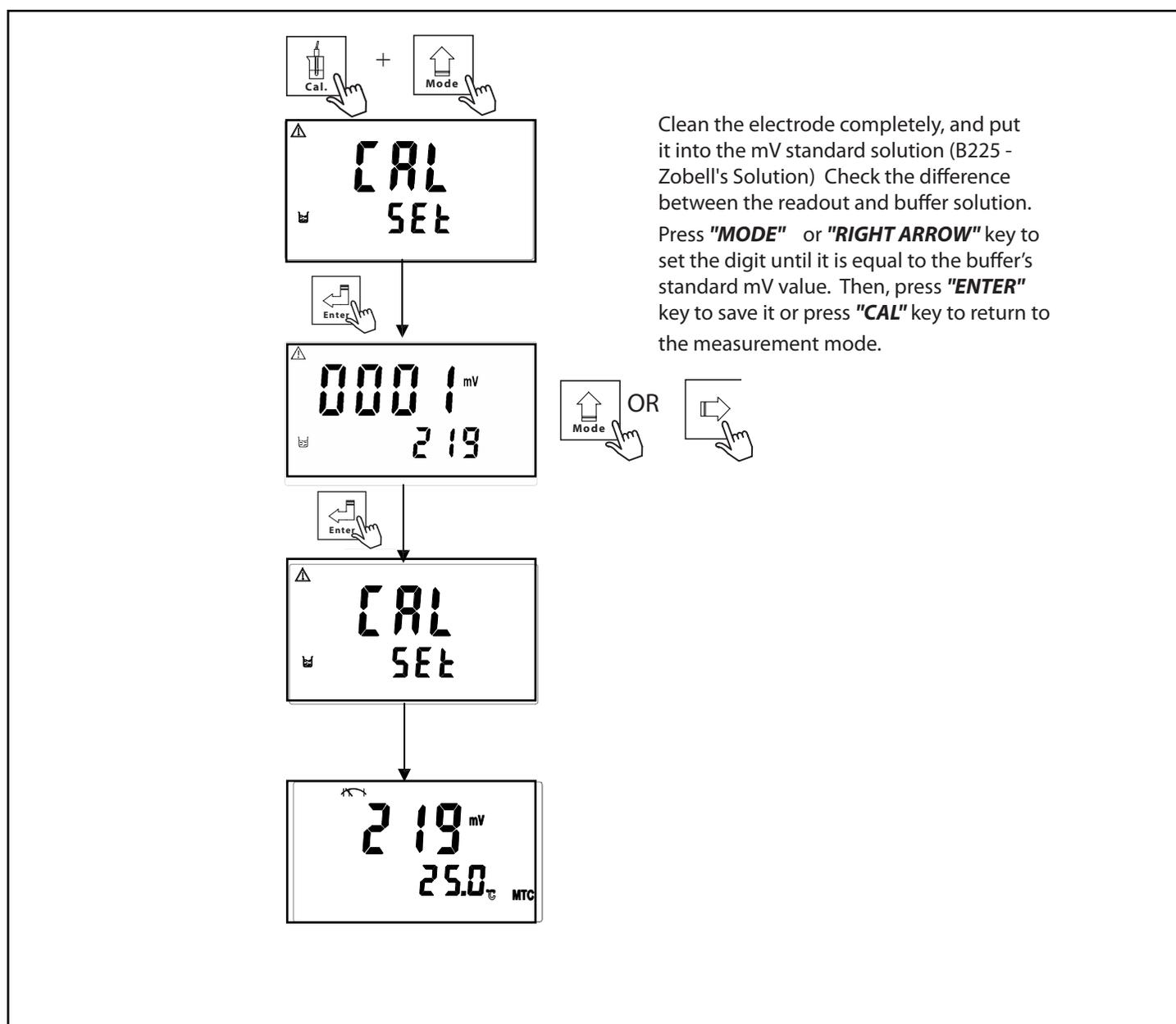
FIG 8-4

Part 9   Troubleshooting (Error Messages)

9.1 Error Messages (Codes): The chart below outlines possible error messages displayed on the TX3000 screen. If you get another message or need help troubleshooting a problem with the TX3000, contact your supplier or Sensorex (support@sensorex.com).

Message	Reason	Action
Err9	Serious error that does not permit any further measurement	Please contact supplier or Sensorex for assistance
Err4 CAL	1. During calibration, the buffer solution temperature is outside of 5-50°C range 2. The buffer value cannot be identified	1. Adjust buffer temperature to within 5 of 5-50°C range and try to recalibrate 2. Replace the buffer or replace the electrode if buffer replacement does not help.
Err3 CAL	The readout is unstable.	Check for bubble in pH electrode glass bulb. If no bubble, soak electrode in pH4 buffer or replace the electrode.
Err2 CAL	Slope value exceeds upper or lower limit	Check electrode to see if dirty. Clean if dirty. If clean check for broken pH glass. If broken, replace electrode and recalibrate.
Err1 CAL	OFFSET(zero-point electric potential) value≥60mv	Clean the electrode or replace the electrode, and make another calibration. Offset may be due to ground loop. See www.sensorex.com troubleshooting for more details

FIG 9-1

Part 10   Warranty and Product Returns

10.1 Warranty
The TX3000 pH/mV transmitter 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 your supplier 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 and a description of the failure. Customers are responsible for incoming freight charges on returned products. The seller 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 within 30 days of purchase.
2. The Warranty shall become void if any unauthorized repair, tampering or alteration is done 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 consequential, incidental or special damages. All responsibilities for items not provided in this box (software, monitors, electrodes or power supplies) are not the responsibility 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 the purchaser for the product to which claim is made.

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