

Instruction Manual

Alpha pH 600

RF Transmitter System

pH / ORP / °C / °F



ISO 9001
CERTIFIED

68X450201 | Rev.0 | Oct 2008

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INSTRUMENTS
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Preface

This manual serves to explain the use of the Alpha pH 600 Series RF transmitter. It functions in two ways, firstly as a step by step guide to help you to operate the transmitter. Secondly, it serves as a handy reference guide. It is written to cover as many anticipated applications of the transmitter as possible. If there are doubts in the use of the transmitter, please do not hesitate to contact the nearest Authorized Distributor.

Thermo Scientific will not accept any responsibility for damage or malfunction to the transmitter caused by improper use of the instrument.

Remember to fill in the guarantee card and mail it back to your authorized distributor.

The information presented in this manual is subject to change without notice as improvements are made, and does not represent a commitment on the part of Thermo Scientific.

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1 INTRODUCTION

1.1 Before You Begin

Thank you for choosing the Alpha pH 600 Series RF Transmitter.

The construction of Alpha pH 600 Series employs leading edge technology and complies with safety regulations currently in force. Notwithstanding this, improper use could lead to hazards for the user or a third-party, and/or adverse effects on the plant or other equipment. Therefore, the operating instructions must be read and understood by the persons involved before working with the pH Transmitter.

The instruction manual must always be stored close at hand, in a place accessible to all people working with the transmitter.

If you have questions, which are not or insufficiently answered in this instruction manual, please contact your authorized supplier. They will be glad to assist you.

1.2 Intended Use

The Alpha pH 600 Series RF Transmitters are intended solely for pH or ORP and temperature measurements, as described in this instruction manual. This transmitter system is currently designed for use in 923 to 928 MHz license-free ISM radio band transmission, which is licensed free in the following countries only.:

- | | | | |
|-----------------------|------------------|---------------|---------------|
| 1. Argentina | 6. Mexico | 11. Australia | 16. Singapore |
| 2. Canada | 7. Peru | 12. Brazil | 17. Taiwan |
| 3. Chile | 8. Puerto Rico | 13. China | 18. Thailand |
| 4. Costa Rica | 9. United States | 14. Hong Kong | 19. Vietnam |
| 5. Dominican Republic | 10. Uruguay | 15. Malaysia | |

Users are strongly encouraged to check with their local agencies on the license status of this radio band transmission before installing this instrument.

Any other use, or use not mentioned here, that is incompatible with the technical specifications is deemed inappropriate. The operator is solely responsible for any damage arising from such use.

Other prerequisites for appropriate use include complying with:

- the instructions, notes and requirements set out in this instruction manual.
- all local safety regulations concerning safety at work.

- all information and warnings in the documentation dealing with the products used together with this pH / ORP Transmitter (housing, sensors, etc.).
- the local environmental and operational conditions.

1.3 Safety Instructions



- The Alpha pH 600 RF Transmitter should be installed and operated only by personnel familiar with the instrument and who are qualified for such work.
- A defective pH 600 RF Transmitter must neither be installed nor put into service.
- The Alpha pH 600 RF Transmitter must only be operated under the specified operating conditions (see section 6).
- The Alpha pH 600 RF Transmitter must not be repaired by the customer.
- No modifications to the Alpha pH 600 RF Transmitter are allowed. The manufacturer/supplier accepts no responsibility for damage caused by unauthorized modifications. The risk is borne entirely by the user.

1.4 Taking Out of Service / Correct Disposal of the Unit

Taking out of Service

- First disconnect the unit from the power supply and then undo all electrical connections.
- Remove the unit from the wall.

Correct Disposal of the Instrument

When the Alpha pH 600 Transmitter is permanently taken out of service, obey the local environmental regulations for correct disposal or send the instrument to your local distributor, they will take care of proper disposal.

2 GETTING STARTED

2.1 Description of Instrument

The Alpha pH 600 RF Transmitter is used for measuring pH or ORP and temperature values. The pH values can be measured using industrial combination pH sensors; the ORP values can be measured using industrial ORP sensor; the temperature values can be measured using 3-wire Pt100 / Pt1000 sensors. The Transmitter can be used for applications such as water treatment and monitoring, galvanic-decontamination, chemical processing, food processing, clean or wastewater control and neutralization processes.

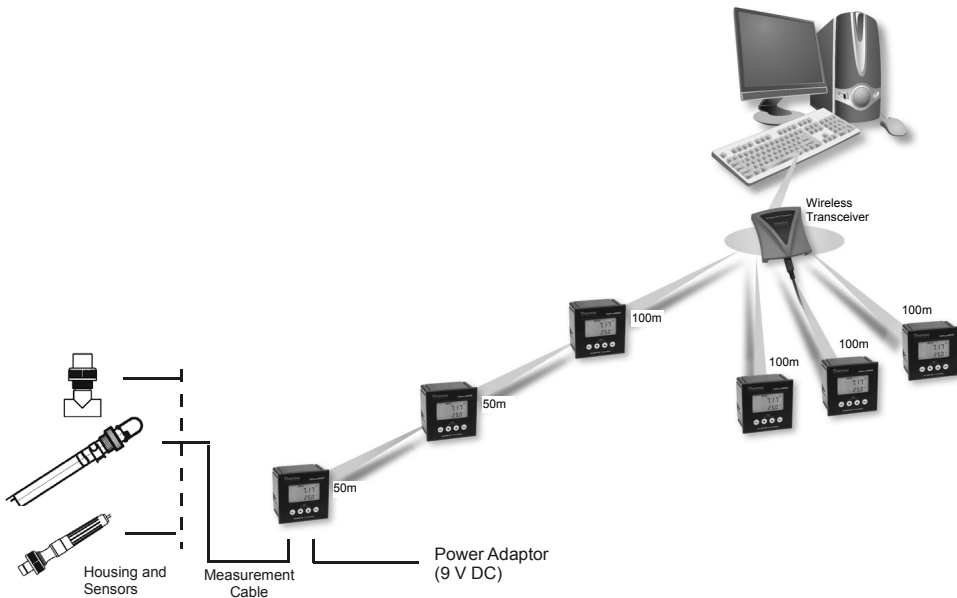
This pH Transmitter has many user-friendly and safety features which include:

- Easy to calibrate and set up
- Built-in non-volatile memory to ensure that calibration and other information are not erased if power supply fails
- Menu-driven program that simplifies setup
- 1 or 2 point calibration with selectable USA or NIST standard pH buffer set
- Automatic temperature compensation (ATC)
- Manual temperature compensation setting without the ATC probe, with independent setting for calibration and process temperature
- Large dual display LCD for easy reading with clear multiple annunciators, operational mode indicators and error indicators.

2.2 Measurement System

A typical measurement system consists of:

- Up to 10 Alpha pH 600 Transmitters
- Alpha Link 600 Data Acquisition Software (Installation instructions included separately)
- A Wireless RF Transceiver
- One pH sensor or ORP sensor with integrated or separate Pt100/Pt1000 temperature sensor per Transmitter
- Appropriate measurement cables
- An immersion, flow or process assembly
- A computer, installed with the Alpha RF Transmitter System Software



2.3 Connecting Peripherals

2.3.1 Connection Terminals

Remove Back Cover:

- Remove the screws from the four corners at the back of the pH Transmitter.
- Remove the back cover. The connectors are exposed on the back PCBA as shown in the Figure 1 below.

Connectors:

- J202 – 9V DC power
- J204 - pH electrode & Temperature probe connections (wiring has to be done in the detachable connector:
 1. Pin 1 : pH Sensor
 2. Pin 2 : pH Reference
 3. Pin 3 : No Connection
 4. Pin 4 : No Connection
 5. Temp I/P : Pt 100 Compensate
 6. Temp Sens : Pt 100 Sense
 7. Temp Gnd : Pt 100 GND
 8. PMP : Potential Matching Pin

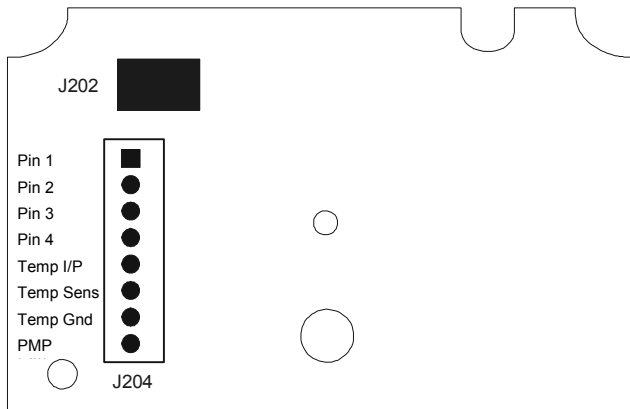


Figure 1: Outer Side of Back PCBA

2.3.2 Switching Between PT100 & PT1000 Temperature Sensors

The Alpha pH 600 transmitter supports both Pt100 & Pt1000 (2-wire or 3-wire) temperature sensors. The default factory setting is Pt100. If you need to use Pt1000 temperature sensor, you have to change the jumper setting (J201) as described below.

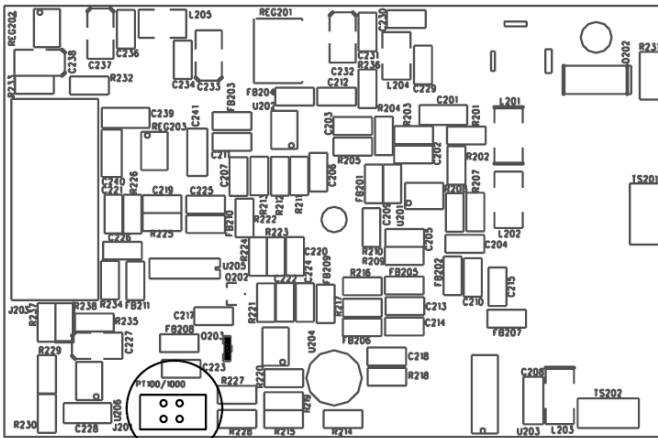
Remove Back Cover:

Remove screws from the four corners at the back of the pH Transmitter. Remove the back cover.

Remove Back PCBA:

Remove the screw located center of the back PCBA (Figure 1). Detach the back PCBA from the Transmitter. Turn over the back PCBA. Locate J201 jumper on the inner side of the back PCBA as shown in Figure 2 below.

Figure 2: Inner Side of Back PCBA



For PT1000, short the top two pins



For PT100, short the bottom two pins

Set Jumper J201: Set the J201 jumper to required sensor (Pt100 or Pt1000) type

2.3.3 Connecting pH/ORP Electrode

1. If the pH/ORP electrode has a BNC connector, remove the BNC connector from the cable.

NOTE: Oakton Instruments offers an optional 'BNC to Spade Lug adapter' (Order code: 05994-90) that can be used with pH/ORP electrode without removing the BNC connector.

2. Strip the insulation of the cable so that the bare wires are exposed enough for connection as shown in Figure 3.

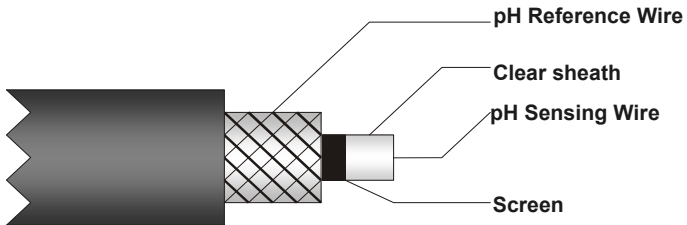


Figure 3 : pH/ORP Electrode Cable

NOTE: Make sure to strip inner black layer (screen) to expose the clear sheath.

3. Connect pH sensing wire to **Pin 1** of J204 connector
4. Connect pH reference wire to **Pin 2** of J204 connector

2.3.4 Connecting Temperature Probe

For Automatic Temperature Compensated (ATC) pH readings, a 100 Ω Pt RTD temperature probe (2-wire or 3-wire) can be connected to the Controller.

3-Wire Probe:

1. Connect PT100 compensate wire to Pin 5 of J204 connector
2. Connect PT100 sense wire to Pin 6 of J204 connector
3. Connect PT100 GND wire to Pin 7 of J204 connector

2-Wire Probe:

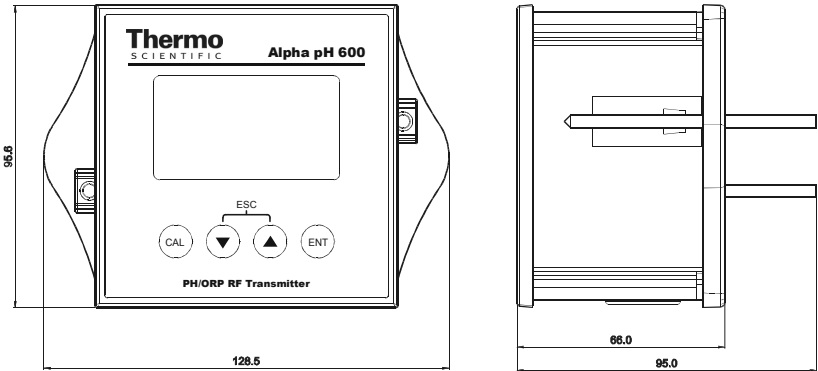
1. Short **Pin 5 & 6** of J204 connector using a small piece of wire
2. Connect PT100 sense wire to **Pin 6** of J204 connector
3. Connect PT100 GND wire to **Pin 7** of J204 connector

2.3.5 Connect Potential Matching Pin (PMP)

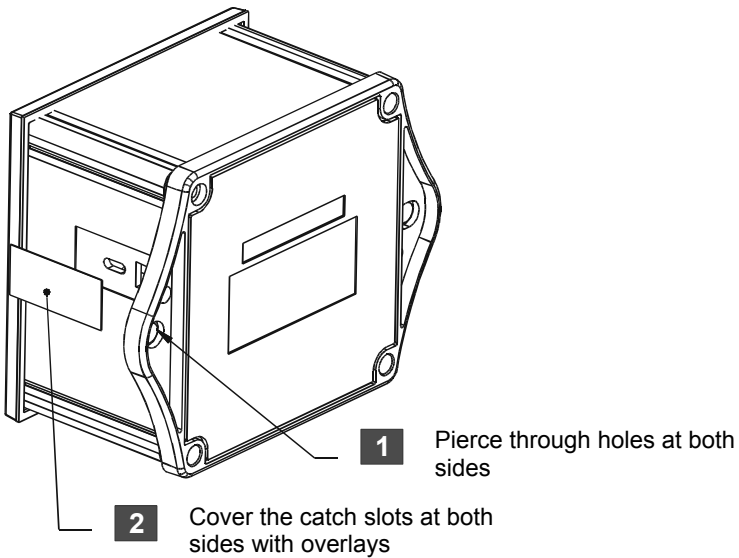
If using an electrode with a PMP, connect the additional wire (PMP) from the pH electrode to **Pin 8** of J204 connector. This liquid electrical reference wire is only used when the pH Controller is configured to 'Symmetrical mode of operation'. Refer section 5.5 for details on symmetrical mode of operation.

2.4 Installation

2.4.1 Mechanical Dimensions



2.4.2 Wall Mount



2.5 Display & Keypad

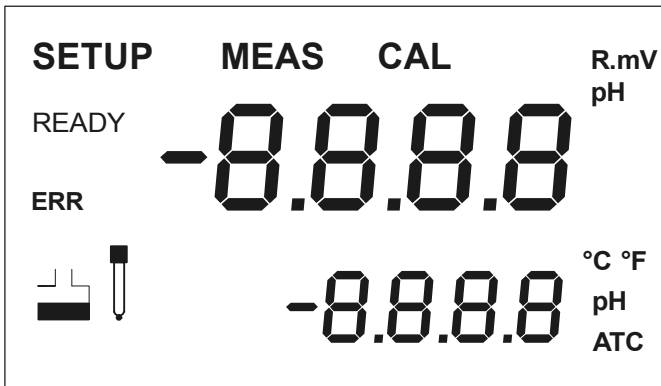
2.5.1 Display Overview

The Liquid Crystal Display (LCD) of Alpha pH 600 Transmitter has two alpha-numerical displays (Upper and a Lower).

- **Upper display:** Measured pH, mV or relative mV value are displayed when the Transmitter is in normal operation (measurement) mode.
- **Lower display:** Measured temperature value is displayed when the Transmitter is in normal operation (measurement) mode. In pH Calibration mode, standard pH buffer values are displayed here: while measured mV values are displayed in the ORP Calibration mode.

The two displays indicate function names, options & settings in Setup mode. Refer 'Appendix 2 – Abbreviations Used in LCD' for more details.



The LCD also consists of various mode indicators, status annunciators and unit of measurement indicators.



Mode Indicators

MEAS	Measurement mode; blinks in Symmetric mode (Refer Section 3.1& 5.5)
SETUP	Setup mode (Refer Section 5)
CAL	Calibration mode (Refer Section 4)

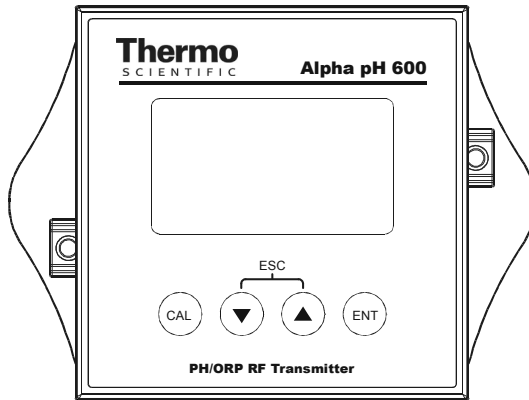
Status Annunciators

READY	Appears when the reading is stable
ATC	Appears when Automatic Temperature Compensation (ATC) is enabled. Not visible when Manual Temperature Compensation (MTC) is enabled. Flashes if the temperature probe is faulty in its ATC mode. (Refer Section 5.3)
ERR	Appears when an error occurs (Eg. wrong key pressed)
	Electrode annunciator. Appears when viewing electrode properties or during calibration error
	Buffer annunciator. Appears in calibration mode

Units of Measurement Indicators

mV	Millivolt. Appears in ORP measurement / calibration modes (Refer Section 3.1, 4.5)
R.mV	Relative Millivolt
pH	Appears in pH measurement/calibration modes (Refer Section 3.1,4.3)
°C	Temperature in Celsius (Refer Section 5.3)
°F	Temperature in Fahrenheit (Refer Section 5.3)

2.5.2 Key Functions



Key	Description
	<p>Brings directly into the Calibration entry mode. The security code must be selected to enter the calibration mode or view only mode.</p> <p>While in pH Measurement mode, press CAL to enter pH Calibration entry mode.</p> <p>While in mV Measurement mode, press CAL to enter mV Calibration entry mode.</p>
	<p>To confirm your calibration values in Calibration mode.</p> <p>To confirm selections in SETUP mode.</p> <p>While in MEAS mode, pressing ENT takes you directly to SETUP entry mode. The security code must be selected to enter the calibration mode or view only mode.</p>
	<p>To scroll through the various submenus</p> <p>To increment/decrement values or toggle between options (in the SETUP/CAL modes)</p> <p>When pressed together, serves as escape function to return to MEAS mode from any point (CAL or SETUP modes).</p>



3 OPERATION

3.1 Measurement mode

When the pH Transmitter is powered on, the display shows all the LCD segments briefly, and then automatically enters into the **Measurement mode**.



The mode indicator '**MEAS**' at the top of the display indicates that the pH Transmitter is in Measurement mode; '**MEAS**' blinks when in Symmetric mode. The upper alpha-numerical display shows the measured pH or mV value, while the lower display shows the temperature value. The indicator "pH" or "mV" at the upper right side of the display indicates the current measurement mode. (Refer Section 5.5 for switching measurement modes)

NOTE: To guarantee accurate readings, the measuring system (the pH Transmitter and the sensor) must be calibrated regularly.

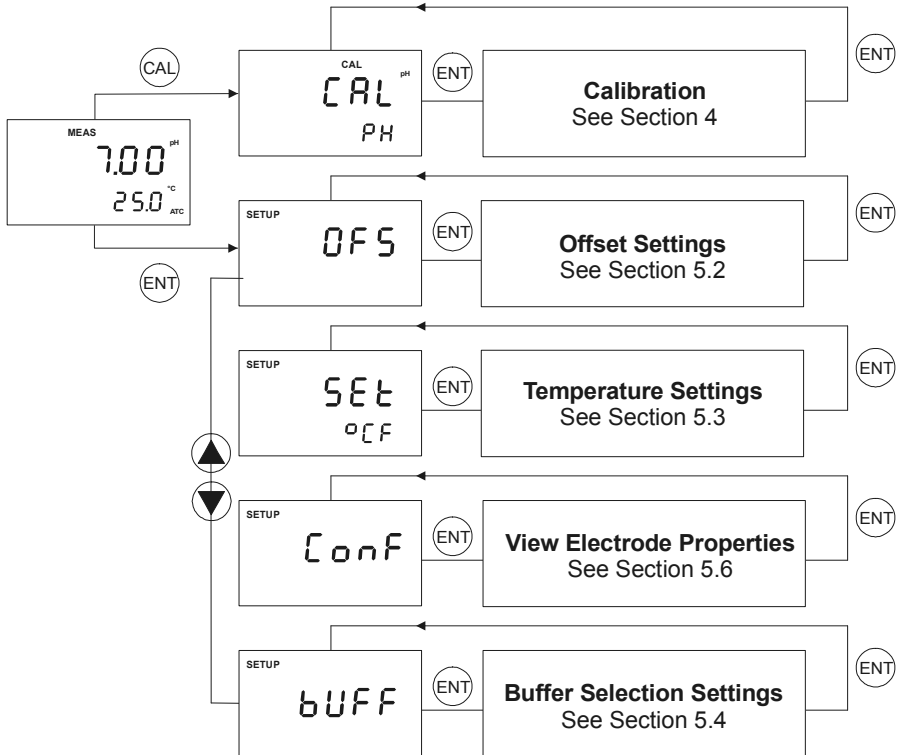
From measurement mode you can access:

- **Calibration mode** (by pressing **CAL** key)
- **Setup mode** (by pressing **ENT** key)

For more details, refer section 4 for Calibration mode and section 5 for Setup mode.)

3.2 Menu Overview

3.2.1 Alpha pH 600



4 CALIBRATION MODE

4.1 Preparing the Transmitter & Electrode for Calibration

Before starting calibration, make sure that the pH Transmitter is in appropriate measurement mode (pH or ORP). When the Transmitter is powered on, it starts up with the measurement mode last used. For example, if the pH Transmitter is powered off in ORP measurement mode, it starts up in ORP mode when it is powered on. (Refer Section 5.5 for switching measurement modes)

Be sure to remove the protective electrode storage bottle or rubber cap of the electrode before calibration or measurement. If the electrode has been stored dry, wet the electrode in tap water for 10 minutes before calibrating or taking readings to saturate the pH electrode surface and minimize drift.

Rinse the electrode in de-ionized water after use, and store in electrode storage solution. If storage solution is not available, use pH 4.01 or 7.00 buffer solution.

Do not reuse buffer solutions after calibration. Contaminants in the solution can affect the calibration, and the accuracy of the measurements.

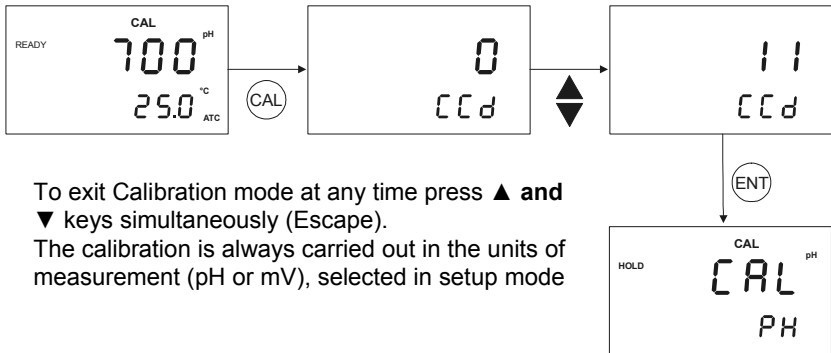
The pH Transmitter features two internationally recognized pH buffer standards. Select the buffer standard you require in the setup mode. (Refer Section 5.4) Available buffer options are:

- USA buffers --- pH 4.01, 7.00 and 10.01
- NIST buffers --- pH 4.01, 6.86 and 9.18

4.2 Entering pH/ORP Calibration Mode

While in Measurement mode press the CAL key.

1. The display prompts to enter the calibration security code. Press the ▲ or ▼ key to set the calibration security code to “11”, and then press the ENT key to confirm the calibration security code.
2. The display shows “CAL pH” and “CAL” indicator appears at the top of display and after 2 seconds delay it automatically leads to the calibration.



- To exit Calibration mode at any time press **▲ and ▼** keys simultaneously (Escape).
- The calibration is always carried out in the units of measurement (pH or mV), selected in setup mode

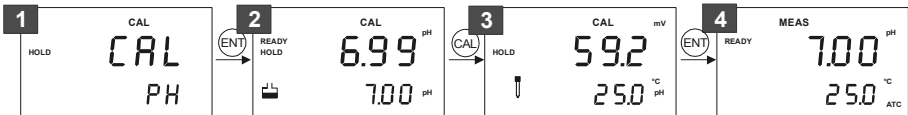
4.3 pH Calibration


The pH Transmitter is capable of calibration of up to 2 points using USA or NIST pH buffer standards. All new calibration values will automatically override the existing calibration data. pH buffer values are referenced to 25 °C. Ensure the measurement mode is set to **pH**. (Refer Section 5.5 for switching measurement modes). All pH buffer values have window of up to ± 1 pH tolerance during calibration. Calibration error can be occurred if the measured pH value exceeds this window. If you wish to abort the pH calibration, press **▲ and ▼** keys simultaneously and the pH Transmitter reverts to pH measurement mode.

4.3.1 For USA Standard Buffer

Make sure that the pH Transmitter is set to accept USA standard buffer in the Setup mode. (Refer Section 5.4 for Buffer Selection Settings) The factory default is USA standard. It is recommended that you perform a 2-point calibration at room temperature (25 °C), starting with the first buffer at pH 7.00 followed by any other buffer value (pH 4.01 or 10.01).

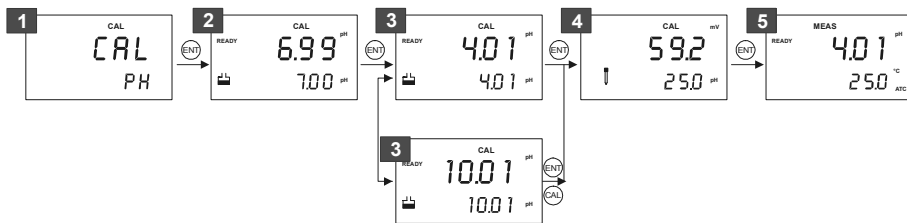
1-Point Calibration:




- 1 From pH measurement mode **press CAL key** to enter calibration mode as described in section 4.2. The LCD shows 'CAL PH'. **Press ENT key** to begin calibration.
- 2 Place the electrode in pH 7.00 buffer. Immerse the temperature probe in the buffer solution if ATC mode is enabled. Immerse the potential matching pin in the buffer if symmetrical mode is enabled. The buffer annunciator  appears in LCD. Lower display shows pH 7.00 (USA standard buffer). Upper display shows the current uncalibrated pH reading. Allow the reading to stabilize. LCD shows 'READY' annunciator when the reading is stable. **Press CAL key** to confirm the reading.
- 3 The calibration is completed. The pH Transmitter re-calculates electrode properties based on the calibration. The new slope (in mV) is shown in the upper display and normalized temperature is shown in lower display. **Press ENT key** to exit from the calibration.
- 4 The pH Transmitter reverts to pH measurement mode.

NOTE: Refer notes at the end of this section for additional information and possible error indicators of calibration process

2-Point Calibration:



- 1 From pH measurement mode **press CAL key** to enter calibration mode as described in section 4.2. The LCD shows 'CAL PH'. **Press ENT key** to begin first calibration point.
- 2 Place the electrode in pH 7.00 buffer. Immerse the temperature probe in the buffer solution if ATC mode is enabled. Immerse the potential matching pin in the buffer if symmetrical mode is enabled. The buffer annunciator  appears in LCD. Lower display shows pH 7.00 (USA standard buffer). Upper display shows the current uncalibrated pH reading. Allow the reading to stabilize. LCD shows 'READY' annunciator

when the reading is stable. **Press ENT key** to confirm the reading.


- 3** The pH Transmitter moves to the second calibration point. The lower display shows next standard buffer value (pH 4.01). **Use ▲ and ▼ keys** to select your second buffer from one of the preset values: pH 4.01 or 10.01. Remove the electrode from the first buffer, rinse and then immerse it into the second buffer. Allow the reading to stabilize. LCD shows 'READY' annunciator when the reading is stable.

Press ENT key (or CAL key) to confirm the reading.

- 4** The calibration is completed. The pH Transmitter re-calculates electrode properties based on the calibration. The new slope (in mV) is shown in the upper display and normalized temperature is shown in the lower display.

Press ENT key to exit from the calibration.

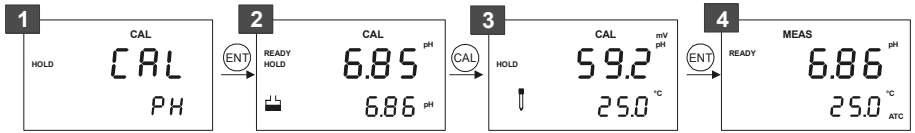
- 5** The pH Transmitter reverts to pH measurement mode.


- NOTE:**
- To exit from pH calibration mode without confirming calibration, press ▲ and ▼ keys together.
 - When confirming the buffer measurement, if measured pH value is not within ± 1.00 pH from selected buffer value, the electrode annunciator  blinks and **ERR** indicator appears in the display. This error can also occur if non-standard buffers are used or the electrode has worn out. If this happens, press both ▲ and ▼ keys together to restart the calibration beginning from Step1.
 - When calibrating with manual temperature compensation, the meter automatically changes from the preset 'process temperature' to the 'calibration temperature'. After leaving the calibration mode, the pH Transmitter reverts back to 'process temperature'.

4.3.2 For NIST Buffer

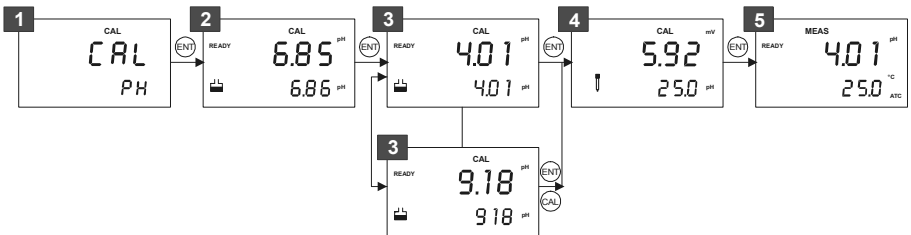
Make sure that the pH Transmitter is set to accept NIST standard buffer in the Setup mode. (Refer Section 5.4 for Buffer Selection Settings) The factory default is USA standard. It is recommended that you perform 2-point calibration at room temperature (25 °C), starting with the first buffer at pH 6.86 followed by any other buffer value. (pH 4.01 or 9.18)

1-Point Calibration:




- 1 From pH measurement mode **press CAL key** to enter calibration mode as described in section 4.2. The LCD shows 'CAL PH'. **Press ENT key** to begin calibration.
- 2 Place the electrode in pH 6.86 buffer. Immerse the temperature probe in the buffer solution if ATC mode is enabled. Immerse the potential matching pin in the buffer if symmetrical mode is enabled. The buffer annunciator  appears in LCD. Lower display shows pH 6.86 (NIST standard buffer). Upper display shows the current uncalibrated pH reading. Allow the reading to stabilize. LCD shows 'READY' annunciator when the reading is stable. **Press CAL key** to confirm the reading.
- 3 The calibration is completed. The pH Transmitter re-calculates electrode properties based on the calibration. The new slope (in mV) is shown in the upper display and normalized temperature is shown in the lower display. **Press ENT key** to exit from the calibration.
- 4 The pH Transmitter reverts to pH measurement mode.

2-Point Calibration:



- 1 From pH measurement mode **press CAL key** to enter calibration mode as described in section 4.2. The LCD shows 'CAL PH'. **Press ENT key** to begin first calibration point.
- 2 Place the electrode in pH 6.86 buffer. Immerse the temperature probe in the buffer solution if ATC mode is enabled. Immerse the potential matching


pin in the buffer if symmetrical mode is enabled. The buffer annunciator  appears in LCD. Lower display shows pH 6.86 (NIST standard buffer). Upper display shows the current uncalibrated pH reading. Allow the reading to stabilize. LCD shows 'READY' annunciator when the reading is stable. **Press ENT key** to confirm the reading.

3 The pH Transmitter moves to the second calibration point. The lower display shows next standard buffer value (pH 4.01). **Use ▲ and ▼ keys** to select your second buffer from one of the preset values: pH 4.01 or 9.18. Remove the electrode from the first buffer, wash and then immerse it into the second buffer. Allow the reading to stabilize. LCD shows 'READY' annunciator when the reading is stable. **Press ENT key (or CAL key)** to confirm the reading.

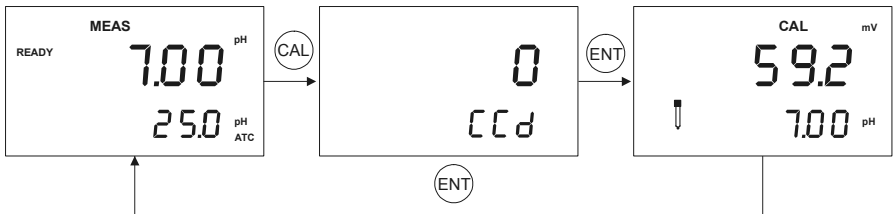
4 The calibration is completed. The pH Transmitter re-calculates electrode properties based on the calibration. The new slope (in mV) is shown in the upper display and normalized temperature is shown in the lower display.

Press ENT key to exit from the calibration.

5 The pH Transmitter reverts to pH measurement mode.

- NOTE:**
- To exit from pH calibration mode without confirming calibration, press ▲ and ▼ keys together
 - When confirming the buffer measurement, if the measured pH value is not within $\pm 1.00\text{pH}$ from selected buffer value, the electrode annunciator  blinks and **ERR** indicator appears in the display. This error can also occur if non-standard buffers are used or the electrode has worn out. If this happens, press both ▲ and ▼ keys together to restart the calibration beginning from Step 1
 - When calibrating with manual temperature compensation, the meter automatically changes from the preset process temperature to the calibration temperature. After leaving the calibration mode, the pH Transmitter reverts back to process temperature.

4.4 Check Calibration



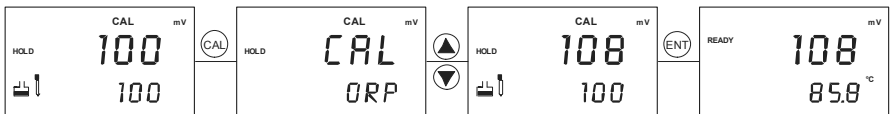
1. While in Measurement mode press the **CAL** key. The display will prompt you to enter a security code. Leave the security code at “0” (view only mode).
2. Press the **ENT** key.

The display shows the slope in mV (Main Reading) and the normalized temperature is shown on the Auxiliary reading of the display.

NOTE: To exit from any intermediate steps, press ▲ and ▼ keys (Escape) together. It will return to measurement mode.

4.5 ORP Calibration

If the unit of measurement is in mV, then the calibration is also carried out in mV.



1. Enter Calibration mode as described in section 4.2. The display shows “**CAL ORP**” (for mV calibration) and the “**CAL**” indicator appears on the display.
2. Place sensor in the solution.
3. Press the **ENT** key to start calibration. The main display shows the current mV output of the electrode with offset adjustment and auxiliary display shows the mV output with out any offset adjustments.
4. Press the ▲ or ▼ key to match the mV value to exact reading.

5. Press the **ENT** key to confirm. The transmitter calculates the correction factor and returns to the Measurement mode.

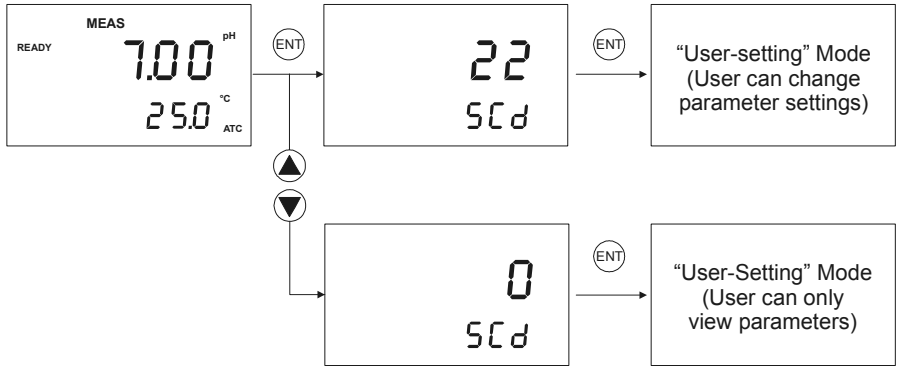
4.6 Temperature Calibration

Calibrate temperature probe only if temperature value displayed on the pH Transmitter is different from that of a calibrated thermometer. Refer to section 5.3 for further information temperature settings.

5 SETUP MODE

5.1 Enter Setup mode

In the Setup mode the transmitter can be configured to the individual requirements.



1. While in measurement mode, press the **ENT** key.
2. The display prompts to enter the security code. Set the security code with **▲** or **▼** key to:
 - “SCD 22” to change parameter settings
 - “SCD 0” to view parameter settings only (view only mode)
3. Press the **ENT** key.

NOTE: To exit from any intermediate steps, press **▲** and **▼** keys (Escape) together. It will return to measurement mode.

5.2 Electrode Offset Settings

NOTE: 'Electrode Offset Setting' is not available when the pH Transmitter is configured for ORP measurement mode. (Refer Section 5.5 for switching measurement modes)

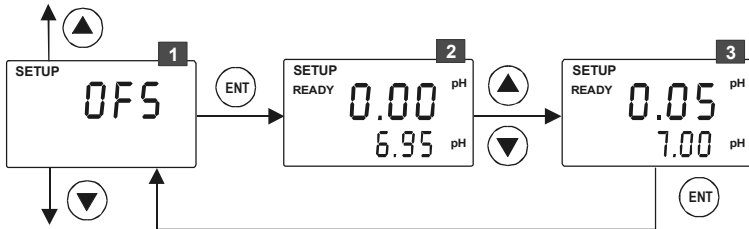
In applications where continuous pH measurement is required, it may not be convenient to remove the electrode for calibration. In such cases, an on-line offset adjustment is recommended. The pH Transmitter allows you set an offset of up to $\pm 2.00\text{pH}$ to compensate for errors in the pH electrode.

The pH Transmitter adds or subtracts the offset value from the measured pH value and displays the corrected value. However, if you need to offset the value beyond the average offset you would expect in your application type, consider a full calibration or even electrode replacement.

To Determine the Offset Value:

1. Take a sample from the liquid of pH measurement. Record the pH reading of the pH transmitter at the time the sample was taken.
2. Measure the pH value of your sample using another calibrated pH meter having its own electrode (pH tester, hand-held meter or bench meter)
3. The difference between these two readings is the offset

To Adjust the Offset Value:



- 1 From pH measurement mode **press ENT key** to enter setup mode as described in section 5.1. The LCD shows the first screen of setup mode (**OFS**). **Press ENT key** to access electrode offset setting (OFS).
- 2 The upper display shows the last configured offset value (if any), otherwise zero. The lower display shows currently measured pH reading (including last configured offset value). Allow the reading to stabilize. LCD shows

'READY' annunciator when the reading is stable.

Press **▲** or **▼** key to set the upper display to the newly calculated offset value.

- 3** As the upper display value (offset) changes, the pH Transmitter adjust the lower reading automatically to suit the new offset value. Up to ± 2.00 pH offset is allowed.

Press **ENT** key to confirm the value. The pH Transmitter reverts to **OFS** screen.

NOTE: To exit from any intermediate steps, press **▲** and **▼** keys (Escape) together. It will return to measurement mode.

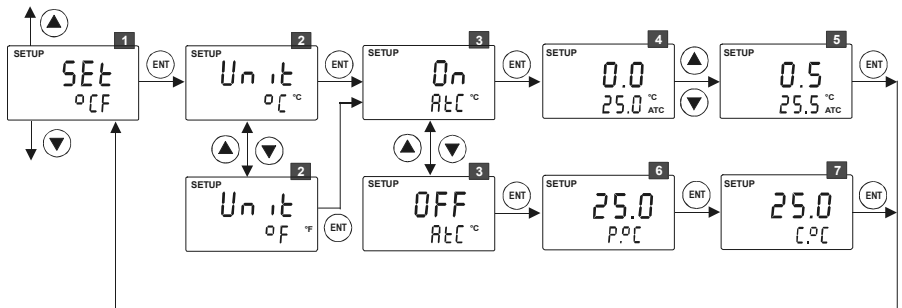
5.3 Temperature Settings

Automatic Temperature Compensation (ATC):

The pH values other than pH 7.00 are affected by temperature. Use ATC feature of the pH Transmitter to compensate for pH changes when the temperature of the sample or process liquid fluctuates. Connect a separate temperature probe (Pt100/pt1000) to the pH Transmitter if an integrated pH/Temperature probe is not available.

Manual Temperature Compensation (MTC):

Set the pH Transmitter to MTC (disable ATC) when the temperature of sample or process liquid is constant and a temperature probe is not available. If you disable ATC, the pH Transmitter allows you to set your **process temperature (P.°C)** and **calibration temperature (C.°C)**. This allows calibration at a different temperature other than the process temperature. Example: Setting calibration temperature of 25°C lets you calibrate using standard solutions at 25°C, even if your process temperature is different from 25°C.



- 1** From pH or ORP measurement mode **press ENT key** to enter setup mode as described in section 5.1. The LCD shows the first screen of setup mode (**OFS**). **Press ▲ or ▼ key** to select Temperature settings screen (**SET °CF**).

Press ENT key to access temperature settings (**SET °CF**).

- 2** **Selecting unit of measurement for temperature:** The upper display shows 'Unit' and the lower display shows the last configured unit of measurement for temperature.

Press ▲ or ▼ key to select the desired units for temperature (**°C or °F**).
Press ENT key to confirm your selection.

- 3** **Enable/disable ATC:** The lower display shows 'AtC' and the upper display shows the last configured ATC selection ('On' or 'OFF').

Press ▲ or ▼ key to enable (**ATC On**) or disable (**ATC OFF**) automatic temperature compensation. **Press ENT key** to confirm your selection.

If ATC enabled (ATC On):

- 4** **Setting temperature offset:** The upper display shows the last configured temperature offset value (if any), otherwise the default is zero. The lower display shows currently measured temperature reading (including last configured offset value). LCD shows 'ATC' annunciator in lower-right corner.

Place a thermometer, which is known to be accurate, in your sample or process liquid. Make sure your temperature probe is placed in the same liquid. Compare the stabilized temperature reading displayed on the Transmitter with the thermometer. If there is a difference between the two readings (offset), you can adjust the reading of the Transmitter. **Press ▲ or ▼ key** to adjust the lower display to the correct temperature value.

- 5** As the lower display value changes, the pH Transmitter adjust the upper display reading automatically to suit the new offset value. Up to ± 10 °C / ± 18 °F offset is allowed.

Press ENT key to confirm the value. The pH Transmitter reverts to **SET °CF** screen.

If ATC disabled (ATC OFF):

- 6** **Setting process temperature:** The lower display shows 'P.°C' and the upper display shows the last configured process temperature. **Press ▲ or ▼ key** to adjust the upper display to desired process temperature. Allowable range: -10.0 to 110.0 °C / 14.0 to 230 °F.

Press ENT key to confirm the process temperature.

7

Setting calibration temperature: The lower display shows 'C.°C' and the upper display shows the last configured calibration temperature. **Press ▲ or ▼ key** to adjust the upper display to desired calibration temperature. Allowable range: -10.0 to 110.0°C / 14.0 to 230°F.

Press ENT key to confirm the calibration temperature. The pH Transmitter reverts to **SET °CF** screen.

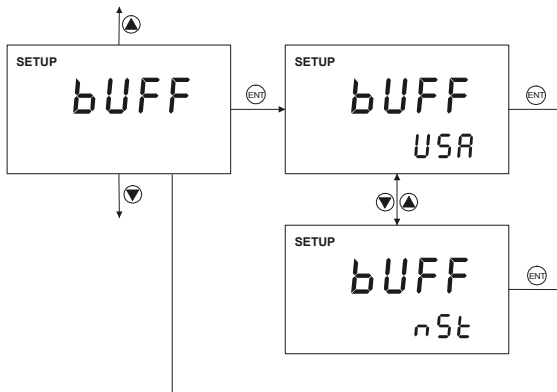
NOTE: **Press ▲ or ▼ key** to access other setup screens or **press ▲ and ▼ key simultaneously** (escape) to return to measurement mode. To exit from any intermediate steps, **press ▲ and ▼ keys simultaneously** (escape). The pH Transmitter returns to the first screen of temperature settings **SET °CF**.

5.4 Buffer Selection Settings

NOTE: The buffer selection setting is only available if the Transmitter is configured for pH measurement mode.

This allows you to set the pH Transmitter to accept either USA or NIST pH buffer standard group during pH calibration.

Buffer Group	pH Buffer Points
USA	pH 4.01, 7.00 & 10.01
NIST	pH 4.01, 6.86 & 9.18



1 From pH measurement mode **press ENT key** to enter setup mode as described in section 5.1. The LCD shows the first screen of setup mode (OFS). **Press ▲ or ▼ key** to select buffer settings screen (bUFF).

Press ENT key to access buffer settings (bUFF).

2 **Selecting buffer group:** The lower display shows the last configured buffer group. **Press ▲ or ▼ key** to select the required buffer group ('USA' or 'nST').

Press ENT key to confirm your selection. The pH Transmitter reverts to bUFF screen.

NOTE: To exit from any intermediate steps, press ▲ and ▼ keys (Escape) together. It will return to measurement mode.

5.5 Configuration Settings

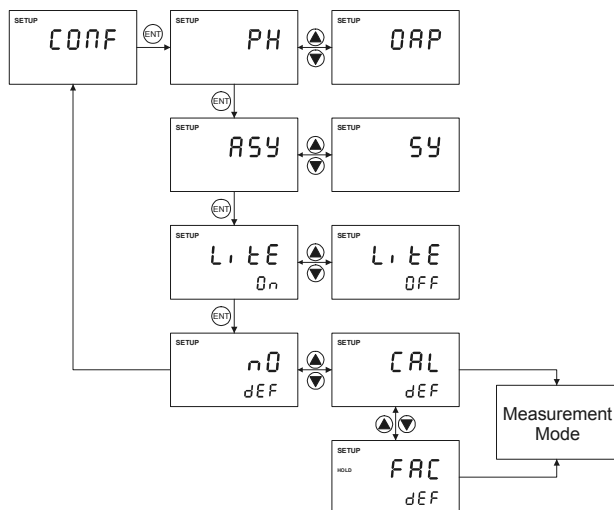
Configuration settings let you configure the pH Transmitter to different measurement & operation modes & reset the pH Transmitter to factory defaults.

Asymmetrical Operation Mode (ASY):

This is the default mode of operation of the pH Transmitter, which is suitable for most applications where sample (or process) liquid is not interfered by adjacent electrical noise.

Symmetrical Operation Mode (SY):

This is the mode of operation is recommended for applications where sample (or process) liquid is subjected to high electrical interference and therefore the pH reading becomes unstable. When the pH Transmitter is set to symmetrical mode, you should immerse the potential matching pin in the sample (or process) liquid or use a pH electrode with built-in potential matching pin. The 'MEAS' indicator blinks when the pH Transmitter is set to Symmetric mode.



NOTE: To exit from any intermediate steps, press ▲ and ▼ keys (Escape) together. It will return to measurement mode.

Selecting “pH” or “mV” Mode of Operation

1. Press **ENT** key and use ▲ or ▼ keys to scroll till LCD displays ‘**CONF**’ (Configuration). Press **ENT** again.
2. LCD displays ‘**PH**’. meter is set to operate as a pH meter. Use ▲ or ▼ keys to change from ‘**PH**’ to ‘**ORP**’, if this Transmitter is to operate as an ORP Transmitter.
3. Press the **ENT** key to accept selection.
4. Press ▲ and ▼ keys together to return to the CONF main menu.

Selecting “Asymmetrical” or “Symmetrical” Mode of Operation

In some applications, there may be some electrical interference in the sample, where the electrode is installed. The sensitive electrode picks up the signal and the effect is displayed on the LCD.

If the electrical interference is from an AC source, the reading on the LCD fluctuates wildly. If the source is DC, then readings will be stable, but at a wrong value.

In such cases, switch the Transmitter to the Symmetrical mode as below:

1. Press **ENT** key and use ▲ or ▼ keys to scroll till LCD displays '**CONF**' (Configuration). Press **ENT** again.
2. LCD displays "**ASY**" (asymmetrical operation). Use ▲ or ▼ keys to select for "**SY**" (symmetrical mode of operation). Press **ENT** key again.
3. Press ▲ and ▼ keys together to return to the **CONF** main mode.

Selecting Back Light ON or OFF Operation

1. Press **ENT** key and use ▲ or ▼ keys to scroll till LCD displays '**CONF**' (Configuration). Press **ENT** again.
2. Press **ENT** key until the LCD displays either "**LitE ON**" or "**LitE OFF**"
3. LCD displays "**LitE ON**" (Back light ON). Use ▲ or ▼ keys to select for "**LitE OFF**" (back light OFF).
4. Press **ENT** key again.
5. Press ▲ and ▼ keys together to return to the **CONF** main mode.

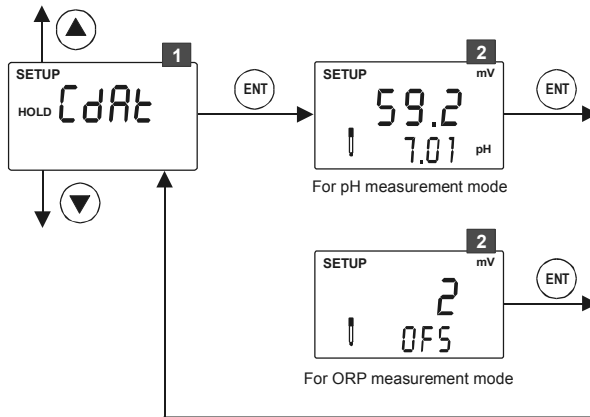
Reset the User Calibration parameters or Setup parameters

1. Press **ENT** key and use ▲ or ▼ keys to scroll till LCD displays '**CONF**' (Configuration). Press **ENT** again.
2. Press **ENT** key until the LCD displays "no DEF".
3. Not to reset any of the setup or user calibration parameters select "nO DEF" and press **ENT** key. It will lead to the **CONF** main menu.
4. To reset the user calibration parameters, select "CAL DEF" and press **ENT** key. It will reset the User calibration parameters and lead to measurement mode.
5. To reset the user calibration parameters and meter setup parameters to default values, select "FAC DEF" and press **ENT** key. It will reset the user calibration parameters and meter setup parameters and lead to measurement mode.


5.6 Viewing Electrode Properties

Each time you calibrate your pH electrode, the pH Transmitter re-calculates slope & offset of the electrode and shown in the LCD at the end of calibration. The setup mode allows you to view slope & offset values at any time.

NOTE: When the measurement mode is set to ORP, only the offset value of the electrode is displayed.



1 To view the calibration and parameter, press **CAL** key, then **ENT** key.

2 **Electrode status:** The electrode annunciator  appears in the LCD. For pH measurement mode, the slope (in mV) is shown in the upper display and normalized temperature is shown in the lower display.

For ORP measurement mode, the offset value (in mV) of the electrode is shown in the upper display.

Press ENT key to quit from electrode properties screen.

NOTE: To exit from any intermediate steps, press **▲** and **▼** keys (Escape) together. It will return to measurement mode.

6 TECHNICAL SPECIFICATIONS

General Specification	
(a) pH	
pH Measuring Range	0.00 to 14.00 pH
Resolution	0.01 pH
Accuracy	± 0.01 pH
(b) mV	
mV Measuring Range	-1000 to 1000 mV
Resolution	1 mV
Accuracy	± 1 mV
(c) Temperature	
Temperature measuring range	-10.0 to +110.0 °C or +14.0 to +230.0 °F
Resolution	0.1 °C or 0.1 °F
Relative accuracy	0.5 °C or 1.0 °F
Sensor	3 wire / 2 wire – Pt100 or Pt1000 (Jumper Selectable)
Compensation	Automatic or Manual
Calibration Point	
(a) pH	
Number of calibration points	1 or 2 points
Number of calibration buffers	USA: 4.01, 7.00, 10.01 NIST: 4.01, 6.86, 9.18
(c) Temperature	
Offset Adjustment	±10 °C/ ±18 °F
Input / Output	
Input	Asymmetrical / Symmetrical
Output	UART Serial Comm. Output for the RF RX/TX Board: Protocol : 8-N-1 Data rate: 9,600 kbps
Display	
LCD	UV coat, Custom Dual segments display with symbols for Status information.
Back light	On/Off selectable
Electrical data and Connections	
pH/mV Input	8-pin Screw Terminal (3.5mm pitch)
Temperature Input	8-pin Screw Terminal (3.5mm pitch)
Power	Phone Jack DC Socket
RF Communication Specifications	
Transmission Method	TDMA, FSK Modulation
Frequency	923 to 928 MHZ, ISM Band Region 2
Air Baud Rate	16 Kbit/S
Range Single Unit	100 m (328 ft) (in open air)
RF Power	+5 dB
Antenna	Internal diversity antenna
Network Model	Mesh
Operating Temperature	-10 to 65 °C
Others	
Power Input	+9 V DC
Pollution Degree	2
Dimensions (W x H x D)	96mm x 96mm x 66 mm
Weight (Estimated)	210g
Ambient Temp. operating range	0 to 40 °C
Maximum Relative Humidity	80% up to 31 °C decreasing linearly to 50% at 40°C
Ingress Protection	IP65

7 LIST OF ACCESSORIES

7.1 Thermo Scientific

pH Transmitter Replacement and Accessories

Item Description	Order Code
Alpha pH 600 wall-mount pH/ORP RF transmitter	TSPHCTP0600
Wireless (RF) receiver and application software	TSRCV0600S
Ryton®-body pH combi electrode with Pt100 RTD (ATC) & 20 m cable with BNC & PMP	EC100GTSO20B
Ryton®-body pH combi electrode with Pt100 RTD (ATC) & 10 m cable with BNC & PMP	EC100GTSO10B
Ryton®-body pH combi electrode with Pt100 RTD (ATC) & 5 m cable with BNC & PMP	EC100GTSO05B
Ryton®-body pH combi electrode with 5 m cable with BNC & connector for PMP (no ATC)	ECARGTSO05B
Ryton®-body pH combi electrode with 5 m cable with BNC connector (no ATC); measures up to 110 °C	ECARHTTSO05B
Ryton®-body pH combi electrode without ATC & 5 m cable with BNC connector. HF resistant glass	ECARTSOHF05B
Ryton®-body pH combi electrode with 5 m cable with BNC connector (no ATC)	ECARTSO05B
Ryton®-body ORP gold electrode with 5 m cable with BNC & PMP (no ATC)	ECHTAUTSO05B
Ryton®-body ORP platinum electrode with 5 m cable with BNC & PMP (no ATC)	ECHTPPTSO05B

Calibration Solutions

Item Description	Order Code
pH 4.01 buffer solution, 480 ml bottle	EC-BU-4BT
pH 7.00 buffer solution, 480 ml bottle	EC-BU-7BT
pH 10.01 buffer solution, 480 ml bottle	EC-BU-10BT
pH 4.01 buffer sachets, 20 ml x 20 pcs.	EC-BU-4BS
pH 7.00 buffer sachets, 20 ml x 20 pcs.	EC-BU-7BS
pH 10.01 buffer sachets, 20 ml x 20 pcs.	EC-BU-10BS
pH De-ionized water rinse sachets, 20 ml x 20 pcs	EC-RIN-WT
pH sachet assortment pack – 5 each of pH 4.01, pH 7.00, pH 10.01 and de-ionized water sachets per box	EC-AST-PK
Protein cleaning solution for pH electrode	EC-DPC-BT
Storage solution for pH electrode	EC-RE-005

- NOTE:**
- pH buffer solutions (480 ml bottle) have ± 0.01 pH accuracy at 25 °C
 - pH buffer sachets are individually sealed, single use pouch containing 20 ml of fresh, contamination free calibration solution
 - pH buffer sachets have ± 0.01 pH accuracy at 25°C

7.2 Eutech Instruments

pH Transmitter Replacement and Accessories


Item Description	Order Code
Alpha pH 600 transmitter	56706-00
Wireless RF receiver with application software	56706-50
pH/Temp electrode with PMPO and 10-ft cable	35807-20
Platinum ORP electrode with 10-ft cable	35801-21
BNC to spade lug adapter	05994-90

Calibration Solutions

Item Description	Order Code
pH 4.01 calibration buffer, 500 ml	00654-00
pH 7.01 calibration buffer, 500 ml	00654-04
pH 10.01 calibration buffer, 500 ml	00654-08
pH 4.01 calibration buffer solution pouches, 20/box	35653-01
pH 7.00 calibration buffer solution pouches, 20/box	35653-02
pH 10.00 calibration buffer solution pouches, 20/box	35653-03
pH De-ionized water rinse sachets, 20 ml x 20 pcs	35653-00
Assortment pack – 5 each of pH 4.01, pH 7.00 and pH 10.00 solution pouches.	35653-04
Electrode cleaning solution	00653-06
Electrode storage solution	00653-04

NOTE: To order **Eutech** accessories, contact the nearest Oakton distributor

8 TROUBLESHOOTING

Problem	Cause	Solution
Power on, but no display	<ul style="list-style-type: none"> a) Loose connections b) Incorrect output voltage of the power adaptor 	<ul style="list-style-type: none"> a) Ensure cables make good contact b) Use an power adaptor with specified output voltage
Unstable pH reading	<ul style="list-style-type: none"> a) Dirty electrode b) Electrical noise interference 	<ul style="list-style-type: none"> a) Clean electrode and recalibrate b) Switch to Symmetric mode
Oscillating temperature readings	<ul style="list-style-type: none"> a) Electrical noise interference 	<ul style="list-style-type: none"> a) Ensure shield wire is properly connected to pin 7
Slow response	<ul style="list-style-type: none"> a) Dirty / Oily electrode 	<ul style="list-style-type: none"> a) Clean electrode
Blinking ATC	<ul style="list-style-type: none"> a) No temperature probe connection during ATC mode 	<ul style="list-style-type: none"> a) Ensure temperature sensing cable makes good contact
Blinking electrode annunciator 	<ul style="list-style-type: none"> a) Error in calibration 	<ul style="list-style-type: none"> a) Ensure calibration standard solution is not contaminated. Ensure electrode is clean.
Or (pH)	<ul style="list-style-type: none"> a) pH electrode is not connected 	<ul style="list-style-type: none"> a) Ensure electrode makes good contact with Transmitter
Or (Temperature)	<ul style="list-style-type: none"> a) Temperature probe is not connected when ATC enabled 	<ul style="list-style-type: none"> a) Ensure electrode makes good contact with Transmitter

9 GENERAL INFORMATION

9.1 Warranty

This transmitter is supplied with a one-year warranty against significant deviations in material and workmanship from date of purchase and a six-month warranty for probe. Each instrument will have a warranty card with a specific serial number. The warranty card must be endorsed by the Authorized Distributor at the point of sale.

If repair or adjustment is necessary and has not been the result of abuse or misuse within the designated period, please return – freight pre-paid – and correction will be made without charge. Thermo Scientific/ Eutech will determine if the product problem is due to deviations or customer misuse.

Out of warranty products will be repaired on a charged basis.

Exclusions

The warranty on your instrument shall not apply to defects resulting from:

- Improper or inadequate maintenance by customer
- Unauthorized modification or misuse
- Operation outside of the environment specifications of the products

9.2 Return of Goods

Authorization must be obtained from our Customer Service Department or authorized distributor before returning items for any reason. A “Return Goods Authorization” (RGA) form is available through our authorized distributor. Please include data regarding the reason the items are to be returned. For your protection, items must be carefully packed to prevent damage in shipment and insured against possible damage or loss. Thermo Scientific will not be responsible for damage resulting from careless or insufficient packing. A restocking charge will be made on all unauthorized returns.

NOTE: Thermo Scientific reserves the right to make improvements in design, construction, and appearance of products without notice.

10 APPENDICES

10.1 Appendix 1– pH Buffer Values at Various Temperatures

The following table shows the various pH values at different temperature of the solution during calibration.

3	pH 4.01	pH 6.86	pH 7.00	pH 9.18	pH 10.01
0	4.01	6.98	7.12	9.47	10.32
5	4.01	6.95	7.09	9.38	10.25
10	4.00	6.92	7.06	9.32	10.18
15	4.00	6.90	7.04	9.27	10.12
20	4.00	6.88	7.02	9.22	10.06
25	4.01	6.86	7.00	9.18	10.01
30	4.01	6.85	6.99	9.14	9.97
35	4.02	6.84	6.98	9.10	9.93
40	4.03	6.84	6.97	9.07	9.89
45	4.04	6.83	6.97	9.04	9.86
50	4.06	6.83	6.97	9.01	9.83
55	4.08	6.83	6.97	8.99	9.81
60	4.10	6.84	6.98	8.96	9.79
70	4.12	6.85	6.99	8.92	9.76
80	4.16	6.86	7.00	8.89	9.74
90	4.20	6.88	7.02	8.85	9.73

10.2 Appendix 2 – Abbreviations Used in LCD

Abbreviation	Description
ASy	Asymmetrical mode
AtC	Automatic Temperature Compensation
bUFF	Buffer
CAL	Calibration
C.°C	Calibration temperature
CONF	Configuration
dEF	Default values
FcT	Factory (defaults)
OFS	Offset
Or	Reading is over range
Orn	Out of range
OrP	Oxidation Reduction Potential
P.°C	Process temperature
PH	pH
Set	Setting
Sy	Symmetrical mode
tyP	Type
Ur	Reading is under range

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Water Analysis Instruments

North America 166 Cummings Center
Beverly, MA 01915 USA
Toll Free: 1-800-225-1480
Tel: 1-978-232-6000
Dom. Fax: 1-978-232-6015
Int'l Fax: 978-232-6031
www.thermo.com/process

Europe Denmark House, Angel Drove
Ely, Cambridgeshire
CB7 4ET, UK
Tel: 44-1353-666111
Fax: 44-1353-666001

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#04-16/24 Singapore 139949
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