pH
INDICATOR/CONTROLLER/ TRANSMITTER
USER MANUAL

For Service Support: +91 70469 60991

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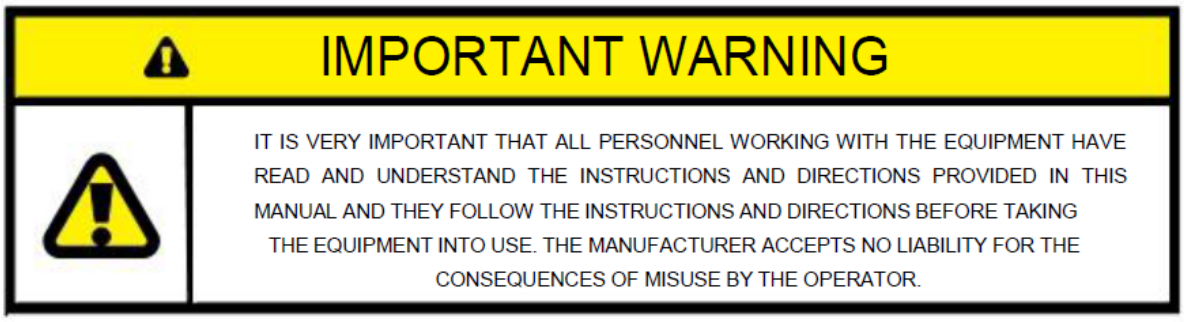


The operator shall bear responsibility for the suitability of the device for the specific purpose:

1. Improper installation and operation of the devices (systems) will cause the warranty to be void.
2. The manufacturer will not be liable for any damage of any kind by using its product, including, but not limited direct, indirect, incidental, punitive, and consequential damages.

Installation, connection, commissioning, and service must be carried out by personnel who are qualified and authorized to do so.

Installation personnel must ensure that the measuring system is correctly connected according to the connection diagram.

This device contains electrical components with an electrical current therefore installation, services, and maintenance must be carried out by expert and qualified personnel, aware of all necessary precautions. Before opening any internal parts, please shut off the power supply.

The Device is composed of metal and plastic parts, all of which must comply with local norms and requirements concerning their trash disposal.

Manufacturer's design and safety statement

- Stresses and loading caused by earthquakes, traffic, high winds, and fire damage are not taken into account during device design.
- During operation do not exceed the pressure and/or temperature ratings indicated on the data label or in this Operating Manual.
- The manufacturer reserves the right to update safety information without prior notice.
- Read and follow all guidelines outlined in this manual to ensure a safe and reliable user experience.
- Ensure that the Device is connected to a power source within the specified voltage range.
- Keep the pH Controller away from water and moisture
- Do not expose the pH Controller to extreme temperatures.
- Use the pH Controller only as described in this manual.

TABLE OF CONTENT

1. Introduction

1.1 Overview

Accumax Instruments Pvt Ltd, a leading provider of precision instrumentation solutions, offers a state-of-the-art pH meter designed to accurately measure the pH of various solution in various industries. This manual is designed to provide you with all the necessary information for the proper installation, operation, calibration, and maintenance of your pH Controller. The pH Controller is a precision instrument that measures the acidity or alkalinity of a solution. It is commonly used in laboratories, water treatment plants, and other industrial applications where accurate pH measurement is essential.

1.2 Key feature

- High Accuracy: Precision pH measurements with ±0.1 pH accuracy.
- Wide Measurement Range: Measures pH from 0 to 14.
- Temperature Compensation: Automatic adjustment for temperature variations.
- Digital Display: Large, backlit LCD for easy readability.
- Easy Calibration: password-protected user selectable Buffer calibration up to 3 calibration points.
- Communication: RS485 Modbus and 4-20mA output for SCADA system integration.
- Relay output: Equipped with relay outputs for process control and alarms.

1.3 Package Contents

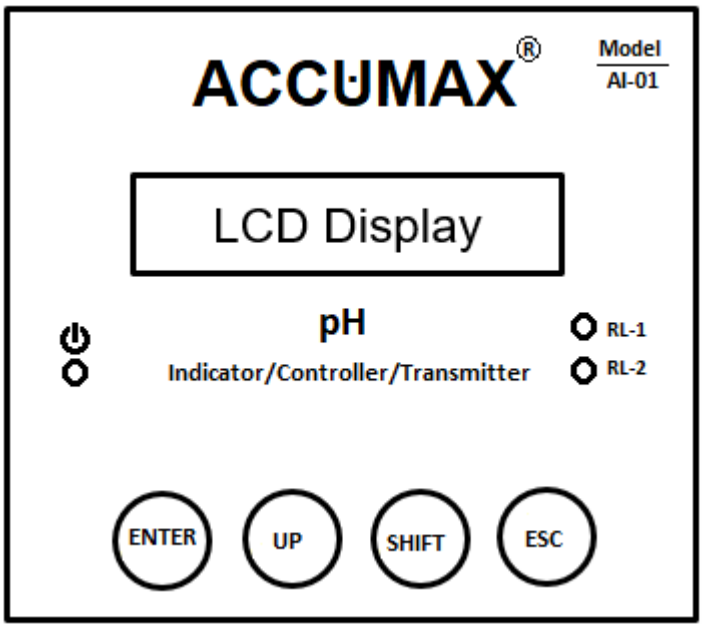
- pH controller device
- pH electrode
- User manual

2. Setup and Configuration

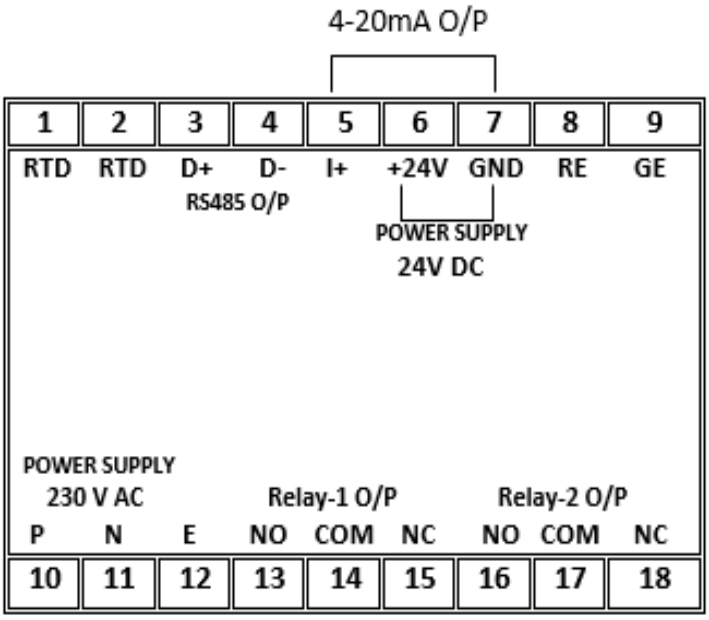
2.1 Installation

- Place the pH Controller on a stable, level surface.
- Connect the power supply to the pH Controller.
- Connect the pH electrode to the pH Controller.
- Before putting the pH electrode in the sample solution, calibrate the controller as mentioned in section 3.1
- Ensure the pH electrode is properly immersed in the sample solution.

2.2 Hardware Connections



FRONT SIDE



BACK SIDE

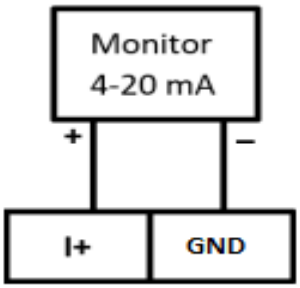
2.2.1 RS485 Connection

- Connect D+ (PIN 3) & D- (PIN 4) of pH Controller to master controller.

3	4
D+	D-
RS485	

2.2.2 4-20 mA Connection

- Connect I+ (PIN 5) and GND (PIN 7) of pH controller to the master controller.



2.2.3 Relay Connection

- The provided relay connection is shown below.

13	14	15	16	17	18
NO	COM	NC	NO	COM	NC
Relay 1			Relay 2		

2.2.4 Sensor Connection

- Temperature sensor
  - Connect 2-wire RTD temperature sensor in PIN 1 and PIN 2

1	2
RTD 1	RTD 2

- pH Sensor
  - Connect pH electrode's RE(-) and GE(+) wire to PIN 8 and PIN 9 respectively.

8	9
RE(-)	GE(+)

3 Software Settings

- Key 1 - ENTER 

- Key 2 - UP 

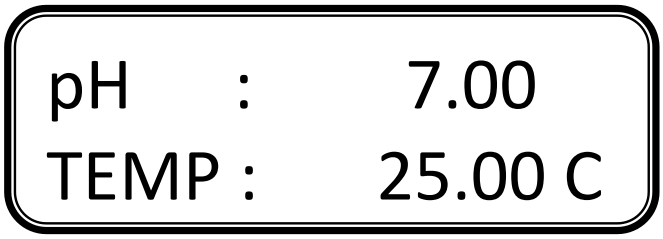
- Key 3 - SHIFT 

- Key 4 - ESC 

- **Note – ESC Key generally used to skip to next Screen/Menu**
- **Password Settings:**
  - Press ENTER key for 2 seconds for setting mode.
  - Press UP key to enter a number and SHIFT key to shift the cursor (set password XXXX).
  - Press ENTER key to enter.
- **Password Table**

Password (XXXX)	Function
1111	Configuration Menu
2222	4 – 20mA Calibration Menu
3333	Modbus Menu
6666	pH Calibration Menu
9999	Re-calibration Menu

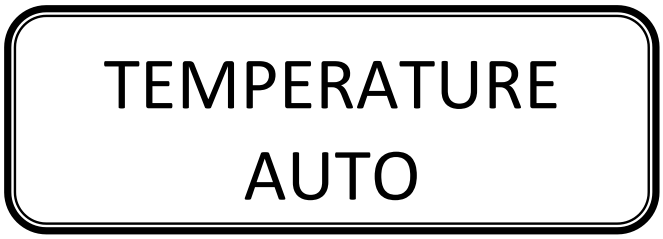
- **LCD Display (Home Screen)**



3.1 Configuration Menu

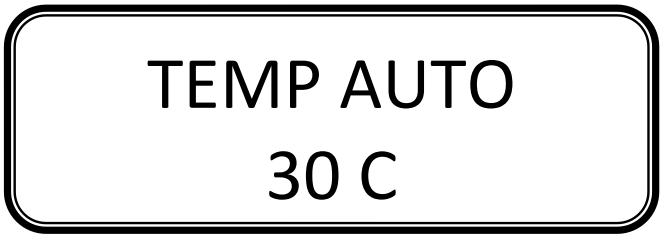
- Press ENTER key for 2 seconds for setting mode.
- Press UP key to enter number and SHIFT key to shift cursor (Set password 1111)
- Press ENTER key to enter into configuration menu.

- **Temperature Type**
  - Press UP key for selection of temperature type (AUTO, MANUAL)
  - Press Enter key after the selection of required temperature type
  - If AUTO type temperature is selected then temperature will be according to temperature sensor

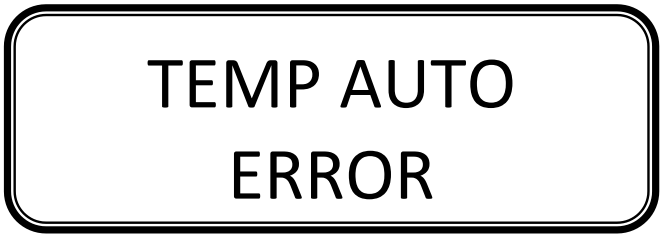


Available option (AUTO, MANUAL)

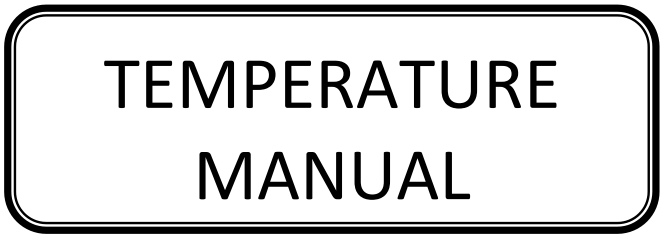
  - If auto temperature is within range then the current temperature will appear as per below screen



  - If auto temperature is out of range then the error will appear as per below screen

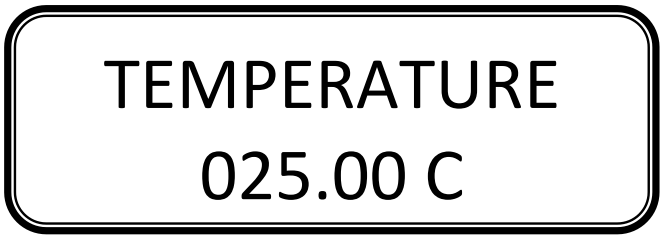


- **Manual Temperature setting**

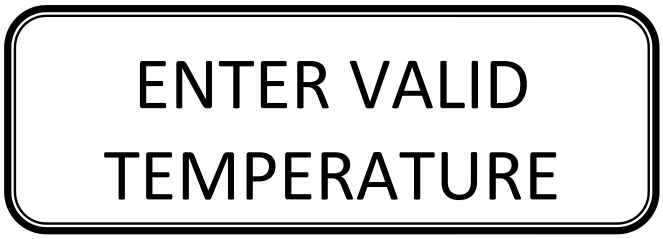


  - Press UP key to enter Temperature and SHIFT key to shift cursor.
  - Press ENTER key to save the data and move to next screen
  - Press ESC key to skip

- Note: User can set up to 170 °C



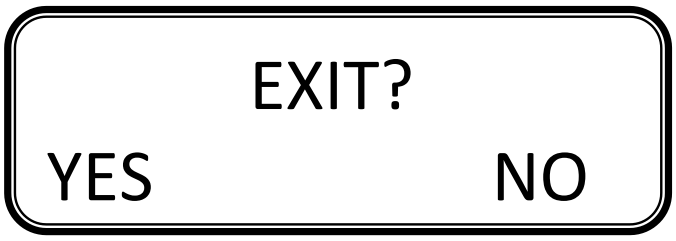
- **Enter valid Temperature**
  - If Temperature is above 170 then below warning will appear when temperature type is manual



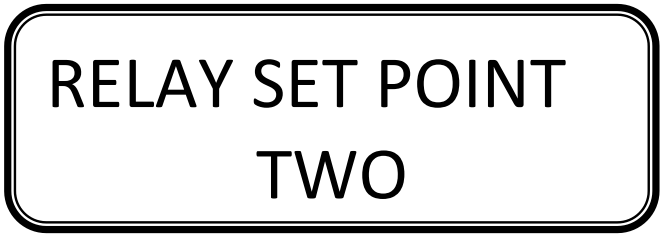
- **Temperature offset**
  - Temperature offset is difference between actual temperature and measured temperature by pH electrode.
  - Press UP key to enter Temperature offset and SHIFT key to shift cursor.
  - Press ENTER key to save the data and move to next screen
  - Press ESC key to skip

- **Relay settings**
  - Press ESC(NO) key to deactivate relay

- **Deactivate both Relays**
  - Press ESC(NO) key at “Activate Relay” menu
  - Press ENTER key (YES) to save changes at “Exit” menu.
  - Press ESC key (NO) to return to “1111” password menu.

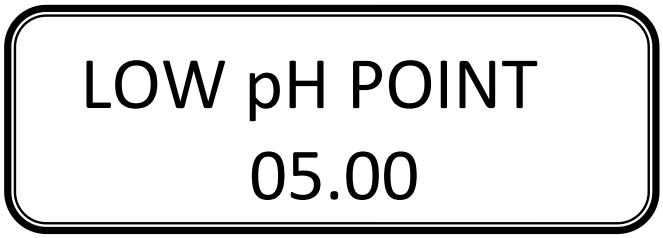


- **Activate relays**
  - Press ENTER key (YES) to activate relays and to set Low and High Set Point.
- **Relay Set Point**
  - Press UP key for selection of relay set point (TWO, FOUR)
  - Press Enter key after the selection of required relay set point



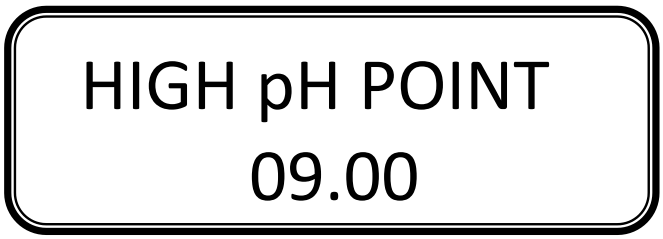
Available option (TWO, FOUR)

- **Relay-1 Low Set Point setting**
  - Press ENTER key to enter Low pH Set point and SHIFT key to shift cursor right.
  - Press ENTER key to enter.
  - If user presses ESC key device will save previous set value
  - Relay will be energized when the pH value goes below a Low Set Point.



  - If the entered pH value is not in 0-14 range then below warning will appear

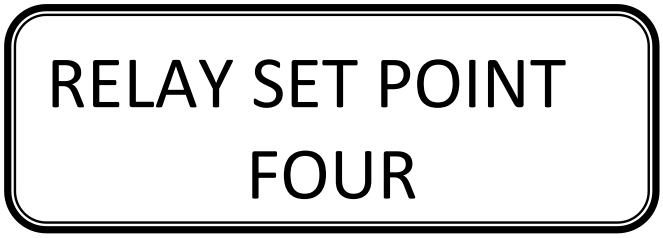
- **Relay-2 High Set Point setting**
  - Press ENTER key to enter High pH Set point and SHIFT key to shift cursor right.
  - Press ENTER key to enter.
  - If user presses ESC key device will save previous set value.
  - Relay will be energized when the pH value goes above a High Set Point.



  - If the entered pH value is not in 0-14 range then below warning will appear

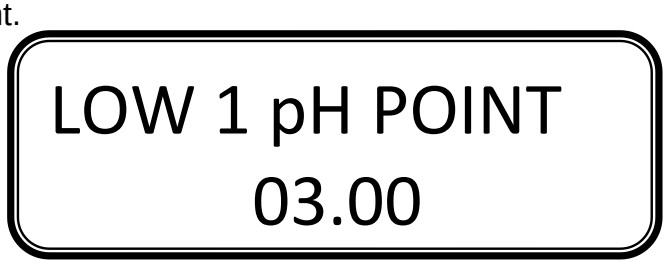
OR

- **Relay Set Point**



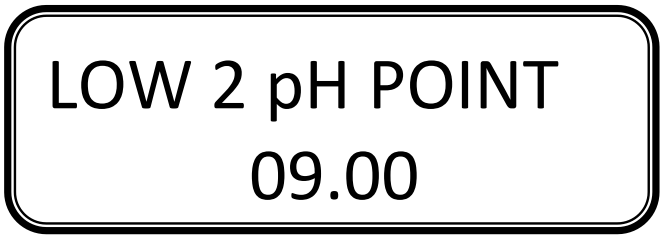
Available option (TWO, FOUR)

- **Relay-1 Low Set Point setting**
  - Press ENTER key to enter Low pH Set point and SHIFT key to shift cursor right.
  - Press ENTER key to enter.
  - If user presses ESC key device will save previous set value
  - Relay will be energized when the pH value goes below a Low 1 Set Point.

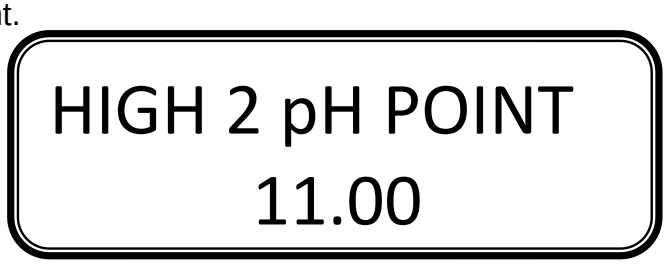


- **Relay-1 High Set Point setting**
  - Press ENTER key to enter High pH Set point and SHIFT key to shift cursor right.
  - Press ENTER key to enter.
  - If user presses ESC key device will save previous set value
  - Relay will be stop when the pH value goes above a High 1 Set Point.

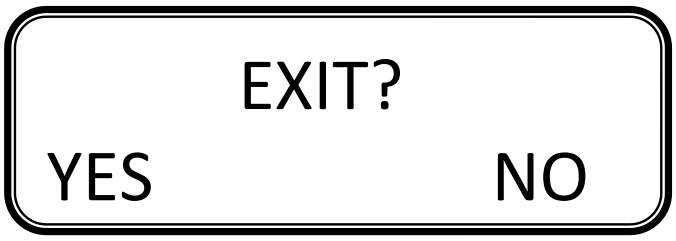
- **Relay-2 Low Set Point setting**
  - Press ENTER key to enter Low pH Set point and SHIFT key to shift cursor right.
  - Press ENTER key to enter.
  - If user presses ESC key device will save previous set value
  - Relay will be stop when the pH value goes below a Low 2 Set Point.



- **Relay-2 High Set Point setting**
  - Press ENTER key to enter High pH Set point and SHIFT key to shift cursor right.
  - Press ENTER key to enter.
  - If user presses ESC key device will save previous set value
  - Relay will be energized when the pH value goes above a High 2 Set Point.



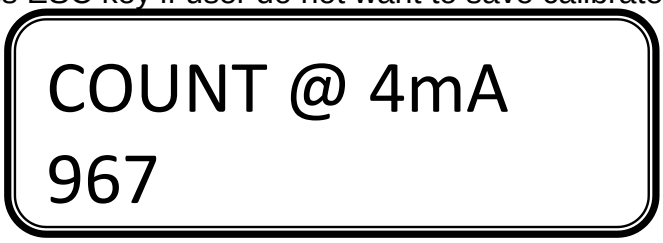
- **Complete Relay setting mode:**
  - Press ENTER(YES) key to save changes.
  - Press ESC(NO) key to return “1111” password menu.



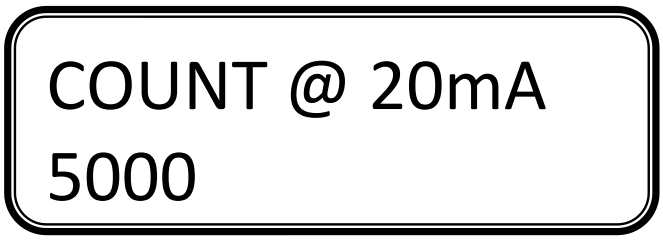
3.2 4 – 20mA Calibration Menu

- Press ENTER key button for 2 seconds for setting mode.
- Press UP key to enter number and SHIFT key to shift cursor (Set password 2222)
- Press ENTER key to enter.

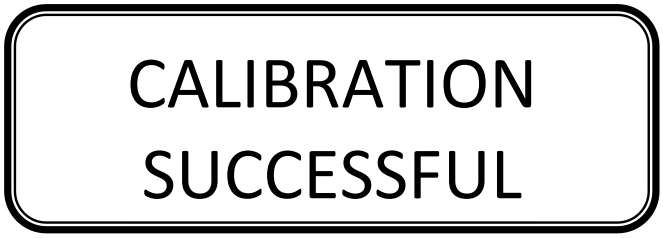
- **4 mA calibration**
  - Connect multimeter at I+ (pin 5) and GND (pin 7) and measure milli-ampere current.
  - Press UP key to enter Count and SHIFT key to shift cursor.(Default value will be 967)
  - Set count until multimeter shows 4.00 mA output
  - Press ENTER key for save the data and to move for 20mA calibration.
  - Press ESC key if user do not want to save calibrated data.



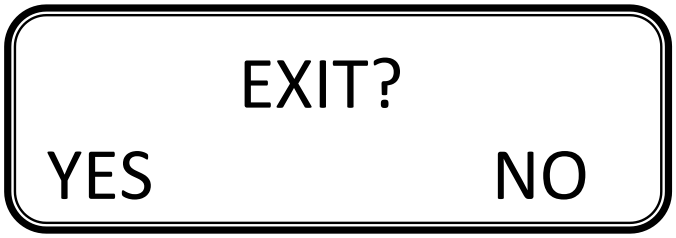
- **20 mA calibration**
  - Connect multimeter at I+ (pin 5) and GND (pin 7) and measure milli ampere current.
  - Press UP key to enter Count and SHIFT key to shift cursor.(Default value will be 5000)
  - Set count until multimeter shows 20.00 mA output.
  - Press ENTER key for save the data and to move “Calibration successful” menu.
  - Press ESC key if user do not want to save calibrated data.



- **Calibration Completed**
  - Press Enter key at “calibration successful” menu



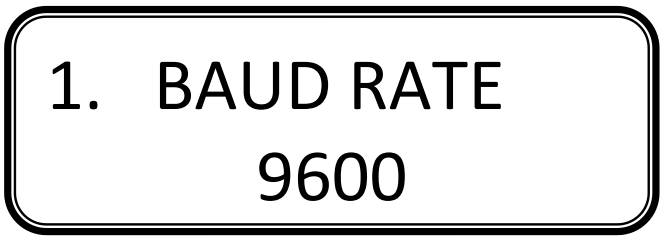
- **Exit Screen**
  - If user have pressed ESC key at any one of calibration point it will show “Exit” menu, because calibration data has not been saved.
  - Press ENTER(YES) key to go on home screen.
  - Press ESC(NO) key for recalibration.



3.3 Modbus Menu

- Press ENTER key for 2 seconds for setting mode.
- Press UP key to enter number and SHIFT key to shift cursor (Set password 3333)
- Press ENTER key to enter

- **Baud rate select:**
  - Press UP key to select Baud rate.
  - Press ENTER key to enter.



Available option (2400, 4800, 9600, 19200, 38400)

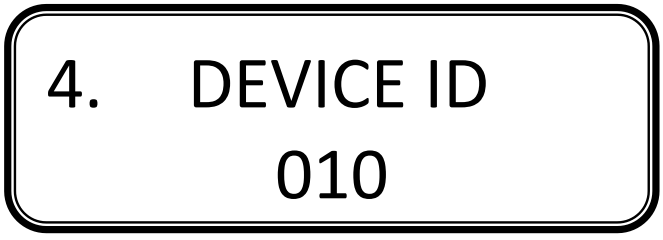
- **Parity select:**
  - Press UP key to select parity
  - Press ENTER key to enter.

Available option (NONE, ODD, EVEN)

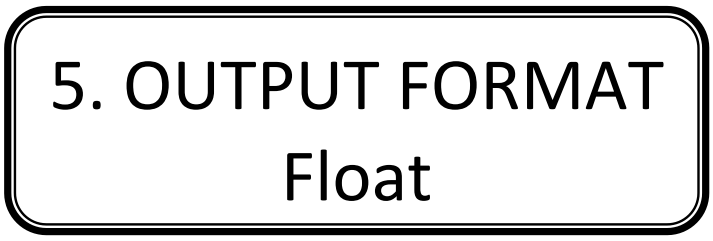
- **Stop bit select:**
  - Press UP key to select stop bit.
  - Press ENTER key to enter

Available option (ONE, TWO)

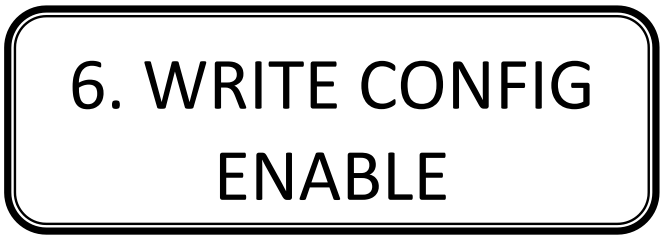
- **Device ID select:**
  - Press UP key to enter Device ID and press SHIFT key to shift cursor right.
  - Press ENTER key to enter.



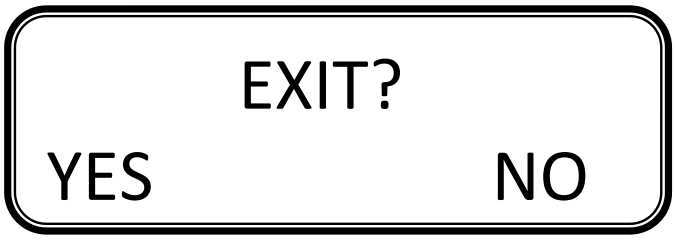
- **Modbus format select:**
  - Press UP key to select Modbus output format (Float, Integer, Long integer)
  - Press ENTER key to enter



- **Write configuration setting:**
  - Press UP key to select write configuration.(ENABLE,DESABLE)
  - Press ENTER key to enter



- **Complete Modbus setting mode:**
  - Press ENTER(YES) key to save changes.
  - Press ESC key to return “3333” password menu .



- **Modbus configuration(Holding Register)**
  - 40000 - pH
  - 40002 - Temperature
    - Relay Two set points
  - 40004 - Low Point for Relay 1
  - 40006 - High Point for Relay 2
    - Relay Four set point
  - 40008 - Low Point 1 for Relay 1
  - 40010 - High point 1 for Relay 1
  - 40012 - Low Point 2 for Relay 2
  - 40014 - High Point 2 for Relay 2
  - Starting Address - 0
  - Quantity/Length – 16

3.4 pH Calibration Menu

- Press ENTER key button for 2 seconds for setting mode.
- Press UP key to enter number and SHIFT key to shift cursor (Set password 6666)
- Press ENTER key to enter.

- **Select Calibration point**
  - User have to select which calibration point
  - Press UP key to enter number and SHIFT key to shift cursor
  - Available options 1 point, 2 point, 3 point

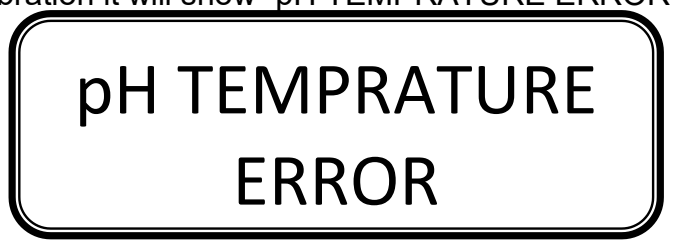
3.4.1 3 point calibration

- **Calibration Point 1**
  - Press UP key to enter buffer solution pH and SHIFT key to shift cursor.(default value will be 4.00 pH)
  - Immerse the pH electrode in a buffer solution with same pH value.
  - Here left side of display is buffer pH(editable), Right side of pH is live pH, and centre value in display is temperature of buffer.
  - Wait for 60-120 seconds to complete the calibration process.
  - Press ENTER key to save the data and to move for 2nd point calibration.
  - Press ESC key if user do not want to save data.
  - Clean the pH electrode with distilled water.

- **Error Indications while calibration**
  - If the buffer solution is not appropriate it will show “INCORRECT BUFFER SOLUTION”

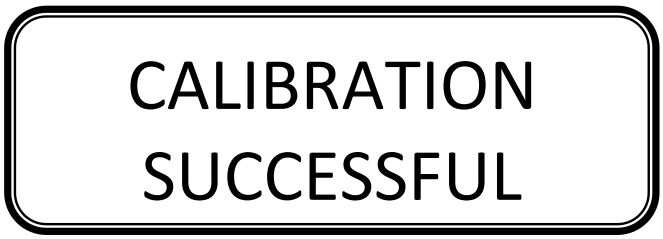
- **Calibration Point 2**
  - Press UP key to enter buffer solution pH and SHIFT key to shift cursor.(Default value will be 7.00 pH)
  - Immerse the pH electrode in a buffer solution with same pH value.
  - Wait for 60-120 seconds to complete the calibration process.
  - Press ENTER key to save the data and to move for 3rd point calibration.
  - Press ESC key if user does not want to save data.
  - Clean the pH electrode with distilled water.

- **Error Indications while calibration**
  - Note: Error indication will be same as calibration point 1
  - If buffer solution's temperature is different at 1st and 2nd point calibration it will show "pH TEMPRATURE ERROR"



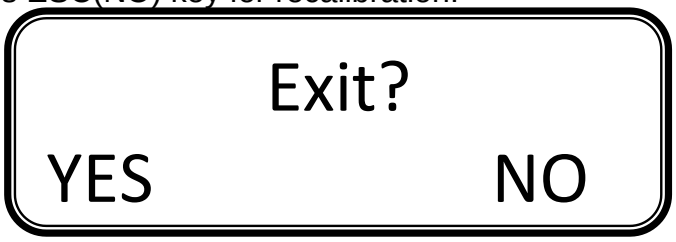
- **Calibration Point 3**
  - Press UP key to enter buffer solution pH and SHIFT key to shift cursor.(Default value will be 9.00pH)
  - Immerse the pH electrode in a buffer solution with same pH value.
  - Wait for 60-120 seconds to complete the calibration process.
  - Press ENTER key to save the data
  - Press ESC key if user does not want to save data.
  - Clean the pH electrode with distilled water.
  - Note: Error indication will be same as calibration point 1 and 2

- **Calibration Completed**
  - Press Enter key at “calibration successful” menu



  - If there is a any problem in calibration process, it will show as per below screen

- **Exit Screen**
  - If user have pressed ESC key at any one of calibration point it will show “Exit” menu, because calibration data has not been saved.
  - Press ENTER(YES) key to go on home screen.
  - Press ESC(NO) key for recalibration.



3.4.2 2 point Calibration

- User can calibrate the controller by only 2 buffer solution.
- Calibration process will be same as 3 point calibration

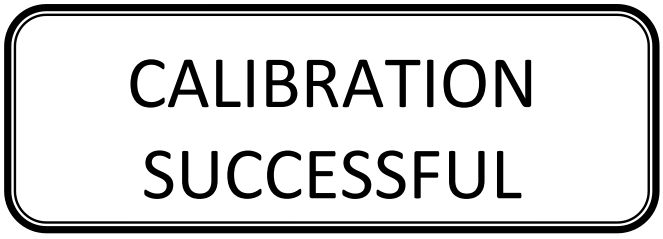
3.4.3 1 Point Calibration

- User can calibrate the controller by only 1 buffer solution.
- Calibration process will be same as 3 point calibration

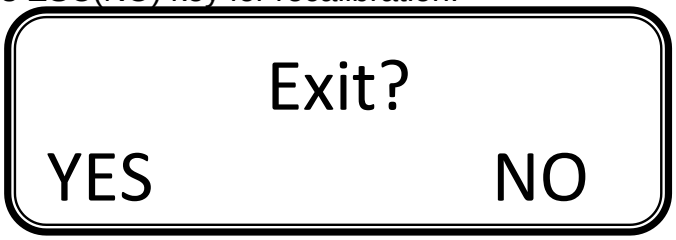
3.5 Update calibration

- Press ENTER key button for 2 seconds for setting mode.
- Press UP key to enter number and SHIFT key to shift cursor (Set password 9999)
- Press ENTER key to enter.

- Here user can re-calibrate any point of calibration.
- Press ESC key at calibration point where user do not want to recalibrate.
- Ex: if user want to re-calibrate only 2nd point out of the 3 point calibration.
  - Press ESC key at 1-point calibration screen.
  - Calibrate the 2 point as per the process of section 3.4.1
  - Press ENTER key to save data.
  - Press ESC key at 3-point calibration screen.
- **Calibration Completed**
  - Press Enter key at “calibration successful” screen.



- **Exit Screen**
  - If user have pressed ESC key at all calibration point it will show “Exit” menu, because calibration data has not been saved.
  - Press ENTER(YES) key to go on home screen.
  - Press ESC(NO) key for recalibration.



4 Technical specification

Measurement	pH/Temperature
pH Range	0.00-14 pH
pH Resolution	0.01 Digit
pH Accuracy	0.10 pH
i/p impedance	10^{12} Ohms
Temp range	0 to 170 C
Temperature resolution	1 Digit
Temp. Accuracy	+/-0.5% Of F.S
Temp Compensation	Auto /Manual
Temp Sensor I/P	Pt-100 RTD (2 wire connection)
Display	16 * 2 LCD
User Interface	4 tactile Buttons
Buffer calibration	User-selectable 1, 2,and 3 point calibration
Relay o/p	2 relay
Control set point	Two/Four
Output	RS-485 Modbus / 4-20 mA
Connection	Terminal
Operating Environment	0-50 °C
Power Supply	85 - 300VAC 50/60Hz or 24VDC +/- 2VDC
Dimensions	96x96x85 mm
Type	Panel/field mount

5 Maintenance

Installation Of pH Electrode Hand-tighten only! It is not necessary to apply excessive torque to achieve a liquid tight installation. Severe twisting of the sensor housing could cause internal damage. If necessary, use a wrench for removal only! For valve retractable sensors.

Cleaning a process pH probe with impaired response:

Used pH sensors which are physically intact can sometimes be restored to an improved level of performance. All pH sensors have a given useful life span depending on the conditions of use. One of the following procedures may prove helpful in restoring a used pH sensor.

Step-1. Initial Cleaning: Wash with a solution of liquid detergent or enzyme detergent and warm water by gently scrubbing with a soft toothbrush or soft cloth. Follow with a thorough rinse in D.I. or clean tap water.

Step-2. Inorganic Scale Deposits: Dissolve the deposit by immersing the sensor's measurement tip in dilute hydrochloric acid for a few minutes. Repeat Step #1 above.

Step-3. Organic Oil or Grease Films: Perform the initial cleaning procedure. If film is known to be soluble in a particular organic solvent, wash with this solvent. Repeat Step #1 above. Depending on the extent of the oil or grease contamination, it's possible that the liquid junction may be damaged beyond recovery. Soak in 3.8M KCl

solution for a minimum of 30 minutes before recalibrating and returning the sensor to service.

Step-4. Plugged or Dry Liquid Junction: Remove any observed contaminant with one of the above procedures, then soak in 3.8M KCl solution for a minimum of 30 minutes.

Storage of process pH probe:

1. **Short-Term**: Immerse sensor measurement tip and liquid junction surface areas in 3.8M KCl. If this solution is not available, use 4.01 pH buffer, clean tap water, or lastly, a sample of the process being measured to keep the sensor hydrated.
2. **Long-Term:** Fill the protective cap that the sensor was originally shipped in with a freshly prepared 3.8M KCl solution and insert the sensor. The sensor should be stored in an upright (vertical) position.

- Clean the pH electrode regularly with a soft brush and mild detergent.
- Store the pH electrode in a storage solution when not in use.
- Replace the pH electrode as recommended by the manufacturer.

Notes:

- Never permit the pH sensor to dehydrate or dry out. Always keep it in a wetted environment especially when not in service.
- Cracked or broken sensors are not repairable.
- Inspect cable and connector to ensure that the insulation integrity is intact and that there are no signs of corrosion or contaminants on the metal components.

6 Troubleshooting

- If the pH Controller does not power on, check the power supply.
- If the pH value is unstable, recalibrate the pH electrode.
- If the pH value is incorrect, replace the pH electrode.

7 Warranty Information

- The pH Controller is covered by a 12-month warranty.
- The warranty does not cover perishable items like pH Sensors.

8 Contact Information

- For technical support or inquiries, please contact: +919974659909/+917046960991

❖ This concludes the user manual for the pH Controller. If you have any further questions or need assistance, please refer to the contact information provided above.