OPERATION   MANUAL

JENCO MODEL 6308PT
MICROCOMPUTER   BASED
pH/ Temperature
CONTROLLER

JENCO ELECTRONICS, LTD.
MANUFACTURER OF PRECISION INSTRUMENTS

CONTENTS

I. GENERAL INTRODUCTION

The Jenco Model 6308PT (**p**H and **T**emperature) System is a rugged microprocessor based instrument assembled in a watertight ¼ DIN case, designed for use in laboratories and process control applications.

The model 6308PT microprocessor allows the user to easily recalibrate the parameters for the probes. The microprocessor also performs a self-diagnostic routine every time you turn on the unit providing you with basic information about the stability of the instrument.

The system simultaneously displays pH, Temperature, Alarm status and current output in one LCD graphic screen. The LCD also includes a backlight for dark environments.   This system uses glass electrode for the pH and a precise thermistor for temperature providing you with accurate readings for all your measurements.

The model 6308 PT is equipped with 5 relays (2 active Low and 2 active High relays for pH and one programmable high or low relay for temperature); all relays are hysteresis driven and configurable to **CENTER** or **EDGE** mode. The system also has a **isolated 4-20mA** analog output, offset and span configurable for the pH display.

The model 6308 PT comes with a **RS485** interface that can easily let the user log all data   (from multiple model 6308) with an IBM© PC/AT compatible computer.

II. INITIAL INSPECTION

Carefully unpack the instrument and accessories. Inspect for damages made in shipment. If any damage is found, notify your Jenco representative immediately. All packing materials should be saved until satisfactory operation is confirmed.

MOUNTING PROCEDURE

PANEL CUTOUT DIMENSIONS
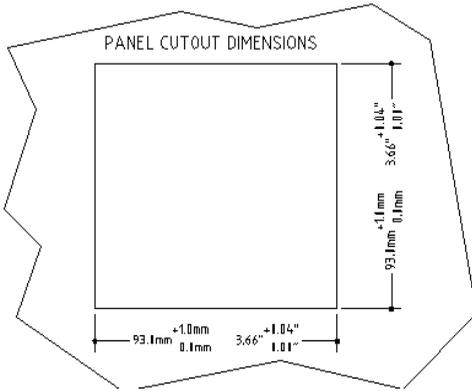
1. Make a cutout on any panel, with a thickness of 1/16 in. (1.5 mm) to 3/8 in. (9.5mm).
2. Remove the mounting assembly from the controller and insert the controller into the cutout.
3. Replace the mounting bracket assembly onto the controller and secure the controller to the mounting panel.

**Warning :**
If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Cleaning the instrument :
1. Be sure to remove the power before attempting to clean the meter.
2. Use a lint free cloth and clean water or neutral detergent.
3. Wipe the outer surface of the instrument only.
4. Wipe dry the instrument before power again.

III. USING THE JENCO MODEL 6308 PT

A. **FRONT PANEL**
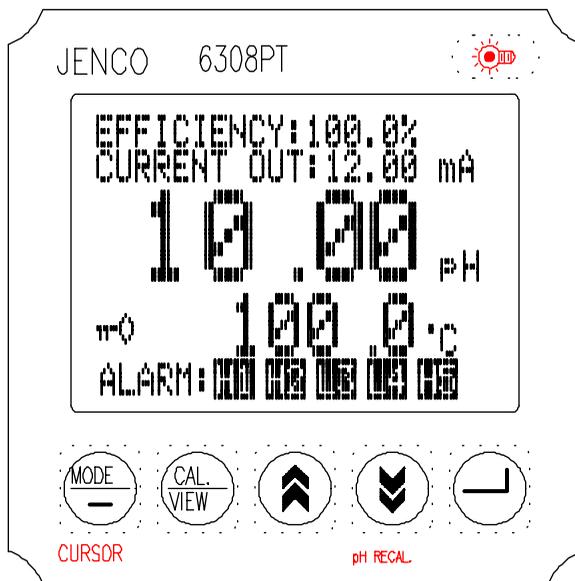
1. The [**MODE / --**] key.
   1a.   In **Main Display mode** this key has no function.
   1b.   In **Calibration/Setting** mode this key will move to the next digit of the current active parameter.
   1c.   In **Calibration/Setting** mode, pressing this key for 2 seconds will move you back to the previous parameter.
2. The [**CAL / VIEW**] key.
   2a.   Pressing this key for about 2 seconds, during main display mode will switch to Calibration/Setting mode.
   2b.   During Calibration/Setting mode this key will switch to the next available Calibration/Setting page. Pressing this key at the last User/Calibration page will return the user to the main display mode.
3. The [⋀] **UP** key.

During Calibration/Setting mode this key will **increment** the current blinking digit of the active parameter.

4. The [⋎] **DOWN** key.

    4a.   During Calibration/Setting mode this key will **decrement** the blinking digit of the active parameter.

    4b.   During pH calibration, instead of SAVING the new pH Stand or Slope you can press this key to recalibrate the buffer again.

5. The [⏎] **ENTER** key.

During Calibration/Setting mode, this key will save the current modified parameter and move to the next parameter.

6. The [⚙] **LIGHT** key.

This key will turn on or turn off the backlight of the LCD.

The backlight will automatically turn off if there is no key activity within two minutes.

7. LCD screen.

B. <u>MAIN DISPLAY MODE</u>
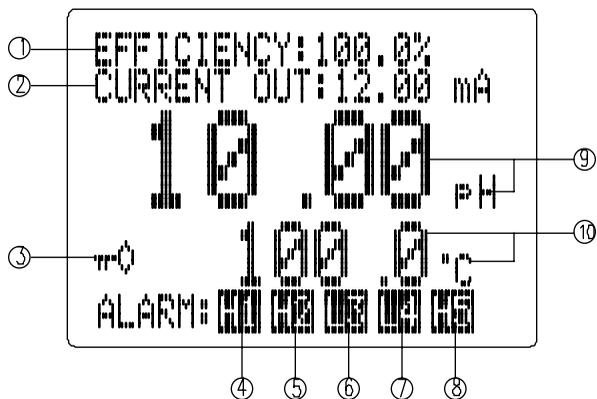
1**. EFFICIENCY** - this will display the efficiency of the pH electrode based on the last pH calibration.

2. **CURRENT OUT** - this will display the actual output of the 4-20 mA circuit. At POWER-ON this will show "**OFF**" for about 3 seconds before going to main display mode. After exiting the Calibration /Setting pages a "**FROZEN**" message will be displayed for about 3 seconds if the unit is not password locked.

3.   ⚿ annunciator -   This will be displayed if   Calibration /Setting pages are password locked meaning the user **can't**   calibrate or change the settings unless the correct 4 digit number has been entered, but user still can view all the settings.
4. **H1** annunciator - this is the status of pH Relay 1, if this is displayed then the high action relay is ON.
5. **H2** annunciator – this is the status of pH Relay 2, if this is displayed then the high action relay is ON.
6. **L3** annunciator – this is the status of pH Relay 3, if this is displayed the low action Relay is ON.
7. **L4** annunciator – this is the status of pH Relay 4, if this is displayed then the low action Relay is ON.
8. **H5** or **L5** annunciator – this is the status of the Temperature Relay 5, if this is displayed then the Relay is ON. **H5** means the relay action is HIGH while **L5** means the relay action LOW.
9. **pH Display**.
10**. Temperature Display**.

C. **REAR CONNECTORS**

Before wiring the probes, relays, analog output, RS485 and power cord be sure that you are connecting to the right terminal as shown below. Remember that the unit is ON once the user plugs in the power cord to an AC power supply.

1. Connect the AC line to the rear of the instrument. The model 6308PT can be used with 115 or 230VAC 50/60 Hz. Power consumption is 6 watt. Make sure the **EARTH** connector is connected to the earth lead of the AC power line.

2. Connect the proper load to the output relays. **Make sure that the load does not exceed the relay rating, 5 Amp at 115VAC and 2.5 Amp at 230 VAC**.
3. Set the proper load to the 4-20mA output connector. Make sure that the load impedance is less than 500 Ohms.
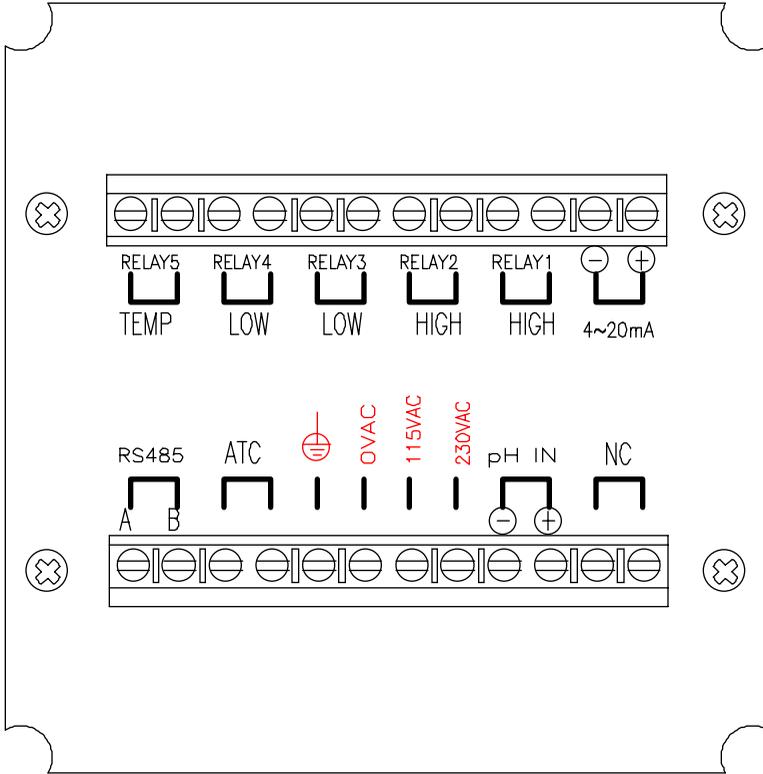
CAUTION:

MAKE SURE YOU CONNECT THE AC POWER CORD TO THE CORRECT AC TERMINALS. CONNECTING INCORRECTLY MAY DAMAGE THE UNIT PERMANENTLY.

D. **TURNING ON/OFF THE INSTRUMENT**

By just plugging the unit to a correct AC voltage the unit will be ready for use. There is **no Power key** so unplugging and plugging the unit will turn OFF or turn ON the unit respectively.
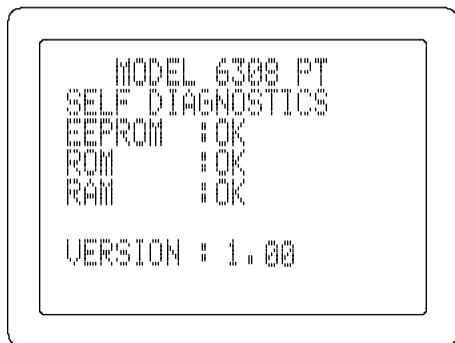
After the unit is turned on, it will perform some basic self-diagnostics and will display "**OK**" or "**BAD**". If you received any "**BAD**" messages turn OFF the unit and turn it ON again. (See **VIII. ERROR DISPLAYS AND TROUBLESHOOTING**).

```
   MODEL 6308 PT
SELF DIAGNOSTICS
EEPROM  :OK
ROM     :OK
RAM     :OK

VERSION : 1.00
```

If the message persists then you might need to call your distributor. (See **XI. WARRANTY**).

After the self-diagnostic is complete the temperature will be displayed on the lower part of the LCD screen and you are ready to make pH calibration or measurements. Just immerse the probes halfway to the buffer or liquid. If possible do not allow the probes to touch any solid object in the buffer or solution. There should be no air bubbles around the probes either. Shaking or moving the probes vigorously before recording any measurement will dislodge any bubbles formed in the probes.

IV. MODEL 6308 PT MODES

A. <u>MAIN DISPLAY MODE</u>

```
EFFICIENCY:100.0%
CURRENT OUT:12.00 mA
       10.00  pH
  ⌐◊   100.0 °c
ALARM:
```
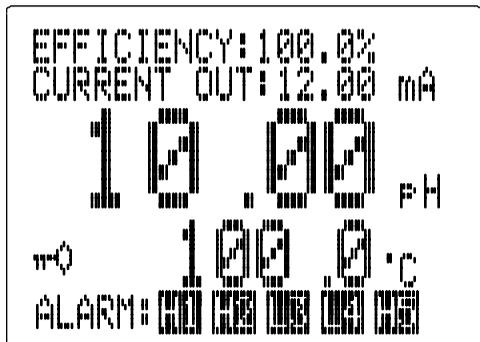
Turning ON the unit will always start in main display mode.

This instrument is designed to provide 2 distinct measurements:

1. **<u>Temperature</u>** - current temperature of the solution.
2. **<u>pH</u>** - the current degree of acidity or alkalinity of the solution with automatic temperature compensation.

B. **CALIBRATION/SETTING MODE**

Pressing the [**CAL/VIEW**] key for about 2 seconds during main display mode will bring-up the first page of 6 pages of the **Calibration/Setting** mode. Pressing [**CAL/VIEW**] key will switch to the next page until the last page, where pressing [**CAL/VIEW**] again will return the user to main display mode.

Below is a simple flowchart showing the path of the [**CAL/VIEW**] key:
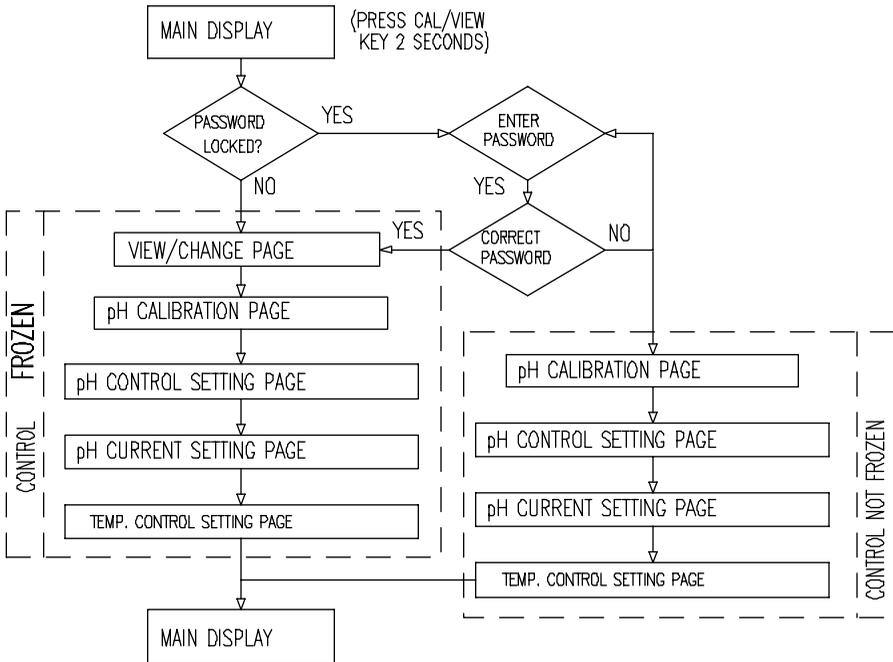
You can change any blinking options or digit by pressing the [▲] or [▼] keys. For options in digit format you need to press the [**MODE/--**] key to move to the next digit . If you are satisfied with the selection you made you need to press the [↵] **ENTER** key to save the changes and move to the next option. If you don't need to change the current blinking option just press the [↵] **ENTER** key to move to the next selection. You also can press and hold this key for 2 seconds will move you back to the previous parameter.

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a. **CHECK PASSWORD** page

```
CHECK PASSWORD

ENTER PASSWORD:0000
   TO CHANGE SETTINGS
OR PRESS ▓▓▓ TO VIEW
   THE SETTINGS ONLY.

▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓
```

You will only see this page if the unit is password locked.   To change any settings or calibration you need to unlock the system to remove the **"PASSWORD LOCKED"** message. You need to enter the correct 4-digit number on the **"ENTER PASSWORD"** input. You can still view all the pages of **Calibration/Setting mode** if the system is password locked by just pressing the **[CAL/VIEW]** key on this page. If the unit is **"PASSWORD LOCKED"** going to **Calibration/Setting mode** will not affect the function of the relays.   **CAUTION: If the unit is not locked then every time the user enters the Calibration/Setting mode the relays and analog out will be frozen.**

```
USER SETTING

!! WARNING !!
RELAYS & ANALOG OUT
ARE NOW FROZEN!

PRESS ▓▓▓ TO PROCEED
```
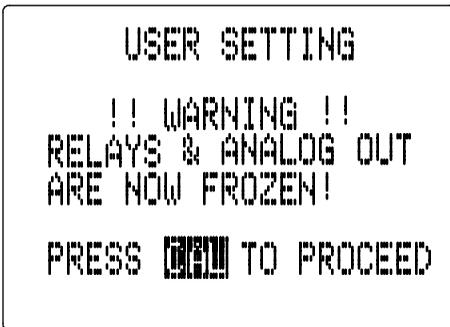
b. **USER SETTING** page – You will only see this page if the unit is not password locked. This page is just a **warning**, telling you that all relays and the analog output are **frozen**, and that you can calibrate and change the settings.

NOTE: FROZEN MEANS ALL THE RELAYS AND THE ANALOG OUT WILL MAINTAIN THEIR LAST STATE UNTIL THE USER RETURNS TO MAIN DISPLAY MODE.

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c. **pH CALIBRATION** page

```
╔═══════════════════════════╗
║    PH CALIBRATION         ║
║  ATC TEMP.:25.0°C          ║
║ 1. BUFFER 1: 7.00 PH       ║
║ 2. BUFFER 2: 4.00 PH       ║
║ 3. STAND: 7.00 PH WAIT     ║
║ 4. SLOPE: 4.00 PH WAIT     ║
║  EFFICIENCY:100.0%         ║
║     * SAVING *             ║
╚═══════════════════════════╝
```

ATC TEMP. – the current temperature of the solution.
1. **BUFFER 1** - in this option you can select which buffer to use for the standardization calibration. You can choose **7.00** pH or **6.86** pH by using the [⋀] and [⋁] keys and pressing the [↵] key to save your choice.

2. **BUFFER 2** - after you selected the buffer 1 this option will let you select the second buffer to use to calibrate the slope. You can choose 4.00 pH, 4.01 pH, 9.18 pH or 10.01 pH by using [⋀] and [⋁] keys and pressing the [↵] to save your choice.

3. **STAND** - this is the actual pH calibration process, this line will display the buffer to be used for STAND (OFFSET) calibration (depending on the choice you made on **BUFFER 1**) . A flashing [↵] icon will be displayed to indicate that pressing the [↵] **ENTER** key will start the calibration for the offset.   Immerse the pH & ATC probe into the standard buffer solution (pH 7.00 buffer or pH 6.86 buffer depending on the choice you made). Press the [↵] **ENTER** key. The "**STAND**" will display the pH of the current buffer corresponding to the current temperature and a flashing "**WAIT**" will appear. If the offset mV of the solution is greater or less than ±100 mV (for buffer 7.00 at 25 ℃) or 108.3 mV/-91.7 mV   (for buffer 6.86 at 25 ℃) then an "OVER" or "UNDER" error display will occur, you can clean the probes and change the buffer or you can press [**CAL/VIEW**] key to exit the calibration. If during stabilization period and the reading changes by more than 0.01 pH within 10 seconds then this wait time will restart (In this case: **a.** you can change the buffer. **b.** just abort by pressing the [**CAL/VIEW**] key. or **c.** wait it out until the electrode stabilizes). If no error occurs the unit will wait for the reading to stabilize, if the solution is stable for about 10 seconds. it will halt the updating of

the display. Once the display is halted changing the input or temperature will not change the "**STAND**" pH display. If there are no problems a flashing "**SAVE**" will be displayed. Pressing the [↵] **ENTER** key will save the new OFFSET of the pH probe or pressing the **[∨/Re-cal]** down key will recalibrate the **BUFFER 1** again. The "EFFICIENCY" of probe will be 100% since the SLOPE will default to Ideal if only the OFFSET is calibrated.

4.   **SLOPE** - The pointer will move to this option if you successfully calibrated the STAND. A flashing [↵] icon will be displayed to signify that pressing the [↵] **ENTER** key will start the calibration for the SLOPE.   Immerse the pH & ATC probe   into the standard buffer solution (4.00, 4.01, 9.18 or 10.01 depending the choice you made for **BUFFER 2**). Press the [↵] **ENTER** key. The "**SLOPE**" will display the pH of the current buffer corresponding to the current temperature and a flashing "**WAIT**" will appear. If the mV input is not within the ±30% of the ideal mV slope of this buffer then an error display will occur. you can clean the probes and change the buffer or you can press [**CAL/VIEW**] key to exit the calibration. If during stabilization period and the reading changes by more than 0.01 pH within 10 seconds then this wait time will restart (In this case :   **a.** you can change the buffer. **b.** just abort by pressing the [**CAL/VIEW**] key. or   **c.** wait it out until the electrode stabilizes). If no error occurs the unit will wait for the reading to stabilize, if the solution is stable for about 10 seconds it will halt the updating of the display. Once the display is halted changing the input or temperature will not change the "**SLOPE**" pH display.   If there are no problems a flashing "**SAVE**" will be displayed. Pressing the [↵] **ENTER** key will save the new SLOPE of the pH probe or pressing the **[∨/Re-acl]** down key will recalibrate the **BUFFER 2** again .

EFFICIENCY -After saving the SLOPE a new efficiency will be displayed around 4 seconds and then will move to the next page. Efficiency = (new slope/ ideal slope) x 100%

We recommend that you use a new electrode, If the electrode efficiency is lower than 80%.

d. **pH CONTROL SETTING** page

```
pH CONTROL SETTING
1.HI RELAY 1:14.00pH
2.HI RELAY 2:10.00pH
3.LO RELAY 3: 4.00pH
4.LO RELAY 4: 0.00pH
5.HYSTERESIS:CENTER
6.HYSTERESIS:1.00 pH
    * SAVING *
```

HI RELAY 1 - The action for this relay is fixed to HIGH. In HI-action the relay will turn **ON** if the pH is greater or equal to RELAY 1 value, which is modified by the hysteresis value and hysteresis mode. (See chapter **V. CONTROLLING THE RELAYS**). Use [⋀] and [⋁] keys to change the blinking digit, use the [MODE/-] key to select another digit and the [↵] key to save the new value.

2. **HI RELAY 2** - The action for this relay is fixed to HIGH. In HI-action the relay will turn **ON** if the pH is greater or equal to RELAY2 value, which is modified by the hysteresis value and hysteresis mode. (See chapter **V. CONTROLLING THE RELAYS** .) Use [⋀] and [⋁] keys to change the blinking digit, use the [MODE/-] key to select another digit and the [↵] key to save the new value.

3. **LO RELAY 3** - The action for this relay is fixed to LOW. In LO-action the relay will turn **ON** if the pH is less than or equal to RELAY3 value, which is modified by the hysteresis value and hysteresis mode. (See chapter **V. CONTROLLING THE RELAYS** .) Use [⋀] and [⋁] keys to change the blinking digit, use the [MODE/--] key to select another digit and the [↵] key to save the new value.

4. **LO RELAY 4** - The action for this relay is fixed to LOW. In LO-action the relay will turn **ON** if the pH is less than or equal to RELAY4 value, which is modified by the hysteresis value and hysteresis mode. (See chapter **V. CONTROLLING THE RELAYS** .) Use [⋀] and [⋁] keys to change the blinking digit, use the

[**MODE/--**] key to select another digit and the [↵] key to save the new value.

5**. HYSTERESIS** (**mode**) -this is the hysteresis mode for pH RELAY 1 to RELAY 4.   You can choose   **CENTER**" or "**EDGE**". (See chapter **V**.   <u>**CONTROLLING THE RELAYS**</u>.)
6. **HYSTERESIS** (**value**) - this is the actual value of the hysteresis. You can change this value   from 0.00 pH to 3.99 pH. **. (See chapter V. <u>CONTROLLING THE RELAYS</u> .)**

e. **CURRENT SETTING** page

```
   CURRENT SETTING

1. 4mA OUT: 0.00 pH
2. 20mA OUT:10.00 pH
3. TRANSMITTER OUTPUT:
       pH LINEAR

      * SAVING *
```

1. **4mA OUT –** This value will be used in conjunction with 20 mA to plot the current output. (See chapter **VI**. **4-20 mA OUTPUT** .)
2**. 20mA OUT –** This value will be used in conjunction with the 4 mA value to plot the output. (See chapter **VI**. **4-20 mA OUTPUT** .)
3. **TRANSMITTER OUTPUT –** This option would let you choose if the current output type is linear (pH LINEAR) or logarithmic(pH LOG).

f. **TEMP. CONTROL SETTING**

```
TEMP. CONTROL SETTING
1. RELAY 5   :HIGH
2. SET POINT :100.0 ℃
3. HYSTERESIS:EDGE
4. HYSTERESIS:   1.0 ℃
5. RS 485 ID : 00
6. PASSWORD SET: 0000
     * SAVING *
```

1. **RELAY 5** - the temperature has only one relay to control you need to set what action it will use, HIGH or LOW action. . (In HIGH-action the relay will turn **ON** if the temperature is greater or equal to RELAY5 value, in LOW-action the relay will turn **OFF** if the temperature is less than or

equal to RELAY5 value, which is modified by the hysteresis value and hysteresis mode.)((See chapter **V.** **<u>CONTROLLING THE RELAYS</u>** .)

2. **SET POINT**- this is the user changeable value for the Temperature Alarm relay.

3. HYSTERESIS (**mode**) -this is the hysteresis mode for TEMPERATURE alarm. You can choose "**CENTER**" or "**EDGE**". (See chapter **V.** **<u>CONTROLLING THE RELAYS</u>** .)

4. **HYSTERESIS** (**value**)- this is the actual value of the hysteresis. You can change this value from 0.0 to 19. 9°C. (See chapter **V.** **<u>CONTROLLING THE RELAYS</u>** .)

5. **RS 485 ID** – this is the unique ID/Address for the unit. If you are connecting multiple model 6308PT or other Jenco models for logging purposes then this ID/Address must be unique for each connected unit. This ID/Address is the same address that must be used by the PC program to communicate with this unit.

6.LOCK NO - this is your security code if the unit is locked the value here will not be available. You need to input the correct code in the PASSWORD CHECK page.

CAUTION: **The user is responsible in remembering their password number otherwise you would no be able to calibrate or change the settings.**

V. CONTROLLING THE RELAYS

A. ISOLATION VOLTAGE

The maximum isolation voltage of the relay output contacts is 1500 VDC. The voltage differential between the relay output contacts and the load should not exceed 1500 VDC.

B. OUTPUT LOAD

The current through the relay output contacts should not exceed 5 Amp at 115 VAC and 2.5 Amp at 230 VAC in order not to cause permanent damage to the relay contacts. This rating is specified for **resistive** loads only.

C. RELAY ACTION, RELAY SET POINT, HYSTERESIS MODE & HYSTERESIS VALUE

Relay Action	Hysteresis mode	Effective RELAY-**ON** Point	Effective RELAY-**OFF** Point
HIGH	CENTER	S.P.+ ½(H.V.)	S.P. -½ (H.V.)
HIGH	EDGE	S.P.	S.P. -(H.V.)
LOW	CENTER	S.P.-½ (H.V.)	S.P.+½ (H.V.)
LOW	EDGE	S.P	S.P. + (H.V.)

S.P. = Relay **S**et **p**oint
H.V.= **H**ysteresis **V**alue (Dead Band)

If the relay action is set to HI and the hysteresis mode is **CENTER**, the relay will turn **ON** at [(RELAY SETPOINT) + (0.5 * hysteresis value)], and will turn **OFF** at [(RELAY SET POINT) - (0.5 * hysteresis value)].
If the relay action is set to HI and the hysteresis mode is **EDGE**, the relay will turn **ON** at (RELAY SET POINT), and will turn **OFF** at (RELAY SET POINT- (hysteresis value)).
If the relay action is set to LO and the hysteresis mode is CENTER, the relay will turn **OFF** at [(RELAY SET POINT) + (0.5 * hysteresis value)], and will turn **ON** at [(RELAY SET POINT) - (0.5 * hysteresis value)].
If the relay action is set to LO and the hysteresis mode is EDGE, the relay will turn **ON** at (RELAY SET POINT), and will turn **OFF** at [RELAY SET POINT+ (hysteresis value)].

D. pH RELAYS
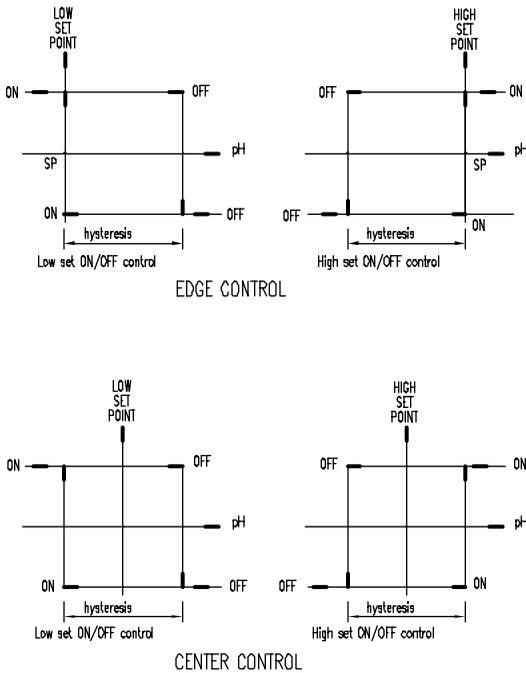
Figure 1

There are four independent Alarm channels for pH display. (see **figure 1.**). The hysteresis mode (center or edge, see **figure 1.**) and hysteresis value will be used by both pH relays.

The action of the pH relays is dependent on set point, relay action type (HIGH or LOW), hysteresis mode (Center or Edge) , hysteresis value and the current pH display. (see **figure 1**).

VI. 4 - 20 mA OUTPUT

A. ISOLATION VOLTAGE

The maximum isolation voltage of the 4-20 mA output is 500 VDC. The voltage differential between the 4-20 mA output and the load should not exceed 500 VDC.

B. OUTPUT LOAD

The maximum load is 500Ω. Output current inaccuracies may occur for load impedance in excess 500Ω.

C. pH LINEAR CURRENT OUTPUT

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The analog output will produce a linear analog output if the user selects this option (see **figure 2**). The analog output will be dependent on the **pH_4 mA setting, pH_20 mA setting** and the **current pH display**.

The pH LINEAR analog output is based on the following equation :

$$mA_{(pH)} = 4mA + (16mA)*(D_{(pH)} - pH(4)) / (pH(20) - pH(4))$$

Where :

$mA_{(pH)}$	= analog output
$D_{(pH)}$	= current pH display
pH(4)	= pH user setting for 4 mA
pH(20)	= pH user setting for 20 mA.

Note :

1. The range for 4mA and 20mA settings is 0.00 to 14.00 pH.
2. The absolute difference of the 4mA and 20mA settings must be greater or equal to 0.10pH or else the analog output will be disabled.
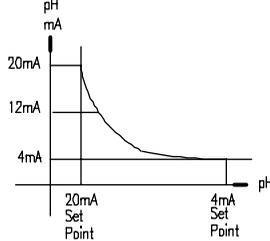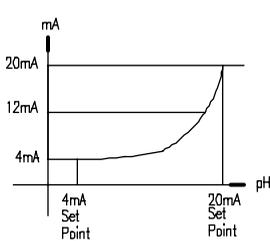
← pH LOGARITHMIC output .
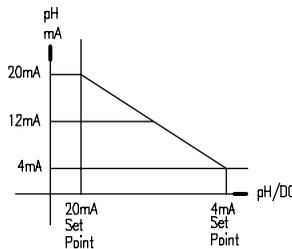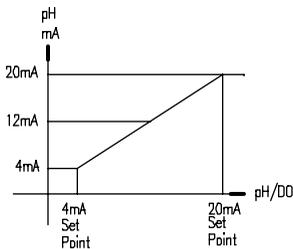
← pH LINEAR output.

Fig. 2

D. pH ANTILOG OUTPUT

The analog output will produce a antilog analog output if the user selects this option (see upper page **figure 2**). The analog output

will be dependent on the **pH _4 mA setting, pH _20 mA setting** and the **current pH display**.

The pH ANTILOG analog output is based on the following equation :

$$mA_{(pH)} = 4mA + (16mA) * (10^{D(pH)} - 10^{pH(4)}) / (10^{pH(20)} - 10^{pH(4)})$$

Where :

    $mA_{(pH)}$ = analog output
    $D_{(pH)}$ = current pH display
    pH(4)   = pH user setting for 4 mA
    pH(20) = pH user setting for 20 mA.

Note :
1. the range for 4mA and 20mA settings is 0.00 to 14.00 pH.
2. the absolute difference of the 4mA and 20 mA settings must be greater or equal to 0.10pH or else the analog output will be disabled.

VII. RS485 INTERFACE OPERATION

A. <u>INTRODUCTION</u>

This section assumes you are familiar with the basics of data communication, the RS485 interface, a rudimentary knowledge and a copy of the more popular Windows® 9X computer languages capable of using a PC RS485 card or RS232-RS485 converter (**third party vendor**) module .

A simple program must be written in order to send your command and receive data from the meter.

A sample source program in Visual Basic® 6.0 is included in the accompanying disk.

B. **PREPARING THE METER**

This meter comes equipped with a 2-wire RS485 interface. Just connect each terminal to the respective RS485 terminal on your PC. (If the DEMO program is not working, try reversing the connections of the terminals.) After you have connected correctly the meter (or multiple meters with unique ID number) and turned on both the meter(s) and the computer, you are now ready to program a simple routine to read data from the instrument.

Read the file "6308PT.TXT" in the accompanying disk to jump-start you in using the meter with your RS485 enabled PC.

VIII. ERROR DISPLAYS AND TROUBLESHOOTING

LCD display	ATC display	DISPLAY unit	Possible cause(s) [Action(s)]
"OVER"	"OVER"	pH	a. Temperature > 120.0°C. [Bring buffer/solution to a lower temperature.] [Replace temperature probe.] b. No temperature sensor.. [Use a temperature probe.]
"OVER"	"UNDR"	pH	Temperature < -10.0°C. [Bring buffer/solution to a higher temperature.]
"OVER"	-10.0~ 120.0°C	pH	pH>16.00 . [Over Range or Recalibrate.]
"OVER"	0.0 ~ 60.0°C	a.pH-Cal-STAND b.pH-Cal-SLOPE	a. Offset @ 7.00pH: mV>100mV Offset@6.86pH: mV>108.3mV b. New slope>ideal slope by 30% [Use a new buffer solution.] [Replace electrode.]
LCD display	ATC display	DISPLAY unit	Possible cause(s) [Action(s)]

"UNDR"	0.0 ~ 60.0°C	a.pH-Cal-STAND	a. Offset @ 7.00pH: mV<-100mV Offset@6.86pH:mV< -91.7 mV
		b.pH-Cal-SLOPE	b. New Slope<ideal slope by 30% [Use a new buffer solution.] [Replace electrode.]
"UNDR"	-10.0~ 120.0°C	pH	pH<-2.00 [Under Range or Recalibrate.]
EEPROM: BAD		During power-on	Unit has failed its EEPROM test. [Turn instrument OFF and back to ON again.] [Return for service. (see Warranty)]
ROM : BAD		During power-on	Unit has failed its ROM test. [Turn instrument OFF and back to ON again.] [Return for service. (see Warranty)]
RAM : BAD		During power-on	Unit has failed its RAM test. [Turn instrument OFF and back to ON again.] [Return for service. (see Warranty)]

IX. pH BUFFERS

The temperature characteristics of pH calibration buffers 4.00, 4.01, 6.86,7.00, 9.18 and 10.01 are stored inside the instrument. The buffers used to calibrate the instrument must exhibit the same temperature characteristics as the stored values.

TABLE 1.

°C	4.00	6.86	9.18	4.01	7.00	10.01
0	4.01	6.98	9.46	4.01	7.11	10.32
5	4.00	6.95	9.39	4.01	7.08	10.25
10	4.00	6.92	9.33	4.00	7.06	10.18
15	4.00	6.90	9.28	4.00	7.03	10.12
20	4.00	6.88	9.23	4.00	7.01	10.06

25	4.00	6.86	9.18	4.01	7.00	10.01
30	4.01	6.85	9.14	4.01	6.98	9.97
35	4.02	6.84	9.10	4.02	6.98	9.93
40	4.03	6.84	9.07	4.03	6.97	9.89
45	4.04	6.83	9.04	4.04	6.97	9.86
50	4.06	6.83	9.02	4.06	6.97	9.83
55	4.07	6.83	8.99	4.08	6.97	9.80
60	4.09	6.84	8.97	4.10	6.98	9.78

Note : The actual reading of the instrument can differ from the values shown by ±0.01 pH.

X. SPECIFICATIONS

pH

Range	Resolution	Accuracy
-2.00 to 16.00 pH	0.01 pH	± 0.01 pH ± 1 LSD

Temperature

Range	Resolution	Accuracy
-10.0 to 120.0 °C	0.1 °C	± 0.1 °C± 1 LSD

pH

pH buffer recognition	**(STAND)**	pH 7.00 or 6.86
	(SLOPE)	pH 4.00 4.01, 9.18 or 10.01
pH Temperature compensation		AUTO -10.0 to 120.0°C
pH Buffer Temperature range		0.0 to 60.0°C
pH Electrode Offset recognition		±100 mV at pH 7.00
		+108.3 mV/-91.7 mV at pH 6.86
pH Electrode Slope recognition		±30% at pH 4.00, 4.01, 9.18 & 10.01
Input impedance		>$10^{13}\Omega$

| **Calibration point sensing** | Yes |

Temperature

| **Temperature sensor** | Thermistor, 10.00kΩ at 25°C |

4-20mA Output

Current output type	Linear or LOG(user programmable)
Current output range	4 to 20 mA (isolated)
Current output scale	user programmable
Maximum load	500 Ω
Accuracy	± 0.02mA
Isolation voltage	500VDC

Controller

Control type	Five ON/OFF control
Relay output	5A at 115VAC or 2.5A at 230VAC
	Resistive load only

GENERAL

Keys	Audio feedback in all keys
Security protect	4-digit password
Communication	RS485
Power Source	115VAC or 230VAC 50/60Hz
Power consumption	6watt
Fuse	315mA/250V fast acting glass tube
Ambient Temperature range	0.0 to 50.0 °C
Display	128x64 graphic LCD w/ backlight
Case	IPT65 ¼ DIN case, depth 155mm
Weight	950 g

XII. WARRANTY

Jenco Instruments, Ltd. Warrants this product to be free from defects in material and workmanship for a period of one year from date of purchase. If repair or adjustment is necessary and has not been the result of abuse or misuse, within the one year period, please return-freight-prepaid and the correction of the defect will be made without charge. If you purchased the item from our Jenco distributors and it is under warranty, please contact them to notify us of the situation. Jenco Service Department will determine whether the product problem is due to defects or customer misuse. Out-of –warranty products will be repaired on a fee basis.

RETURN OF ITEMS

Authorization must be obtained from one of our representatives before returning items for any reason. When applying for authorization, please have the model and serial number handy, including all relevant information regarding the reasons for return. For your protection, items must be carefully packed to prevent damage in shipment and insured against possible damage or loss. Jenco will not be responsible for damage resulting from careless or insufficient packing. A fee will be charged on all unauthorized returns.

NOTE: Jenco Instruments, Inc reserves the right to make improvements in design, construction, and appearance of our products without notice.

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