OPERATION MANUAL

JENCO MODEL 6308 OT MICROCOMPUTER BASED ORP/ Temperature CONTROLLER

JENCO ELECTRONICS, LTD.
MANUFACTURER OF PRECISION INSTRUMENTS

CONTENTS

I. GENERAL INTRODUCTION

The Jenco Model 6308OT (**O**RP 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 6308OT microprocessor performs a self-diagnostic routine every time you turn on the unit providing you with basic information of the stability of the instrument.

The system simultaneously displays ORP, Temperature, relay status and current output in one LCD graphic screen.

The model 6308OT is equipped with 5 relays (2 active Low and 2 active High relays for OT 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 an **isolated 4-20mA** analog output, offset and span configurable for the ORP display.

The model 6308OT comes with a **RS485** interface that can easily let the user log all data   (from multiple model 6308 or 6309) with an IBM© PC/AT compatible computer. For advanced users, the model 6308OT may also be remotely controlled from main display mode to all calibration/setting modes.

II. INITIAL INSPECTION and ASSEMBLY

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

3.66" +1.04" 1.01"
93.1mm +1.1mm 0.1mm

93.1mm +1.0mm 0.1mm   3.66" +1.04" 1.01"
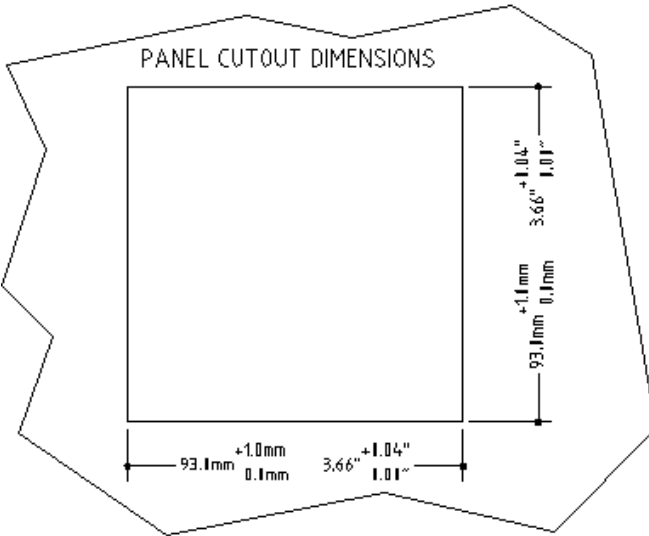
1. Make a cutout on any panel, with a thickness of **1/16 in. (1.5 mm) to 3/8 in. (9.5mm).**
2. Remove the mounting assembly from the controller and insert the controller into the cutout.
3. Replace the mounting bracket assembly onto the controller and secure the controller to the mounting panel.

Warning:
If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.
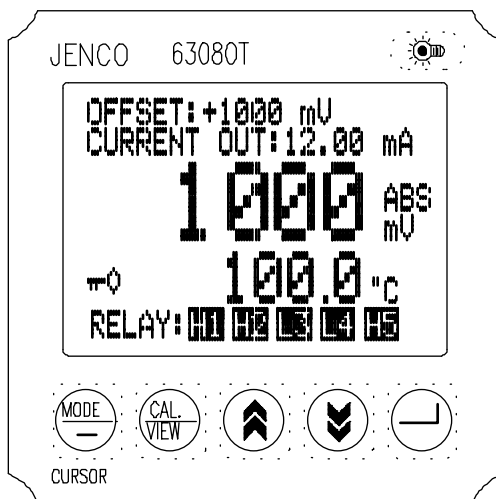
Cleaning the instrument:
1. Be sure to remove the power before attempting to clean the meter.

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 powering again.

III. USING THE JENCO MODEL 6308 OT

A. **<u>FRONT PANEL</u>**

1. The [**MODE**] key.
1a. In **Normal** mode this key will change the ORP display to ORP **ABS**(olute) or ORP **REL**(ative).
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.

During Calibration/Setting mode this key will **decrement** the blinking digit of the active parameter.
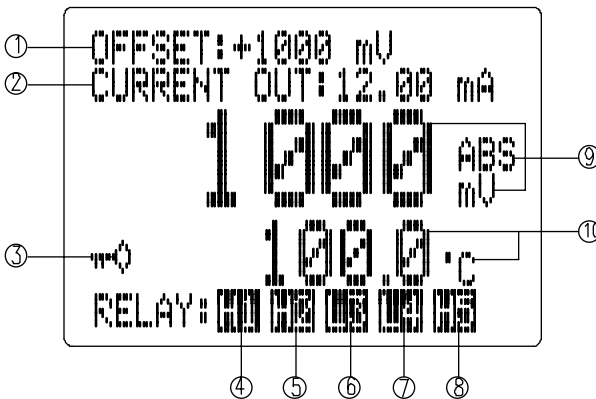
5. The [↵] **ENTER** key.

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 after two minutes.

B. <u>**MAIN DISPLAY MODE**</u>

1. **OFFSET** – This is the value that will be subtracted to the absolute mV value to display the ORP **relative** value.

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. An "ERROR" display here means that the

difference between the 4mA and 20 mA settings is between –10mV and +10mV and that the current output is disabled.

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 ORP relay 1, if this is displayed then the relay is ON.

5. **H2** annunciator – this is the status of ORP relay 2, if this is displayed then the relay is ON.

6. **L3** annunciator – this is the status of ORP relay 3, if this is displayed the relay is ON.

7. **L4** annunciator – this is the status of ORP relay 4, if this is displayed then the 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 is LOW.

9. **ORP** unit and reading. The resolution is automatic, if the reading is <1000mV then the resolution is 0.1 mV, if the reading is >999.9mV then the resolution is 1 mV.

10**. Temperature** unit and reading. **Temperature is not needed to display ORP readings.** The Model 6308 OT comes installed with 10k ohm resistor (~25.0 degrees centigrade) at the temperature input. If the user has a temperature probe just remove the resistor and install the temperature probe.

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.
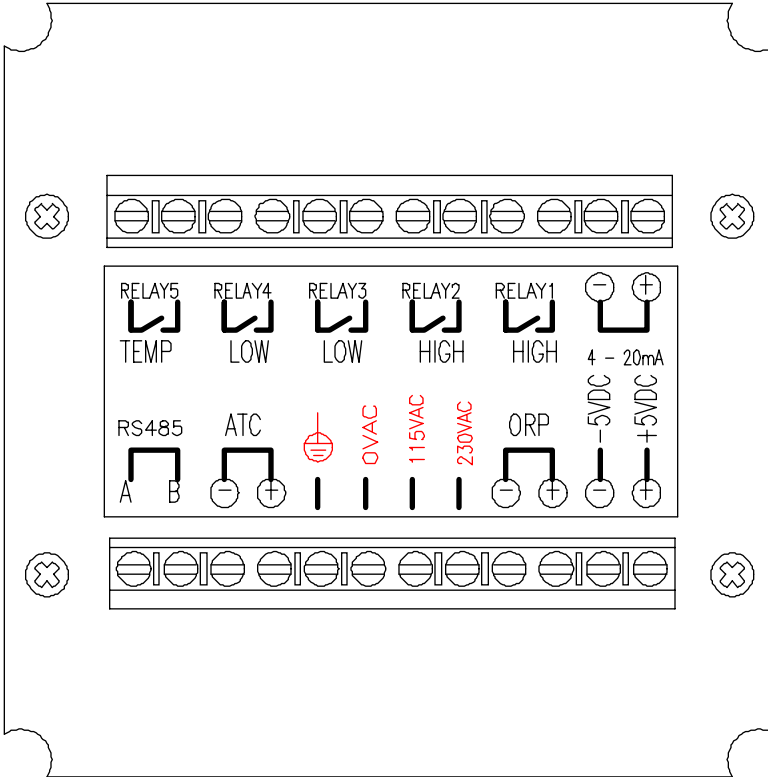
1. Connect the AC line to the rear of the instrument. The model 6308 OT can be used with 115 or 230VAC 50/60 Hz. The power consumption is 6 watts. Make sure the **EARTH** connector is connected to the earth lead of the AC power line.
2. Connect the proper load to the output relays. **Make sure that the 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.

4. A **+5VDC** and **-5VDC** (max 20mA for each) output to provide excitation voltage for ORP pre-amplifier only.

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 or plugging the unit will turn OFF or turn ON the unit respectively.

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

 VERSION : 1.00
```
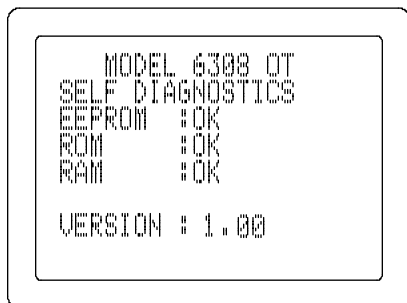
After the unit is turned on, it will perform some basic self-diagnostics and will display "OK" or "BAD". If you received any "BAD" messages turn OFF the unit and turn it ON again.

(See section **VIII. ERROR DISPLAYS AND TROUBLESHOOTING**).

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

After the self-diagnostic is complete the temperature will be displayed on the lowest part of the screen and you are ready to make ORP measurements. Just immerse the probes half way to the liquid. If possible do not allow the probes to touch any solid object in the 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 OT MODES

```
OFFSET:+1.000 mV
CURRENT OUT:12.00 mA
      1.000 ABS
              mV
   ⟳  100.0 °C
RELAY: 01 02 03 04 05
```
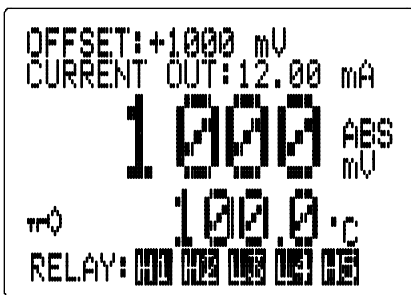
A. **NORMAL MODE**

Turning ON the unit will always display main display mode.

This instrument is designed to provide 3 distinct measurements:

1. Temperature - current temperature of the solution, which is always displayed compensation.

2. ORP-ABS   - a measurement of absolute ORP mV.

3. ORP-REL - a measurement of relative ORP mV.

Temperature, and ORP (Absolute or Relative) are always simultaneously displayed in the graphic LCD screen in normal mode. You can select which ORP unit to display by pressing the [**MODE**] key.

B. **CALIBRATION/SETTING MODE**

Pressing the [**CAL/VIEW**] key for about 2 seconds during main display mode will bring-up the first page of 5 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:

```
MAIN DISPLAY        (PRESS CAL/VIEW
                     KEY 2 SECONDS)

         PASSWORD        YES        ENTER
         LOCKED?  ───────────────► PASSWORD
            │ NO                       │ YES
            │                CORRECT   │
            │           YES  PASSWORD  NO
   ┌────────▼──────┐ ◄─────────
   │ VIEW/CHANGE PAGE │

FROZEN
   │ ORP CALIBRATION PAGE │          │ ORP CALIBRATION PAGE │

   │ ORP CONTROL SETTING PAGE │      │ ORP CONTROL SETTING PAGE │

CONTROL
   │ ORP CURRENT SETTING PAGE │      │ ORP CURRENT SETTING PAGE │   CONTROL NOT FROZEN

   │ TEMP. CONTROL SETTING PAGE │    │ TEMP. CONTROL SETTING PAGE │

        MAIN DISPLAY
```

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.

a. **CHECK PASSWORD** page

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

```
   CHECK PASSWORD

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

   PASSWORD LOCKED
```

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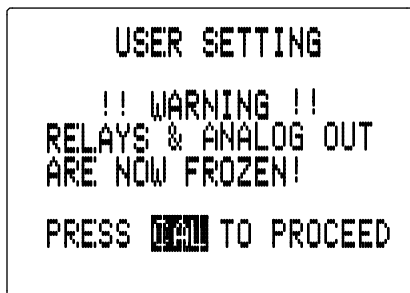
b. **USER SETTING** page – You will only see this page if the unit is not password locked. This page is just a warning, telling you that all relays are frozen, and that you can calibrate and change the settings.

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

c. ORP CALIBRATION

```
ORP CALIBRATION

1.OFFSET:+1000 mV
2.RELAY/mA UNIT: AmV

ACTUAL:  1000 ABS
                 mV
     * SAVING *
```

1. OFFSET - The value here will be subtracted to the absolute ORP reading to display the relative ORP reading.

2. RELAY/mA UNIT – this is the unit that the ORP **RELAY1 to** ORP **RELAY4** will be based upon. The ORP Relay 1 to ORP Relay 4 values for **ABS** and **REL** are saved in different eeprom location.

Note: **AmV** = Absolutue mV, **RmV** = Relative mV

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e. **ORP CONTROL SETTING**

```
ORP CONTROL SETTING
1.HI RELAY 1:+1400AmV
2.HI RELAY 2:+1000AmV
3.LO RELAY 3:+0400AmV
4.LO RELAY 4:+0000AmV
5.HYSTERESIS:CENTER
6.HYSTERESIS: 100AmV
      * SAVING *
```

HI RELAY 1 - The action for this relay is fixed to HIGH. In HI-action the relay will turn **ON** if the ORP is greater or equal to RELAY 1 value, which is modified by the hysteresis value and hysteresis mode. (See section **V. <u>CONTROLLING THE RELAYS</u>**).

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 ORP is greater or equal to RELAY2 value, which is modified by the hysteresis value and hysteresis mode. (See section **V. <u>CONTROLLING THE RELAYS</u>**.) 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 ORP is less than or equal to RELAY3 value, which is modified by the hysteresis value and hysteresis mode.   (See section **V. <u>CONTROLLING THE RELAYS</u>**.)

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 ORP is less than or equal to RELAY4 value, which is modified by the hysteresis value and hysteresis mode. (See section **V. <u>CONTROLLING THE RELAYS</u>**.)

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 ORP RELAY 1 to 4. You can choose **CENTER**" or "**EDGE**".
(See section **V**.   <u>CONTROLLING THE RELAYS</u>.)

6. **HYSTERESIS** (**value**) - this is the actual value of the hysteresis. You can change this value from 0 to 199 AmV or 0 to 199 RmV **.** **(** See section **V.** <u>**CONTROLLING THE RELAYS**</u> **.)**

```
CURRENT SETTING

1. 4mA OUT:+0000 AmV
2. 20mA OUT:+1000 AmV


    * SAVING *
```

e. **CURRENT SETTING** page
1. **4mA OUT** – This value will be used in conjunction with 20 mA to plot the current output. (See section **VI.** **4-20 mA OUTPUT** .)
2**. 20mA OUT** – This value will be used in conjunction with the 4 mA

CAUTION: If the difference between 4mA and 20mA is greater than –10mV or less than 10 mV then the CURRENT OUT will display "ERROR" indicating that the output is disabled.

f. **TEMP. CONTROL SETTING**

```
TEMP.CONTROL SETTING
1.RELAY 5   :HIGH
2.SET POINT :100.0°C
3.HYSTERESIS:EDGE
4.HYSTERESIS:  1.0°C
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 section **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 section **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 section **V**. CONTROLLING THE RELAYS .)

5. **RS 485 ID –** this is the unique ID/Address for the unit. If you are connecting multiple model 6308 OT 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 SETPOINT, HYSTERESIS MODE & HYSTERESIS VALUE

Relay Action	Hysteresis mode	Effective RELAY-**ON** Setpoint	Effective RELAY-**OFF** Setpoint

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 Set point

H.V.= Hysteresis value (Dead Band)

If the relay action is set to **HI**GH 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**GH 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**W 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**W 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. ORP RELAYS

EDGE CONTROL

CENTER CONTROL
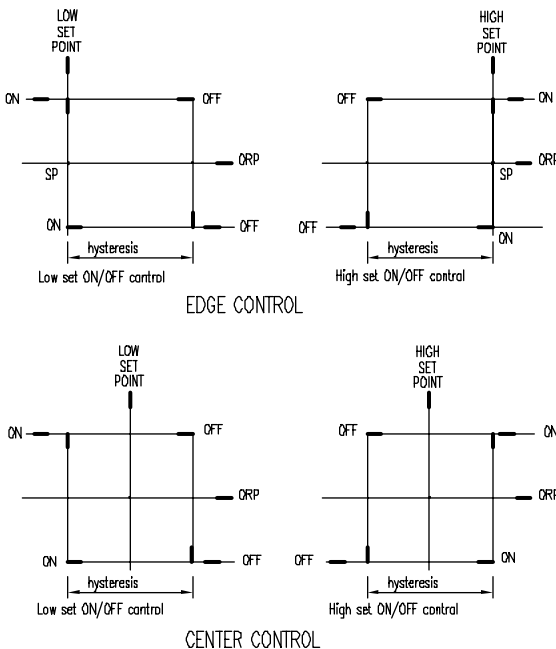
There are four independent Alarm channels for ORP display. (see **figure 1.**). The hysteresis mode (center or edge) (See **figure 1.**) and hysteresis value will be used by all ORP relays.

The actions of the ORP relays are dependent on set point, relay action type (HIGH or LOW), hysteresis mode (Center

Figure 1

or Edge) , hysteresis value and the current ORP display. (see **figure 1**).

E. TEMPERATURE RELAY
One relay channel is available for temperature display which has independent set point, action (see **figure 1**) setting (HIGH or LOW), hysteresis mode (center or edge) and hysteresis value.

The action of the Temperature relay is dependent on **set point**, **relay action type** (HIGH or LOW), **hysteresis mode** (Center or Edge) , **hysteresis value** and the **current Temperature display**. (See **figure 1**).
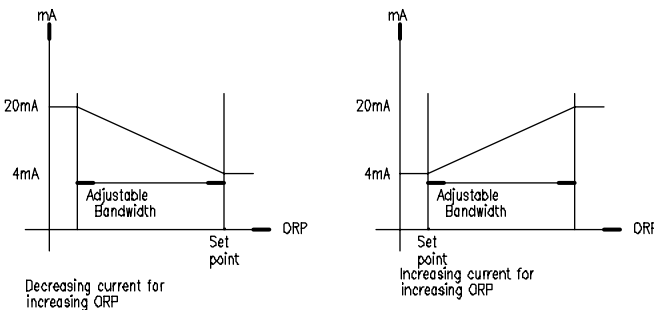
VI. 4 - 20 mA OUTPUT

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 550Ω. Output current inaccuracies may occur for load impedance in excess 550Ω.

C. ORP mA OUTPUT

← ORP LINEAR output .

Figure 2

The analog output will produce a linear current output. The analog output will be dependent on the **ORP_4 mA setting**, **ORP_20 mA setting** and the **current ORP (**ABS or REL**) display**. The ORP analog output is based on the following equation :

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

Where :
$mA_{(ORP)}$ = analog output
$D_{(ORP)}$ = current ORP (ABS or REL) display
$ORP(4)$ = ORP(ABS or REL) user setting for 4 mA
$ORP(20)$ = ORP (ABS or REL) user setting for 20 mA.

Note :
1. The range for 4mA and 20mA settings is 0 to 9999AmV or 0 to 9999 RmV.
2. **The absolute difference of the 4mA and 20 mA settings must be greater or equal to 10 AmV or 10 RmV or else the analog output will be disabled.**

VII. RS485 INTERFACE OPERATION

A. INTRODUCTION
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® 95+ 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 demo source program in Visual Basic® 6.0 or Delphi© 5.0 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 "6308OT.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"	don't care	ORP (ABS or REL)	a. ORP ABS display > +2000 mV [Bring solution to a lower ORP reading]
"UNDR"	don't care	ORP (ABS or REL)	a. ORP ABS display < -2000 mV [Bring solution to a higher ORP reading]
don't care	"OVER"		a. Temperature > 120.0°C. [Bring solution to a lower temperature.] [Replace temperature probe.] b. No temperature sensor. [Use a temperature probe.]
don't care	"UNDER"		Temperature < -10.0°C. [Bring buffer/solution to a higher temperature.]
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. SPECIFICATIONS

ORP

Display	Range	Accuracy	Resolution
ORP Absolute mV	-2000 to 2000 mV	±0.2 % of span	1 mV
ORP Relative mV	-2999 to 2999 mV	±0.2 % of span	1 mV

Temperature

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

Temperature

Temperature sensor   Thermistor, 10.00kΩ at 25°C
                               or 2252Ω at 25°C

4-20 mA Output

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

Controller

Relays   2 active low & 2 active high for ORP
                               1 programmable for temperature
Control type   ON/OFF control
Relay output   5A at 115VAC or 2.5A at 220VAC

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Hysteresis mode	CENTER or EDGE
Hysteresis range	0 - 999 mV

GENERAL

Keys	Audio feedback in all keys
Security protect	4-digit password
Communication	RS485
Power:	115VAC or 230VAC 50/60Hz
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

X. WARRANTY

Jenco Instruments, Ltd. warrants this product to be free from significant deviations in material and workmanship for a period of 1 year from date of purchase. If repair or adjustment is necessary and has not been the result of abuse or misuse, within the year period, please return-freight-prepaid and the correction of the defect will be made free of 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 alone will determine if the product problem is due to deviations or customer misuse.

Out-of-warranty products will be repaired on a charge basis.

RETURN OF ITEMS

Authorization must be obtained from one of our representatives before returning items for any reason. When applying for authorization, have the model and serial number handy, including data regarding the reason 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 authorized returns.

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

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