

# Operation Manual

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## MODEL 6312CTB

Conductivity/TDS/Temperature Controller

**JENCO** ELECTRONICS, LTD.  
MANUFACTURER OF PRECISION INSTRUMENTS

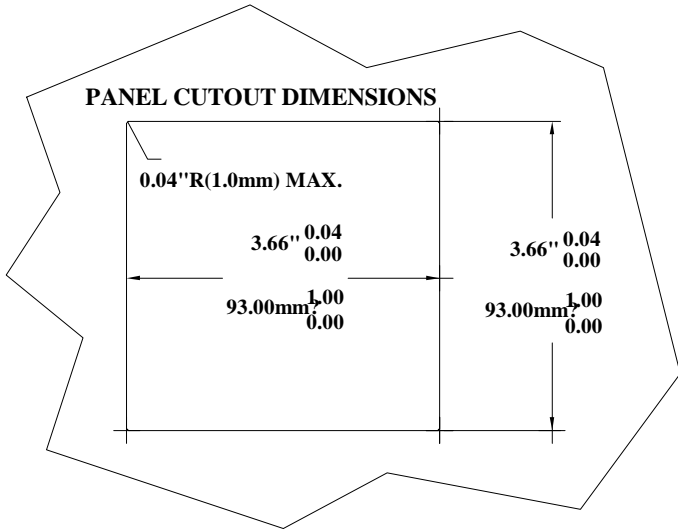
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# I. INITIAL INSPECTION and ASSEMBLY

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

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.

## II. GENERAL INTRODUCTION

The Jenco 6312CTB (Conductivity and Temperature) 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 6312CTB microprocessor allows the user to easily recalibrate the parameters for the probes. The Conductivity system requires only a single calibration. 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.

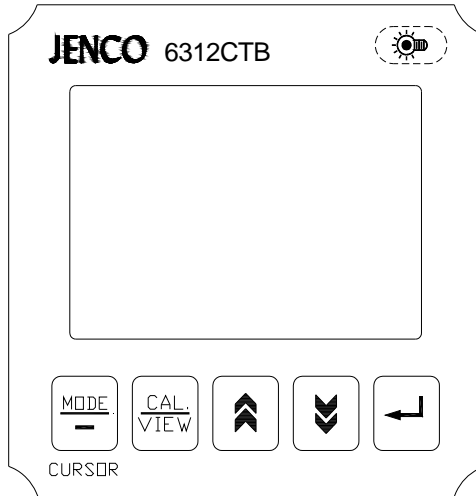
The system simultaneously displays Conductivity, Temperature, relay status and mA output in one LCD graphic screen. This system uses a two-wire or four-wire type sensor for the conductivity and a precise thermistor for temperature, providing you with accurate readings for all your measurements.

The model 6312CTB is equipped with two relays: two programmable High/Low control relays for conductivity/TDS. All relays are hysteresis driven and configurable to CENTER mode. The system also have two isolated 4-20mA analog output, offset and span configurable for Conductivity/TDS & temperature display.

The model 6312CTB comes with a **RS485** interface which can easily let the user log all data with an IBM® PC/AT compatible computer.

# III. USING THE 6312CTB

## A. FRONT PANEL



### 1. The [MODE/-] key.

1a. In **Normal** mode, pressing this Key will change the display to Conductivity or TDS.

1b. In **Calibration/Setting** mode, pressing 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. Pressing this key for 2 seconds at the first parameter of the page will move you back to last parameter of the previous page.

### 2. The [CAL/VIEW] key.

2a. During any normal mode, pressing this key will switch to first Calibration/Setting screen.

2b. During **Calibration/Setting** mode, pressing 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 Normal mode.

### 3. The [▲] UP key.

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

### 4. The [▼] DOWN key.

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

### 5. The [↵] ENTER key.

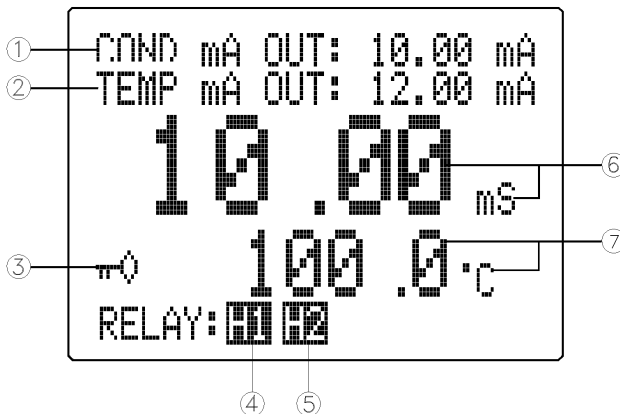
During Calibration/Setting mode, pressing this key will save the current modified parameter and move to the next parameter on the page. If the parameter is the last one on the page then it will move to the first parameter on the next available page.

### 6. The [ ] LIGHT key.

Pressing 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. NORMAL MODE DISPLAY



1. **COND mA OUT** –this will display the actual conductivity output of the isolated 4-20 mA output.

2. **TEMP mA OUT** - this will display the actual temperature output of the isolated 4-20 mA output.

At POWER-ON this will show “OFF” for about 3 seconds before going to normal operation. After going to the Calibration/Setting pages when the unit is not password locked this will show “FROZEN” for about 3 seconds before returning to normal operation.

3. (  ) **key icon annunciator** - this will be displayed if the Calibration /Setting pages are locked, meaning the user will not be able to change the values unless the correct 4 digit number has been entered at the PASSWORD CHECK page.

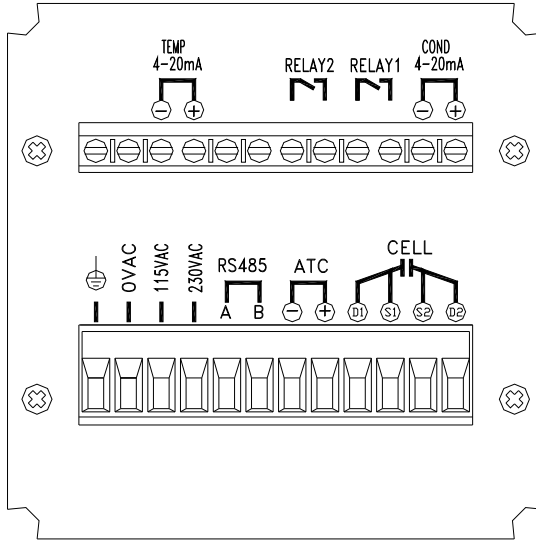
4. **H1 or L1 annunciator** - this is the status of Conductivity/TDS Relay 1, if this is displayed then the relay is ON. (H stands for high action control and L stands for low action control)

5. **H2 or L2 annunciator** – this is the status of Conductivity/TDS Relay 2, if this is displayed then the relay is ON.

6. **Conductivity or TDS display.**

7. **Temperature display.**

## C. REAR CONNECTORS



Before wiring the probes, relays, analog output, RS485 and the power cord, be sure that you are connecting to the right terminal as shown above (be sure the ac-plug is not plugged-in). 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 can be used with 115 or 230 VAC 50/60 Hz. 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 115 VAC 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. If the user uses a two-wire conductivity probe, the user needs to short terminal D1 with terminal S1 and terminal D2 with terminal S2.

**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

```
SELF DIAGNOSTICS
EEPROM   :OK
ROM      :OK
RAM      :OK

VERSION  : 1.00
```

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** ).

If the message persists, then you might need to call our Applications Specialists.

After the self-diagnostic is complete, the temperature will be displayed on the lowest part of the screen and you are ready to make conductivity or TDS measurements. Just immerse the probes halfway 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.

## PROBE HANDLING AND MAINTENANCE

**REMINDER:** If the user uses a two-wire conductivity probe, the user needs to short terminal D1 with terminal S1 and terminal D2 with terminal S2.

### Handling the probe

To ensure accurate and repeatable results:

1. The probe (cell) must be clean before making any measurements. If measuring low conductivity solutions, extraordinary cleanliness may be necessary.
2. The probe cell plates must be totally submerged in the solution. The electrode chamber must be free of trapped air or particulates. You may need to tap the probe gently to dislodge any air bubbles.

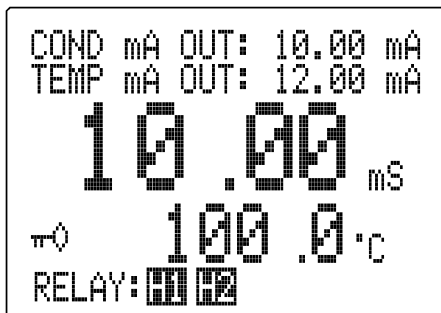
3. Ideally, the probe should be at least 1/4 inch away from any object, including the sides and bottom of the container.
4. Stirring may be necessary for high accuracy readings.
5. If possible, isolate the solution container from ground potentials.
6. Electrical fields and stray currents caused by stirrer motors, heaters, etc., can interfere with the measurements. The user should determine the effects of these and make the necessary corrections either by shielding or by disconnecting those units that cause trouble.
7. Always rinse the cell carefully before using it in another solution.
8. Never store a dirty or contaminated probe.

## Storing the probe

1. Always rinse the probe thoroughly with de-ionized or clean tap water to remove contaminants before storing it.
2. For short-term storage it is recommended to immerse the probe in deionized water to keep the plates wet. For long-term storage, after rinsing the probe thoroughly, the exterior body should be wiped dry before storing it.

## IV. MODEL 6312CTB MODES

### A. MAIN DISPLAY MODE



user reference temperature.

Turning ON the unit will always display Conductivity in normal mode.

This instrument is designed to provide 3 distinct measurements:

1. **Temperature** - current temperature of the solution.
2. **Compensated Conductivity** – a conductivity reading adjusted to a calculated value which would have been read if the sample had been at the

The conductivity of solutions of ionic species is highly dependent on temperature, varying as much as 3% for each change of 1°C (Temperature Coefficient (TC) = 3%/°C). In addition, the temperature coefficient itself varies with the nature of the ionic species present.

Because the exact composition of a natural media is usually not known, it is best to report conductivity at a particular temperature, e.g. 10.2 mS at 15°C. However in many cases, it is also useful to compensate for the temperature dependence in order to determine at a glance if gross changes are occurring in the ionic content of the medium over time. For this reason, the model 6312CTB allows the user to output conductivity in either raw or compensated form. If the User Temperature Coefficient (TC) is set to 0.00% then an uncompensated Conductivity is output to the screen. If the TC is not zero then the Model 6312CTB uses the temperature, TC, raw Conductivity and the reference temperature to display the compensated Conductivity.

The calculation is carried out as in the equation below:  
Compensated Conductivity = Conductivity/(1+TC\*(T- RT))

Where: TC = Temperature Coefficient  
T= Solution temperature  
RT= Reference Temperature

**Note:**

The TDS is based on the specific conductance reading of the solution, setting the TC to 0.00% will change the reading of conductivity to uncompensated conductivity.

**3. Total Dissolved Solid (TDS)** –The calculation is carried out as in the equation below:

$$\text{TDS} = \text{Compensated Conductivity} * (\text{TDS Factor})$$

TDS – is an approximation of the total weight of all solids that are dissolved in a volume of water. This is expressed in ppt (parts per thousand) also referred as g/L(gram per liter) or ppm (parts per million) also referred as mg/L (milligram per liter).

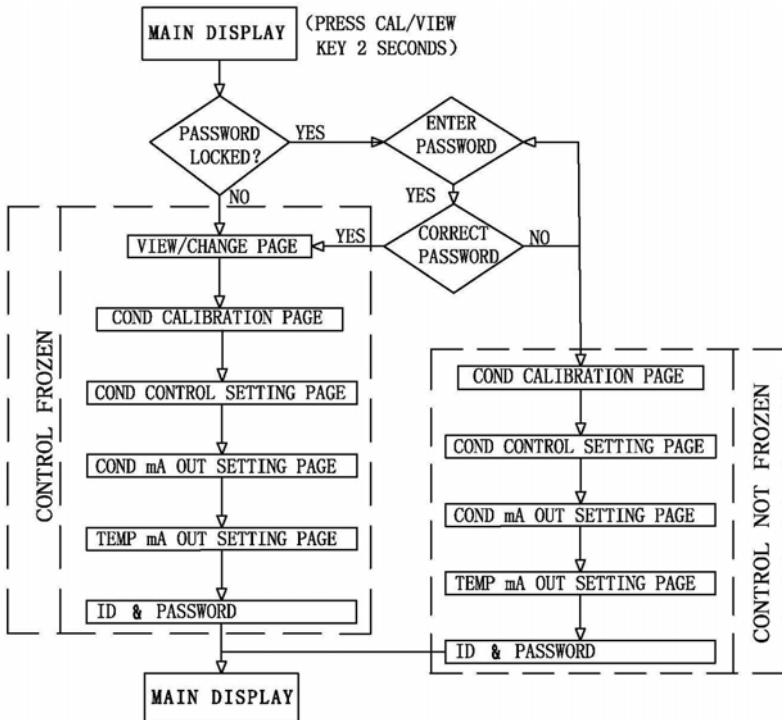
\* In general, the total dissolved solids concentration is the sum of the cations (+charged) and anions (-charged) ions in the solution. The TDS reading provides a qualitative measure of the amount of dissolved ions, but does not tell us the nature or ion relationships.

Temperature and Conductivity (or TDS) are always simultaneously displayed in the graphic LCD screen in normal mode. You can select conductivity or TDS reading by pressing the [MODE/-] key in normal mode.

## B. CALIBRATION/SETTING MODE

Pressing the [CAL/VIEW] key for about 2 seconds during normal 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:



## HOW TO USE THE KEYS

1. You can change any blinking options or digit by pressing the [▲] or [▼] keys.
2. For options in digit format you need to press the [MODE/-] key to move to the next digit.

3. 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.
4. If you don't need to change the current blinking option just press the [↵] ENTER key to move to the next parameter.
5. If you need to go back to the previous parameter press the [MODE/-] key for 2 sec.

### a. PASSWORD CHECK page

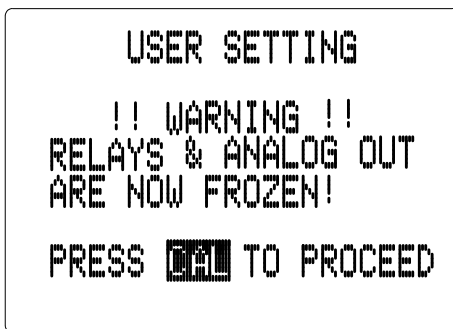


You will only see this page if the unit is password locked. To change any settings or calibration you need to unlock the system to remove the “PASSWORD LOCKED” message. You need to enter the correct 4-digit number on the “ENTER PASSWORD” input. You can still view all the pages of **Calibration/Setting** mode if the system is password locked by just pressing the [CAL/VIEW] key on 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.

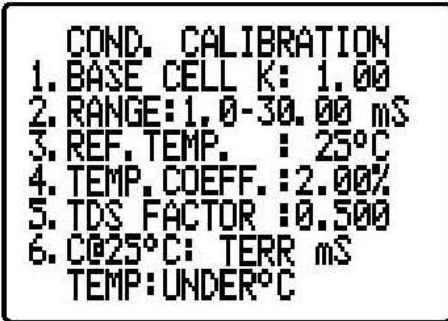
### b. USER SETTING page



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. CONDUCTIVITY ( & TDS) CALIBRATION page



```
COND. CALIBRATION
1. BASE CELL K: 1.00
2. RANGE: 1.0-30.00 mS
3. REF. TEMP. : 25°C
4. TEMP. COEFF. : 2.00%
5. TDS FACTOR : 0.500
6. C@25°C: TERR mS
   TEMP: UNDER°C
```

**1. BASE CELL K** – this is the basic probe cell constant. You can choose **0.01, 0.10, 1.00** or **10.0**. Be careful in changing this option since it will set the actual cell constant to this value and you must calibrate the cell constant before you can accurately use the unit.

**2. RANGE** – for every basic cell constant you can choose 3 different ranges for conductivity and an

additional 3 ranges if you want your relay controls to be in TDS. Whichever you choose you can still view the reading in TDS or conductivity but the relay control will always be what you choose here. Choosing mS or uS range will let the conductivity readings trigger the relays set point, choosing ppt/ppm will let the TDS readings trigger the relays. Conductivity and TDS have the same range limit except for the units displayed.

**3. REF. TEMP.** – if the Temperature Coefficient (TC) is not zero, then the model 6312CTB will use the value here to calculate and display the compensated conductivity or TDS. The display will be the value as if the temperature is the Reference Temperature. The normal reference temperature is between 15 to 25°C but you can actually select between 10 to 29°C in this option.

**4. TEMP. COEFF.** – this will be used by conductivity or TDS if you want your display to be compensated. Setting this option to 0.00% will disable compensation. You can select between 0.00% to 4.99%.

**5. TDS FACTOR**– TDS Factor, this value is multiplied with the conductivity to get the TDS value. The user can directly adjust this value from 0.300 to 0.999.

**6. C@25°C** - if the user is calibrating the Cell Constant, the user must enter the conductivity value of the standard solution at 25°C.

### Before calibration remember to do the following:

1. Use properly stored standard solutions and a clean calibration container.

2. Rinse the probe with de-ionized or distilled water (wipe dry) before using in standard solutions.
3. After immersing into the solution, let the reading stabilize for about 1 minute and shake the probe lightly to remove any air bubbles.
4. If possible and to minimize errors, perform the calibration as close as possible to the selected reference temperature.

#### Accurate Calibration of the Model 6312CTB

1. Clean the probe thoroughly.
2. Wait for about 30 minutes after you turned on the instrument to stabilize the circuitry before calibrating the probe.
3. Choose a calibration solution which most similar to the sample being measured.
  - a. For seawater select 50 mS conductivity standard.
  - b. For fresh water select 1 mS conductivity standard.
  - c. For brackish water select 10 mS conductivity standard.
4. Select the correct base cell constant for the probe.
5. Select the correct range for the standard solution.
6. Input the temperature coefficient of the standard solution. Most standard salt calibration solution has a TC between 1.91% to 2.00%. If the TC is not available, use the default of 2.00%.
7. During calibration, the user reference temperature is disregarded. The reference temperature is fixed at 25°C since this temperature is the most popular reference temperature for all if not most standard solutions.
8. Immerse the probe into the solution. Do not let the probe touch any part of the container and allow at least 1 minute so the temperature reading will stabilize.
9. Shake the probe lightly to remove air bubbles from the probe.
10. Wait for the conductivity reading to be stable.

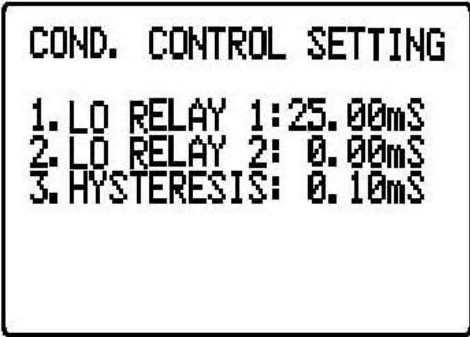
11. Press the [ENTER] key to capture the stable reading and freeze the reading. The model 6312CTB will blink at the first digit to tell the user that he/she can now input the standard solution value.
12. Input the standard solution value by using the [▲] and [▼] keys (to increment/decrement the blinking digit), the [MODE/-] key (to select another digit).
13. Press the [↵] key to save the standard solution value. After saving the model, 6312CTB will display a new cell constant.
14. The model 6312CTB is now ready for conductivity/TDS measurements.

### **Before reading the sample (unknown solution):**

1. Clean the probe thoroughly.
2. Move to CONDUCTIVITY CALIBRATION page.
3. Set the RANGE to the approximate range of the solution.
4. If you want a compensated reading, input the most similar Temperature Coefficient of the sample or use the default of 2.00%. Set the Temperature Coefficient to 0.00% if you want just the raw uncompensated conductivity.
5. If the TC is not 0.00% you need to select a reference temperature or set it to the default of 25°C.
6. Move the display to the normal mode.
7. Immerse the probe into the solution. Do not let the probe touch any part of the container and allow at least 1 minute so the temperature reading will stabilize.
8. Shake the probe lightly to remove air bubbles from the probe.
9. Read the display. Press the [MODE/-] key to toggle between conductivity and TDS reading.



## d. CONDUCTIVITY (or TDS) CONTROL SETTING page



```
COND. CONTROL SETTING
1. LO RELAY 1: 25.00mS
2. LO RELAY 2: 0.00mS
3. HYSTERESIS: 0.10mS
```

1. **RELAY1** (action) - the action for this relay is changeable, you can choose “**HI**”-action or “**LO**” action. (In HI-action, the relay will turn **ON** if the conductivity or TDS is greater or equal to RELAY1 value, in LO-action, the relay will turn **OFF** if the conductivity or TDS is greater or equal to RELAY1 value, which is modified by the hysteresis value and hysteresis mode.)

(See chapter **V. CONTROLLING**

### **THE RELAYS.**)

Use [▲] and [▼] keys to select the RELAY1 action and press [↵] key to save. After you select the RELAY1 action, you can now select the RELAY1 set point. Use [▲] and [▼] keys to change the blinking digit, use the [MODE/-] key to select another digit and the [↵] key to save the new set point.

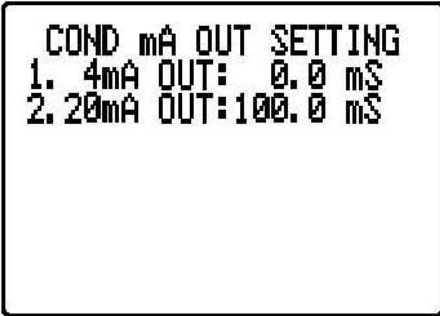
2. **RELAY2** (action) - the action for this relay is changeable, you can choose “HI”-action or “LO” action. (In HI-action, the relay will turn ON if the conductivity or TDS is greater or equal to RELAY2 value, in LO-action, the relay will turn OFF if the conductivity or TDS is greater or equal to RELAY2 value, which is modified by the hysteresis value and hysteresis mode.)

(See chapter **V. CONTROLLING THE RELAYS.**)

Use [▲] and [▼] keys to select the RELAY2 action and press [↵] key to save. After you select the RELAY2 action you can now select the RELAY2 set point. Use [▲] and [▼] keys to change the blinking digit, use the [MODE/-] key to select another digit and the [↵] key to save the new set point.

3. **HYSTERESIS** (value) - this is the actual value of the hysteresis.

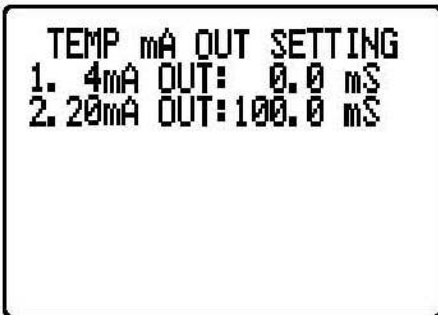
### e. COND mA OUT SETTING page



1. 4mA OUT (offset) – 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 (span) – this value will be used in conjunction with the 4 mA value to plot the output. (See chapter VI. 4-20 mA OUTPUT.)

### f. TEMP mA OUT SETTING page



1. 4mA OUT (offset) – 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 (span) – this value will be used in conjunction with the 4 mA value to plot the output. (See chapter VI. 4-20 mA OUTPUT.)

### g. ID & PASSWORD page



1. RS 485 ID – this is the unique ID/Address for the unit. If you are connecting multiple model 6312CTB 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.

2. PASSWORD SET - 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. RELAY 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. RELAY 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, SETPOINT, HYSTERESIS MODE & HYSTERESIS VALUE**

If the relay action is set to HI hysteresis mode is EDGE, the relay will turn **ON** at  $[(\text{RELAY SETPOINT}) + (\text{hysteresis value})]$ , and will turn **OFF** at (RELAY SETPOINT).

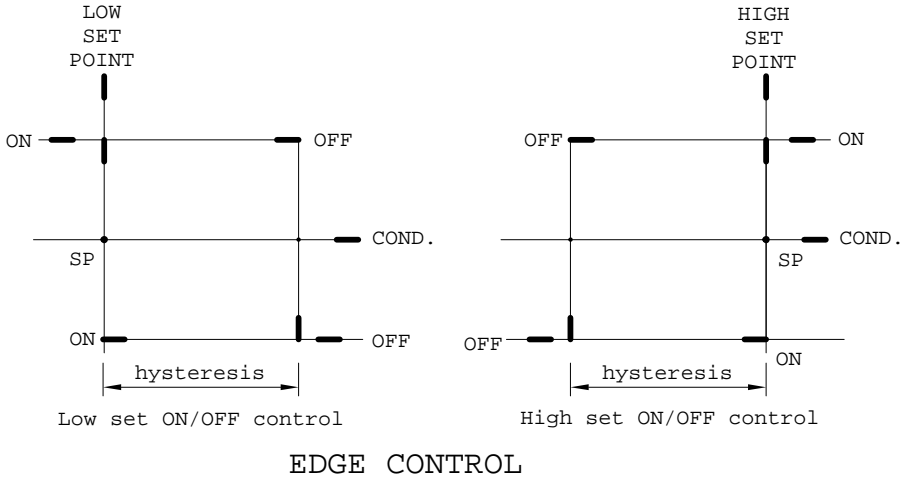
If the relay action is set to LO hysteresis mode is EDGE, the relay will turn **OFF** at  $[(\text{RELAY SETPOINT}) + (\text{hysteresis value})]$ , and will turn **ON** at (RELAY SETPOINT).

| Relay Action | Hysteresis mode | Effective RELAY-<br><b>ON</b> Setpoint | Effective RELAY-<br><b>OFF</b> Setpoint |
|--------------|-----------------|--|---|
| HIGH         | EDGE            | S.P.                                   | S.P. -(H.V)                             |
| LOW          | EDGE            | S.P                                    | S.P.+(H.V.)                             |

S.P. = Relay Set point

H.V.= Hysteresis value (DeadBand)

## D. CONDUCTIVITY/TDS RELAYS



There are two independent Relay channels for the TDS or conductivity display which has independent set point and HIGH or LOW action setting. The hysteresis mode (EDGE) and hysteresis value will be used by both relays.

The action of the relays is dependent on set point, relay action (HIGH or LOW), hysteresis mode (EDGE), hysteresis value and the current conductivity or TDS display.

## VI. 4 - 20 mA OUTPUT

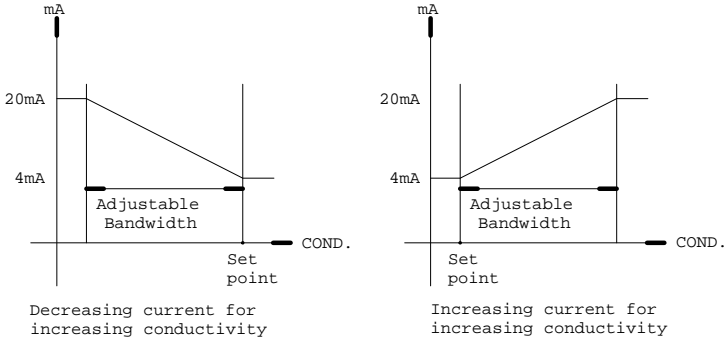
### A. ISOLATION VOLTAGE

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 500  $\Omega$ . Output current inaccuracies may occur for load impedance in excess 500  $\Omega$ .

## C. CONDUCTIVITY OR TDS LINEAR CURRENT OUTPUT



The linear analog output will be dependent on the 4 mA setting, 20 mA setting and the current conductivity or TDS display.

The analog output is based on the following equation :

$$\text{mA}_{(c)} = 4\text{mA} + (16\text{mA}) * (D_{(c)} - C(4)) / (C(20) - C(4))$$

Where :

$\text{mA}_{(c)}$  = analog output

$D_{(c)}$  = current conductivity or TDS display

$C(4)$  = conductivity or TDS user setting for 4 mA

$C(20)$  = conductivity or TDS user setting for 20 mA.

### Note :

1. The absolute difference of the 4mA and 20mA settings must be greater or equal to 10 LSD (Least Significant Digit) of the user range.
2. If the absolute difference is smaller than 10 LSD the current output will display "ERROR".

# 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 sample source program in DELPHI® 5.0 or 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.

## VIII. ERROR DISPLAYS AND TROUBLESHOOTING

| LCD display         | ATC display     | mode                                  | Possible cause(s)<br>[Action(s)]  |
|---------------------|-----------------|---------------------------------------|---|
| "TERR"              | "OVER"          | Conductivity, TDS or Cell Calibration | a. Temperature > 120.0°C.<br>[Bring solution to a lower temperature.]<br>[Replace temperature probe.]<br>b. No temperature sensor..<br>[Use a temperature probe.] |
| "TERR"              | "UNDR"          | Conductivity, TDS or Cell Calibration | Temperature < -10.0°C.<br>[Bring solution to a higher temperature.]   |
| "OVER"              | -10.0~120.0°C   | Conductivity, TDS or Cell Calibration | Reading over user specified range .<br>[Change range to higher level]   |
| "LERR"              | -10.0 ~ 120.0°C | Conductivity, TDS or Cell Calibration | Compensated Calibration exceeds temperature limit.<br>[Increase or decrease the solution temperature]   |
| <b>EEPROM : BAD</b> |                 | Power-on                              | Unit has failed its EEPROM test.<br>[Turn instrument OFF and back to ON again.]<br>[Return for service. (see Warranty)]   |
| <b>ROM : BAD</b>    |                 | Power-on                              | Unit has failed its ROM test.<br>[Turn instrument OFF and back to ON again.]<br>[Return for service. (see Warranty)]  |
| <b>RAM : BAD</b>    |                 | Power-on                              | Unit has failed its RAM test.<br>[Turn instrument OFF and back to ON again.]<br>[Return for service. (see Warranty)]  |

# IX. SPECIFICATIONS

## Conductivity/TDS

| Range               | Basic Cell K | Resolution   | Accuracy    |
|---------------------|--------------|--------------|-------------|
| 0 to 9.999 uS/ppm   | 0.01         | 0.001 uS/ppm | 0.5% ±1 LSD |
| 1 to 99.99 uS/ppm   | 0.01         | 0.01 uS/ppm  | 0.5% ±1 LSD |
| 10 to 300.0 uS/ppm  | 0.01         | 0.1 uS/ppm   | 0.5% ±1 LSD |
| 0.0 to 99.99 uS/ppm | 0.1          | 0.01 uS/ppm  | 0.5% ±1 LSD |
| 10 to 999.9 uS/ppm  | 0.1          | 0.1 uS/ppm   | 0.5% ±1 LSD |
| 0.1 to 3.000 mS/ppt | 0.1          | 0.001 mS/ppt | 0.5% ±1 LSD |
| 0 to 999.9 uS/ppm   | 1.00         | 0.1 uS/ppm   | 0.5% ±1 LSD |
| 0.1 to 9.999 mS/ppt | 1.00         | 0.001 mS/ppt | 0.5% ±1 LSD |
| 1.0 to 30.00 mS/ppt | 1.00         | 0.01 mS/ppt  | 0.5% ±1 LSD |
| 0 to 9.999 mS/ppt   | 10.0         | 0.001 mS/ppt | 0.5% ±1 LSD |
| 1 to 99.99 mS/ppt   | 10.0         | 0.01 mS/ppt  | 0.5% ±1 LSD |
| 10 to 300.0 mS/ppt  | 10.0         | 0.1 mS/ppt   | 0.5% ±1 LSD |

## Temperature

| Range             | Resolution | Accuracy |
|-------------------|------------|----------|
| -10.0 to 120.0 °C | 0.1 °C     | ±0.3 °C  |

## Conductivity / TDS

|                                 |                                  |
|---------------------------------|----------------------------------|
| <b>TDS Factor Range</b>         | 0.300 to 0.999 (user selectable) |
| <b>Reference Temperature</b>    | 10°C to 29°C (user selectable)   |
| <b>Temperature Coefficient</b>  | 0.00 to 4.99% (user selectable)  |
| <b>Temperature Compensation</b> | Automatic                        |

## Temperature

|                           |                          |
|---------------------------|--------------------------|
| <b>Temperature sensor</b> | Thermistor, 10 k at 25°C |
|---------------------------|--------------------------|

## 4-20mA Output

|                             |                       |
|-----------------------------|-----------------------|
| <b>Current output range</b> | 4 to 20 mA (isolated) |
| <b>Current output scale</b> | user programmable     |
| <b>Maximum load</b>         | 500                   |
| <b>Accuracy</b>             | ± 0.1 mA              |
| <b>Isolation voltage</b>    | 500VDC                |

## Controller

|                     |                                |
|---------------------|--------------------------------|
| <b>Control type</b> | ON/OFF control                 |
| <b>Relay output</b> | 5A at 115VAC or 2.5A at 220VAC |



## **GENERAL**

|                                  |                                   |
|----------------------------------|-----------------------------------|
| <b>Keys</b>                      | Audio feedback in all keys        |
| <b>Security protect</b>          | 4-digit password                  |
| <b>Communication</b>             | RS485                             |
| <b>Power:</b>                    | 115VAC or 230VAC 50/60Hz          |
| <b>Power consumption</b>         | 6 watts                           |
| <b>Fuse</b>                      | 315mA/250V fast acting glass tube |
| <b>Ambient temperature range</b> | 0.0 to 50.0 °C                    |
| <b>Display:</b>                  | 128x64 graphic LCD w/ backlight   |
| <b>Case</b>                      | IP67 ¼ DIN case, depth 155mm      |
| <b>Weight</b>                    | 950 g                             |

## **X. WARRANTY**

Jenco 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.

## **XI. 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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