

# OPERATION MANUAL

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## JENCO MODEL 6308TuSS MICROCOMPUTER BASED TURBIDITY AND SUSPENDED SOLIDS CONTROLLER

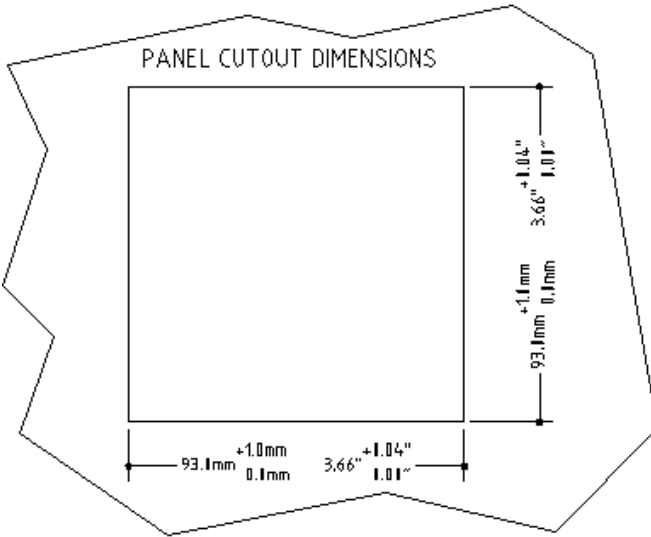
JENCO ELECTRONICS, LTD.  
MANUFACTURER OF PRECISION INSTRUMENTS

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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 Model 6308TuSS (Turbidity and Suspended Solids) 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 6308TuSS microprocessor performs a self-diagnostic routine every time you turn on the unit providing you with basic information on the stability of the instrument.

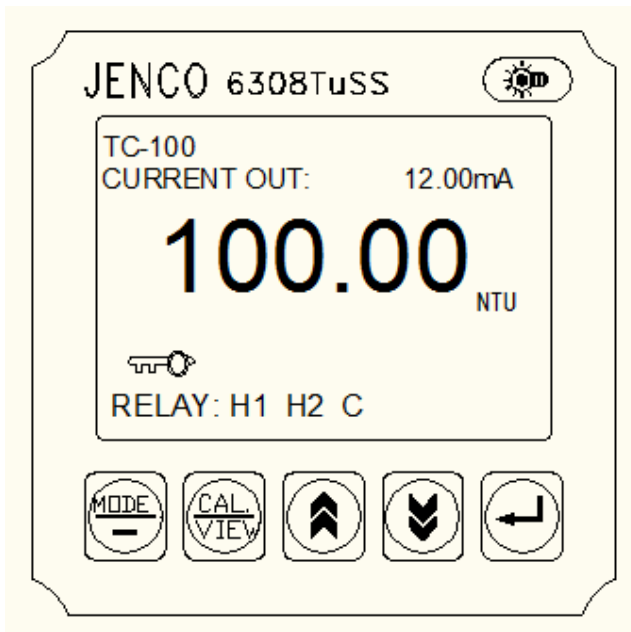
The system simultaneously displays Turbidity and Suspended Solids, relay status and current output in one graphic LCD screen.

The model 6308TuSS is equipped with 3 relays (2 programmable high or low relay for Turbidity and Suspended Solids, 1 programmable for external cleaning); Turbidity and Suspended Solids relays are hysteresis driven and configurable to **CENTER** mode. The system also has a **isolated 4-20mA** analog output for the Turbidity and Suspended Solids display.

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

### III. USING THE JENCO MODEL 6308TuSS

#### A. FRONT PANEL



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

1a. In the turbidity measuring page (TC-100、TC-500、TC-3000), press the “MODE” key to switch between the NTU and the FNU turbidity units. The default is in NTU unit.

1b. In Calibration/Setting mode, pressing this key will move the cursor to the next digit of the current active parameter.

1c. In Calibration/Setting mode, pressing this key for two seconds will move you back to the previous parameter.

2. The [CAL / VIEW] key.

2a. In the normal mode, the display will go to **Calibration/Setting** mode if you press this key for about two seconds.

2b. During **Calibration/Setting** mode, pressing this key will switch to the next available **Calibration/Setting** page. Pressing this key at the last **Calibration/Setting** 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.

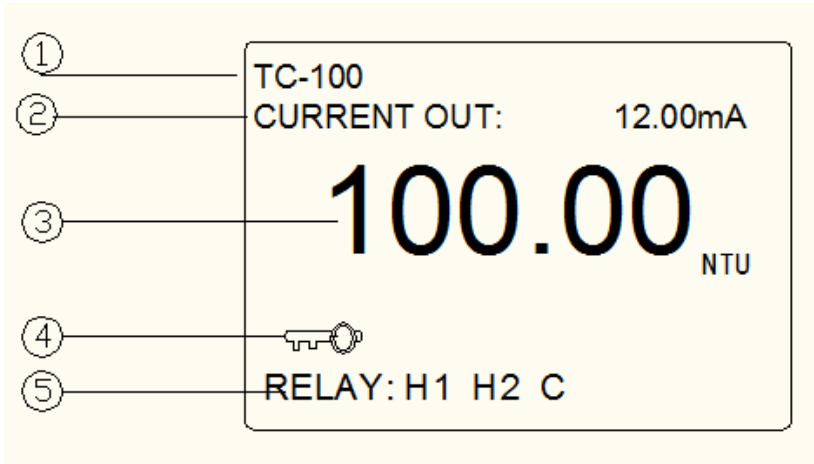
5. The [↵] ENTER key.


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 in the page then it will move to first parameter on the next available page.

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 for about two minutes.

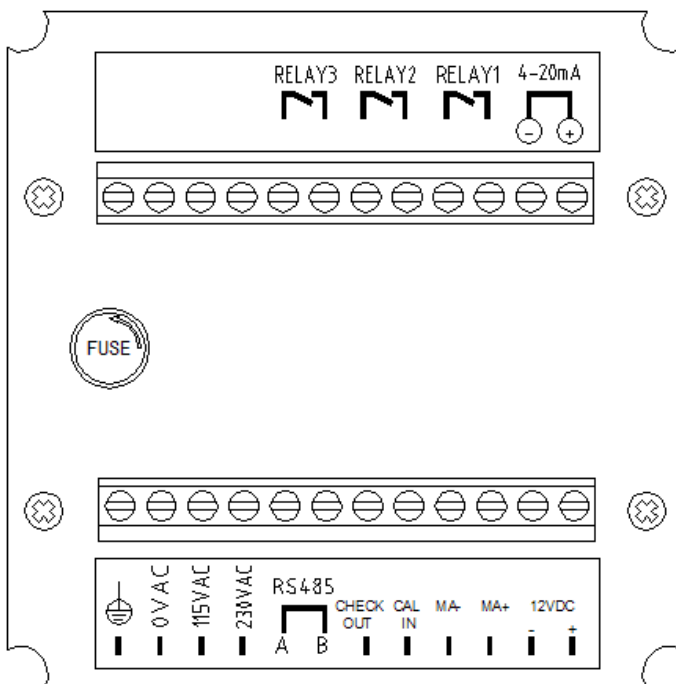
## B. NORMAL MODE DISPLAY



1. **TC-100** annunciator- this is the sensor selection mode. The model 6308TuSS can work with 5 different 5 sensors, they are: TC-100、TC-500、TC-3000、TCS-1000 and TS-MXS-A.
2. **CURRENT OUT** - this will display the actual reading of the 4-20mA output. At power-on this will show "OFF" for about 3 seconds before going to the normal 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. **100.00** <sub>NTU</sub> annunciators- Turbidity display and unit (NTU or FUT) or Suspended Solids display and unit (mg/L).
4.  annunciator - this will be displayed if Calibration/Setting pages are **password locked** meaning the user can't change the values unless the correct 4 digit password has been entered.

5. **H1 (High action relay 1) or L1 (Low action relay1)** annunciator - This is the status of the Turbidity or Suspended Solids relay 1, if this is displayed then the relay is ON. H1 means the relay action is HIGH while L1 means the relay action is LOW.
6. **H2 (High action relay 2) or L2 (Low action relay2)** annunciator - This is the status of the Turbidity or Suspended Solids relay 2, if this is displayed then the relay is ON. H2 means the relay action is HIGH while L2 means the relay action is LOW.
7. **C (Cleaning relay3)** annunciator - "C" will appear when the external cleaning relay is ON.

**C. REAR CONNECTORS**





Before connecting the probes, relays, analog output, RS485 and power cord be sure that you are connecting to the right terminal as shown above. 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 6308TuSS can be used with 115VAC or 230VAC 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 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 to the correct AC terminals. Connecting incorrectly may damage the unit permanently.***

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

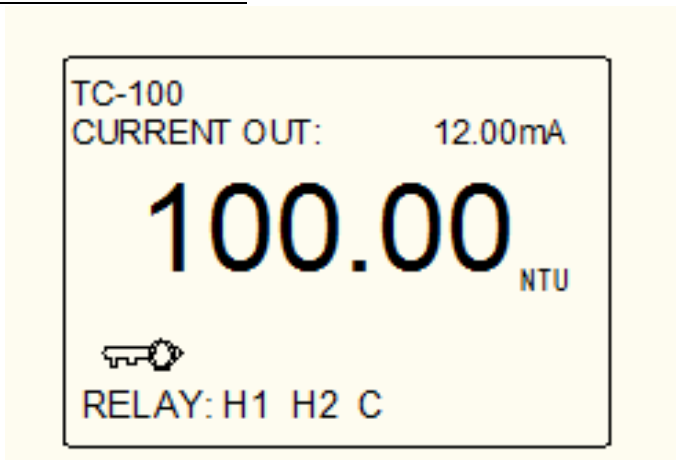
```
MODEL 6308 TuSS
SELF DIAGNOSTICS
RAM:      OK
ROM:      OK
EEPROM:   OK
VERSION:  1.00
```

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

## IV. MODEL 6308TuSS MODES

### A. MAIN DISPLAY MODE



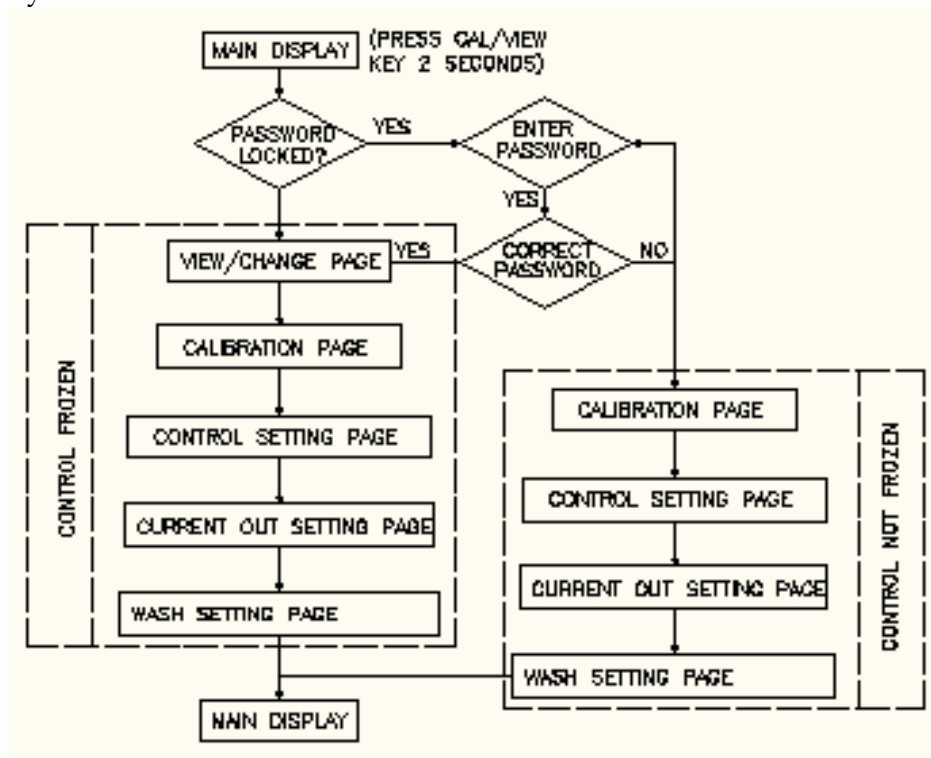
The unit will always start in main display mode once it is turned on. This instrument is designed to provide 2 distinct measurements:

1. Turbidity - a measurement of turbidity in NUT or FUT.
2. Suspended Solids -a measurement of suspended solids in mg/L.

### B. CALIBRATION/SETTING MODE

Pressing the [CAL/VIEW] key for about two seconds during the main display mode will bring-up the first page of seven pages of the **Calibration/Setting** mode. Pressing [CAL/VIEW] key will switch to the next page. At the last page, pressing [CAL/VIEW] again will return the meter to the main display mode.

Below is a simple flowchart showing the path of the [CAL/VIEW] key:



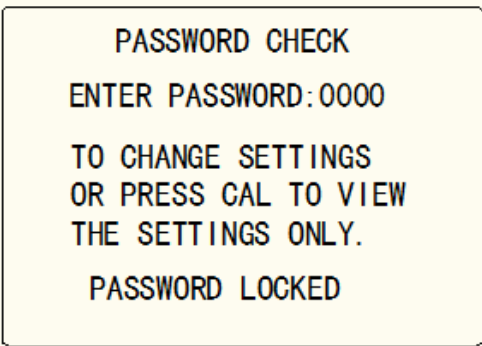
### How to use the keys

1. At main display you need to press and hold the [CAL/VIEW] key for two seconds to change the display to VIEW SETTING PAGE or if the instrument is password locked the display will go to the PASSWORD CHECK page.
2. At the turbidity main display mode you can press the [MODE/-] key to select the turbidity unit.
3. You need to press the [▲] or [▼] keys to increment or decrement the numbers. 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 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 option.
5. You can press and hold [ **MODE/-** ] key for two seconds and it will move back the cursor to the previous option.
  - 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

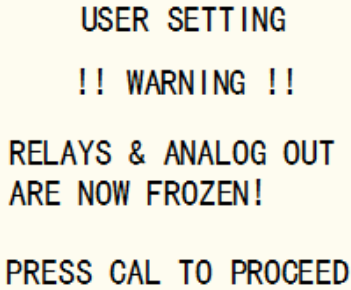


remove the “**PASSWORD LOCKED**” message. You need to enter the correct four digit number on the “**ENTER PASSWORD**” input. You can still view all the pages of the **Calibration/Setting mode** if the system is password locked by just pressing the [ **CAL/VIEW** ] key on this

page. If the unit is “**PASSWORD LOCKED**” going to **Calibration/Setting mode** will not affect the function of the relays and analog output.

***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

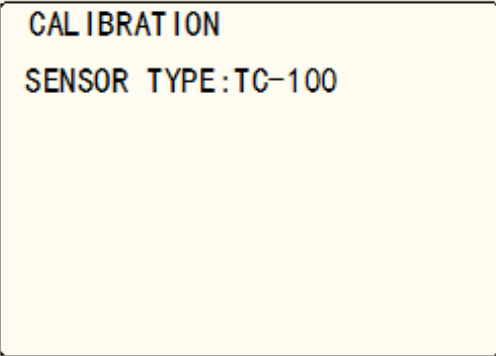


USER SETTING  
!! WARNING !!  
RELAYS & ANALOG OUT  
ARE NOW FROZEN!  
PRESS CAL TO PROCEED

You will only see this page if the unit is not password locked. This page is just a **WARNING**, informing that all relays and analog output are frozen, and that you can calibrate and change the settings.

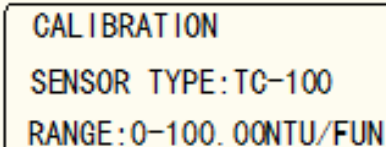
***NOTE: FROZEN means all the relays and the analog out will maintain their last state until the user returns to main display mode.***

c. CALIBRATION page



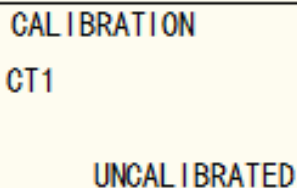
CALIBRATION  
SENSOR TYPE:TC-100

1. At the "USER SETTING" page, press [CAL/VIEW] key to enter the first page of the "CALIBRATION" mode. "TC-100" icon will flash, use the [▲] or [▼] key to select the appropriate sensor. Press [↵] ENTER key to confirm.



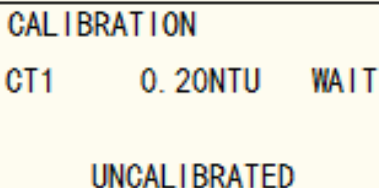
CALIBRATION  
SENSOR TYPE: TC-100  
RANGE: 0-100.00NTU/FUN

2. At this page, the meter will display the measuring range of the sensor selected. Press [↵] **ENTER** or [CAL/VIEW] key to continue. In the Calibration mode, press the [MODE/-] key for 2 seconds will move you back to the previous parameter.



CALIBRATION  
CT1  
  
UNCALIBRATED

3. At the CT1 calibration page, rinse the sensor with distilled water and place it in 0.00NTU (0.00FTU) standard solution for one minute. Press [↵] **ENTER** key to confirm. The meter will automatically enter the next page.



CALIBRATION  
CT1      0.20NTU      WAIT  
  
UNCALIBRATED

4. At this page, the meter will show a value. This is the deviation value of the non-calibrated sensor from 0.00NTU. Press [↵] **ENTER** key to enter the automatic calibration mode. The "WAIT" icon will flash. When the "WAIT" icon stops flashing, the meter will automatically enter the next page.

CALIBRATION	
CT1	0.00NTU
CT2	5.88NTU

5. At this page, press [↵] **ENTER** key to save the calibration. The meter will show CT1 at 0.00NTU and CT2 at a random value. One point calibration is now complete. Press [CAL/VIEW] key to go to "CONTROL SETTING" page or continue second point calibration.

***(NOTE: For taking general turbidity or suspend solids measurements for the 6308TuSS, one point calibration is suffice).***

CALIBRATION	
CT1	0.00NTU
CT2	012.36NTU

6. For CT2 calibration, rinse the sensor with distilled water and place it the second set of standard solution for one minute. The meter will show a certain NTU value. This is the deviation value of the non-calibrated sensor from the second set of standard solution.

Press [↵] **ENTER** key to enter the manual calibration page. The first digit will flash. Use the [▲] or [▼] key to select the proper numeral. Press [MODE/-] key to go to the next digit.

***IMPORTANT: Any calibration value cannot exceed 80% from the full scale.***

### CALIBRATION

CT1	0.00NTU
CT2	10.00NTU
CT3	17.90NTU

7. When the proper value of the second standard solution is selected, press [↵] **ENTER** key to save. Two point calibration is now complete. Press [CAL/VIEW] key to go to "CONTROL SETTING" page or continue third point calibration.

### CALIBRATION

CT1	0.00NTU
CT2	10.00NTU
CT3	20.00NTU
CT4	30.00NTU
CT5	40.00NTU

8. Repeat steps 6 and 7 for the third, fourth and fifth point calibration.

***NOTE:*** At any stage during calibration, you can press the [MODE/-] for 2 seconds to go back to the previous calibration point. By doing so, the meter will erase the value set previous for the calibration point.



#### d. CONTROL SETTING page

##### CONTROL SETTING

HI RELAY1 : 100.00NTU

LO RELAY2 : 30.00NTU

HYSTERESIS : 1.00NTU

1. HI or LO RELAY 1 - 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 turbidity or suspended solids reading is greater or equal to RELAY1 value, in LO-action the relay will turn off if the turbidity or

suspended solids reading is greater or equal to RELAY1 value, which is modified by the hysteresis value. See chapter V. CONTROLLING THE RELAYS ).

User can use [▲] and [▼] keys to select the relay1 action and press [↵] ENTER key to save the setting. 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 [↵] ENTER key to save the new set point value.

2. HI or LO RELAY 2 - function & setting procedures same with RELAY 1

3. The hysteresis value setup: Users can press [▲] or [▼] and [MODE/-] keys to input the appropriate hysteresis value. When the set value is confirmed press the [↵] ENTER key. If the hysteresis value setting is too small it may cause relay to chatter. Please enter the appropriate Hysteresis value based on S.P + / - ½ (H.V.)

Note: The hysteresis value can be set within the range corresponding to the measured electrode set. The user enters the current setting screen after setting up the Hysteresis value.

e. CURRENT OUT SETTING page

```
CURRENT OUT SETTING
4mA OUT : 0.00NTU
20mA OUT : 100.00NTU
```

1. 4mA OUT - User can press [ $\blacktriangle$ ] or [ $\blacktriangledown$ ] and [**MODE/-**] key to enter the desired values. Press the [ $\blackleftarrow$ ] **ENTER** key when finished. (See chapter VI. 4-20mA OUTPUT.)

2. 20mA OUT - Repeat the same setting procedure of 4mA OUT for 20mA OUT setup. When the 20mA OUT setup is complete, the user enters to the "WASH SETTING" page. (See chapter VI. 4-20mA OUTPUT.)

```
WASH SETTING
ON : 0360 SECOND (S)
OFF : 600.0 HOUR (S)
```

f. WASH SETTING page

If the cleaning device is set to auto run, any one of the setting values reaches to zero terminates this function. To initiate the cleaning function, the user can input the time in

seconds by using the [ $\blacktriangle$ ], [ $\blacktriangledown$ ] and [**MODE/-**] key. (The default time is 0000 second and range from 0000 to 9999 seconds). To terminate the cleaning function, the user can input the time in hours by using the [ $\blacktriangle$ ], [ $\blacktriangledown$ ] and [**MODE/-**] key. (The default time is 000 hour and range from 000.0 to 999.9 hours). When the external cleaning is turned on, it will display "C" on the screen. After

finishing the equipment wash relay setup, the user enters to the "RS485 SETTING" page.

### RS-485 SETTING

RS485 PARITY : EVEN

RS485 ID : 01

PASSWORD SET : 0000

g. RS-485 SETTING page

RS485 with MODBUS communication protocol.

1. RS485 PARITY:- the communication is in the format of EVEN, ODD and NONE.

2. RS485 ID:- this is the unique ID/Address for the unit. If you are connecting multiple model 6308TuSS 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.

3. 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:*** You are *is responsible in remembering your 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 VALUE**

Relay Action	Effective RELAY-ON Set Point	Effective RELAY-OFF Set Point
HIGH	S.P.+ 1/2(H.V.)	S.P. -1/2 (H.V.)
LOW	S.P.-1/2 (H.V.)	S.P.+1/2 (H.V.)

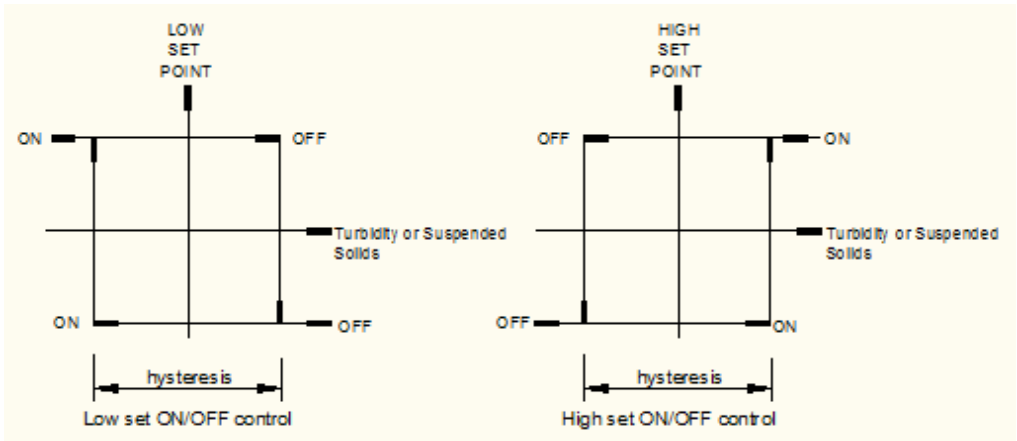
S.P. = Relay Set point

H.V.= Hysteresis value (Dead Band)

If the relay action is set to **HIGH** 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 **LOW** 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)].

## D. TURBIDITY AND SUSPENDED SOLIDS RELAYS



### CENTER CONTROL

There are two independent Alarm channels for Turbidity or Suspended Solids display. The hysteresis mode (Center) and hysteresis value will be used by the two Turbidity or Suspended Solids relays.

The actions of the Turbidity or Suspended Solids relays are depended on set point, relay action type (HIGH or LOW), hysteresis mode (Center), hysteresis value and the current Turbidity or Suspended Solids display.

## VI. 4 - 20 mA ANALOG OUTPUT

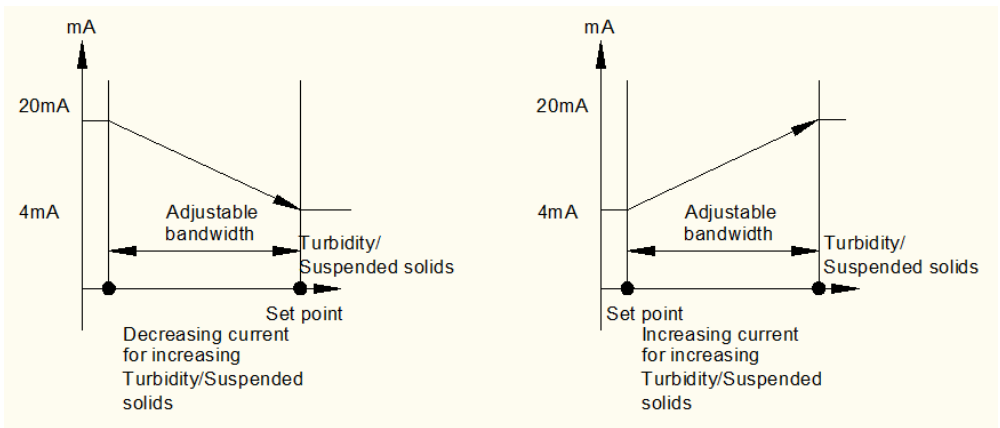
### A. ISOLATION VOLTAGE

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. TURBIDITY AND SUSPENDED SOLIDS LINEAR OUTPUT**



The analog output will produce a linear analog output if the user selects this option. The analog output will be dependent on the Turbidity or Suspended Solids\_4 mA setting, Turbidity or Suspended Solids\_20 mA setting and the current Turbidity or Suspended Solids display.

The Turbidity or Suspended Solids LINEAR analog output is based on the following equation:

$$\text{mA}_{(\text{Turbidity or Suspended Solids})} = 4\text{mA} + (16\text{mA}) * (\text{D}_{(\text{Turbidity or Suspended Solids})} - \text{Turbidity or Suspended Solids (4)}) / (\text{Turbidity or Suspended Solids (20)} - \text{Turbidity or Suspended Solids (4)})$$

Where:

$mA_{(\text{Turbidity or Suspended Solids})}$

= analog output

$D_{(\text{Turbidity or Suspended Solids})}$

= current Turbidity or Suspended Solids display

Turbidity or Suspended Solids(4)

=Turbidity or Suspended Solids user setting for 4 mA

Turbidity or Suspended Solids(20)

= Turbidity or Suspended Solids user setting for 20 mA.

## VII. SPECIFICATIONS

### TURBIDITY

Probe Mode	Range NTU(FNU)	Resolution NTU(FNU)	Accuracy NTU(FNU)	Auto Washing Time(min)
TC-100	0.00~100.0	0.01	±3%F.S	30
TC-500	0.0~500.0	0.1	±3%F.S	10
TC-3000	0~3000	1	±3%F.S	10

### SUSPENDED SOLIDS

Probe Mode	Range mg/L	Resolution mg/L	Accuracy mg/L	Auto Washing Time(min)
TCS-1000	0.0~1000.0	0.1	±3%F.S	10
TS-MXS-A	0~50000	1	±3%F.S	10

### 4-20 mA Analog Output

**Current output range**

4 to 20 mA (isolated)

**Current output scale**

user programmable

<b>Maximum load</b>	500 Ω
<b>Isolation voltage</b>	500VDC

## Controller

<b>Control type</b>	(two) ON/OFF control
<b>Relay output</b>	5A at 115VAC or 2.5A at 220VAC Resistive load only

## External Cleaning Controller

<b>Control type</b>	ON/OFF control
<b>ON/OFF Time</b>	ON 0~9999 sec or OFF 0~9999 sec

## GENERAL

<b>Keys</b>	Audio feedback in all keys
<b>Security protect</b>	4-digit password
<b>Communication</b>	RS485, with MODBUS communication protocol.
<b>Power:</b>	115VAC or 230VAC 50/60Hz
<b>Fuse</b>	0.315Amp/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>	IPT65 ¼ DIN case, depth 148mm
<b>Weight</b>	950 g





## VIII. 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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