

# MANUAL

## Online TSS Analyzer

### MS TSS 791 (Flow Through / Submerged)

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## **Attentions**

- Please follow the operating procedures and precautions of this manual when using.
- If you find that the instrument is working abnormally or damaged during use, please contact the dealer, do not repair it yourself..
- In order to make the measurement more accurate, the instrument must be calibrated with the electrode; if your electrode has been purchased for nearly one year or the electrode has quality problems, please pay attention to replace it.
- Before performing the calibration work, please connect the instrument to the electrode and warm it up for 30 minutes.
- Due to product updates, this manual is subject to change without notice.

# 1.Product configuration

Please confirm the Suspended Solid(SS) Analyzer you purchased, the package is complete. If there is any damage to the package or any shortage of accessories, please contact the MicroSet as soon as possible.The configuration is as follows.

## 1.1 Standard configuration

- ✧ Online controller ×1
- ✧ Suspended Solid sensor ×1
- ✧ locking bars ×1
- ✧ User manual ×1
- ✧ Cleaning brush ×1( flow type sensor)
- ✧ Water stopper ×1( flow type sensor)
- ✧ Water pipe 3m ( flow type sensor)
- ✧ Water stop clip x 1 ( flow type sensor)
- ✧ White connectors x 3( flow type sensor)
- ✧ Fastening buckles x 3( flow type sensor)

## 1.2 Optional accessories

- ✧ Mounting bracket
- ✧ Connector of 485 communication interface and 485 transfer into 232 or 485 transfer into USB

## 2 Product introduction

The suspended solid sensor adopts infrared light technology for measurement. The instrument analyze these data that are obtained by infrared light through the medium to the detector. It can know the exact concentration of suspended matter in the medium. It has the same accuracy and continuity when measuring low or high ranges. Besides, in order to effectively eliminate the deviation of data due to some changes of environment, so that it can be used in more environments. It is widely used in the monitoring of SS concentration in solution, such as Chemical, electroplating, papermaking, environmentally friendly water treatment engineering, pharmaceutical, food, water, etc.

### 2.1 Main features

- ✧ Waterproof, dust proof, moisture-proof (IP65), high-end design look.
- ✧ high precision, high stability and preferable antijamming ability.
- ✧ Communicate function: RS-485 communication interface with photoelectric isolation (optional, MODBUS protocol partially compatible), photoelectric isolation 4-20mA current output, the corresponding value can be set freely.
- ✧ Watchdog function: make sure the meter doesn't crash.
- ✧ Power off protects > 10 years.
- ✧ Adopting two-point correction method, the instrument measurement range can be modified.
- ✧ The quartz glass lens with high transmittance is used in the optical path of the sensor, and the infrared wave is more stable to

transmit and receive, and the photometric compensation is built in to improve the measuring accuracy.

- ✧ Relay lag value can be set freely, avoid frequent action of switch relay. It has the function of setting the switch on and off.
- ✧ The SS concentration sensor is not affected by the flow rate and pressure of water.
- ✧ The automatic cleaning interval can be set freely (only sensor support that).

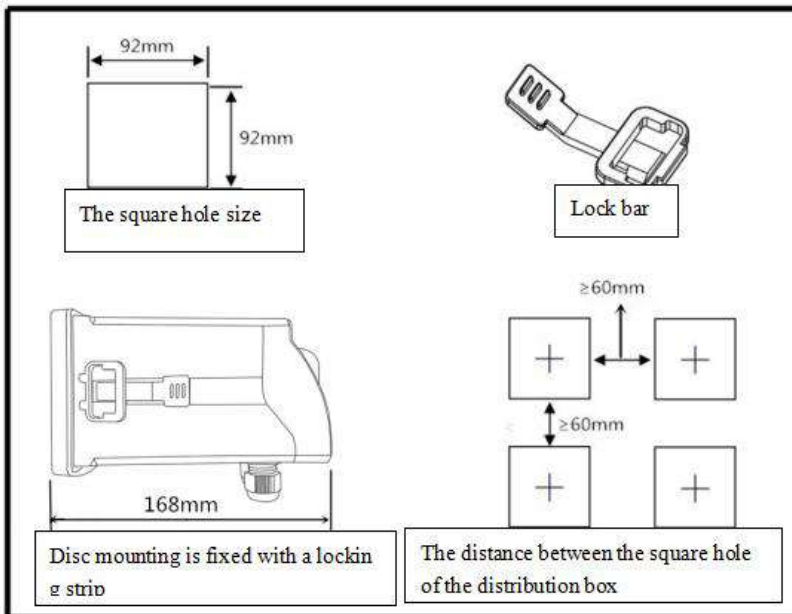
### 3 Technical indicators

- ✧ Measuring Range: 0-500mg/L (flow type sensor);0-10000mg/L(Submerged sensor),measure range can be customized,
- ✧ Resolution: 1mg/L
- ✧ Repeatability: 1%.
- ✧ Accuracy:  $\pm 2.0\%$ FS
- ✧ Control interface: two groups of ON/OFF contact individual high and low alarm signal photoelectric isolation output
- ✧ Signal isolation output: photocoupler isolation protection 4-20mA analog output.
- ✧ Relay: relay lag value can be set freely , relay load 3A 220VAC/24VDC
- ✧ Working conditions: Ambient temperature is 0~60°C, relative humidity  $\leq 90\%$ .
- ✧ Output load:  $< 750\Omega$  (4-20mA)
- ✧ Working voltage: AC 220V10%、50/60Hz, sensor: DC 12V
- ✧ Size: 100×106×168mm(instrument)
- ✧ Hole-cutting Size: 92×92mm
- ✧ Protection level: IP65 (controller), IP68(sensor)

## 4. Instrument installation

### 4.1 Installation of main unit

The instrument should be installed in a clean, dry, well-ventilated and vibration-free position, with no corrosive gas around.

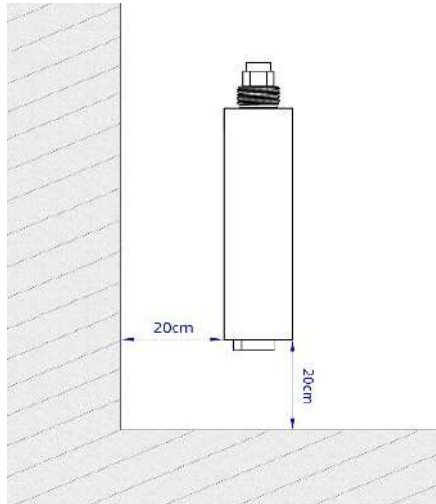


### 4.2 Installation of Sensor

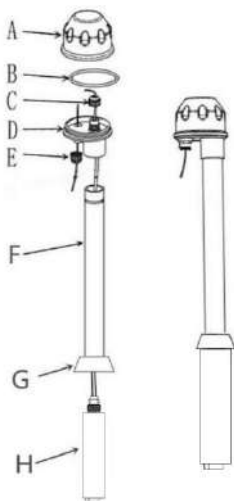
- The sensor is required to be installed indoors or out of the sun, because the strong infrared rays in the sun will seriously affect the sensor's measurement results.

- b. In the case of submerged installation, since the infrared rays emitted by the sensor will be reflected on the wall and bottom of the pool, which will affect the measurement result, the sensor is required to be installed at least 20cm away from the wall and the ground, as shown in the figure below.

**\*Submerged Type**



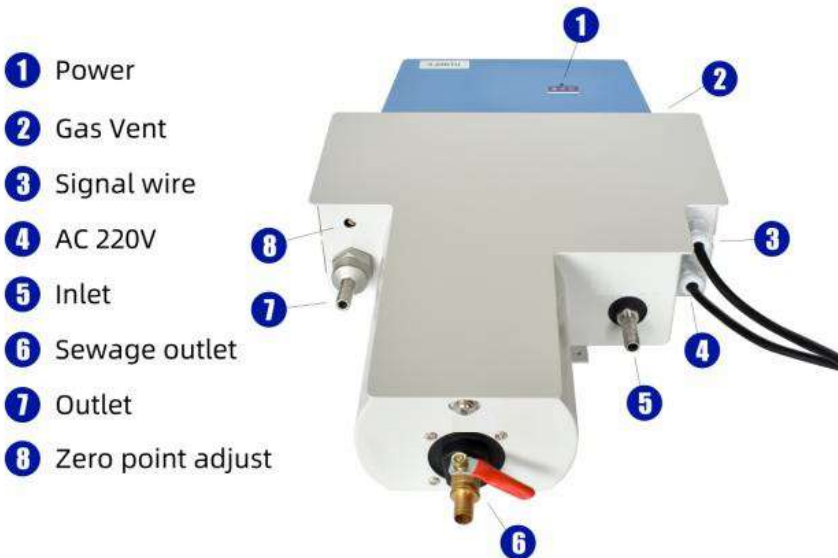
**Installation method of submerged type sensor**



- A--The top lid of Junction box
- B--O-rings
- C--Fastener of wire of sensor
- D--Bottom lid of Junction box
- E--Guard tube of wire of sensor
- F--Electrode wire fastener
- G--Sensor thread connection
- H--Sensor



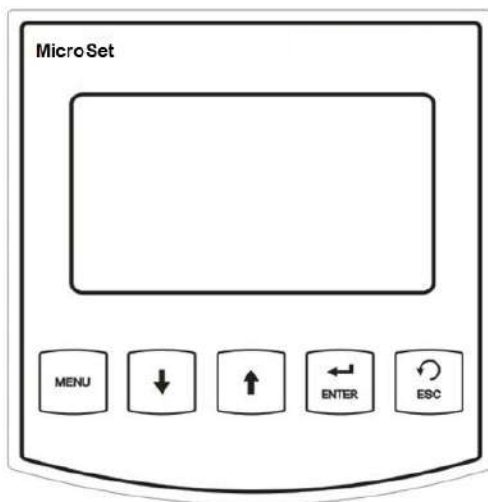
- c. Water flow adjustment of Flow type sensor: connect each pipe joint of the sensor to a transparent hose with an inner diameter of 10mm, and open the water inlet valve to supply water into the sensor. It should be noted that there must be a component that can control the water flow in the water inlet pipe. The water flow requirement is  $\leq 0.5\text{L}/\text{min}$ , and the water intake point should have a stable pressure and no bubbles. If a large number of bubbles are found in the inlet pipe after the water has been flowing for a period of time, a defoaming device needs to be added before the water inlet of the sensor to eliminate the bubbles in the water to avoid unnecessary errors in the measurement. The sewage valve remains closed during use and only opens when draining for maintenance.



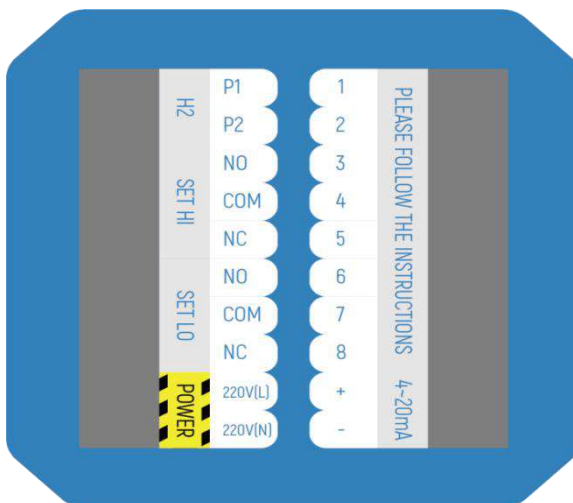
# 5. Instrument panel & wiring instructions

## The buttons of front side

1. Menu: cyclic model
2. DOWN: numerical reduction
3. UP: numerical increase
4. ENTER: Confirmation
5. ESC: escape key



## Wiring instructions of the rear panel

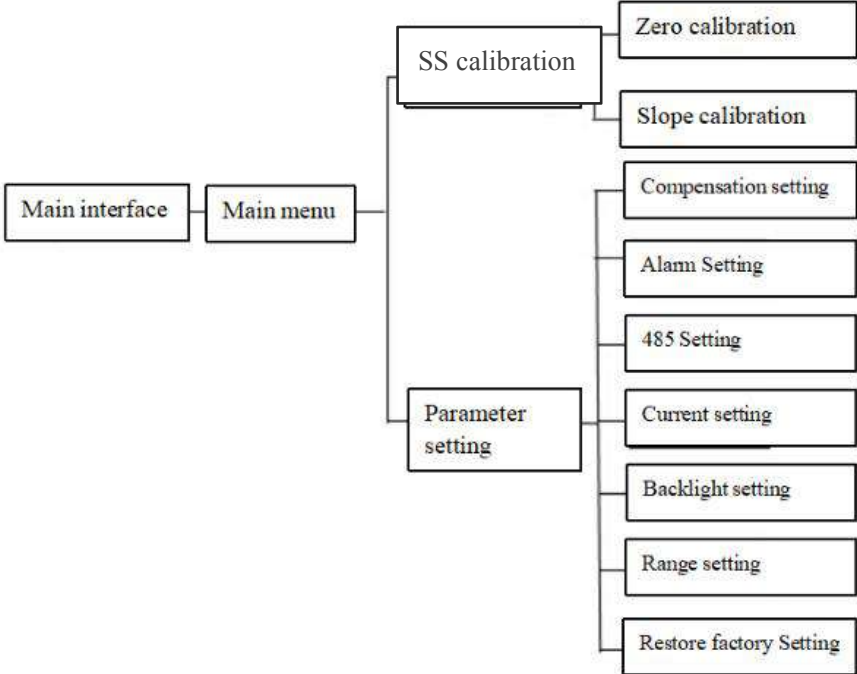


P1: DC12V+ for sensor	1. NC
P2: DC12V- for sensor	2. NC
HI NO: High point relay normally open port	3. RS 485 A of Sensor
HI COM: High point relay common port	4. RS 485 B of Sensor
HI NC: High point relay normally closed port	5.empty
LO NO: Low point relay normally open port	6. empty
LO COM: Low point relay common port	7. RS485 A
LO NC: Low point relay normally closed port	8. RS485 B
Power: 220V (L)	9. 4~20mA+
Power: 220V (N)	10. 4~20mA-

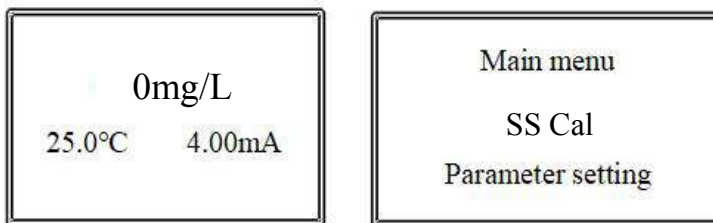
Note: If you want RS-232 function, please select the appropriate RS-485 to RS-232 device. The RS-485 interface part of this instrument is compatible with MODBUS protocol. Please consult the manufacturer or dealer for details

# 6.Instrument function setting.

## 6.1 Menu structure



## 6.2. Main interface and main menu.



SS value is the main display, temperature value, current value are the secondary display. The middle value is the SS measured value, 25.0 °C is the current temperature value, and 4.00mA is the current output value.

## 6.3 Concentration calibration

Because the zero potential and slope of SS electrode are basically consistent. However, with the use process of electrode that will gradually change and perished. You need to calibration in this time so that protect accuracy of measuring. As following: Press the up and down keys in the main menu to select SS setting and press ENTER.

SS Cal  
TD Zero Cal  
TD Slope Cal

### 6.3.1 Zero calibration

Zero Cal  
0042  
SS: 0mg/L  
VaL: 000mg/L

Zero calibration of SS concentration, put the electrode in (such as distilled water, purified water, etc.), use the meter and press the ENTER, then press the MENU to pop up the cursor, press the up and down keys to modify, the default value is 0, usually not required Change, waiting the figure is stable, press ENTER. If there is a “saved” interface that the calibration is complete, and this dialog box will be similar in the future. press ESC return to the previous menu.

## 6.3.2 Slope calibration

Slope Cal	
0043	
SS:	0mg/L
VaL:	2500.00mg/L

Enter SS slope calibration menu. Before calibration, place the SS electrode in the SS concentration standard solution of known concentration, press the ENTER key to enter the instrument, and then Press ENTER to pop up the cursor, move the cursor. The default value is 5.00g/L. Press the up and down keys to change to Know the concentration value, and wait for the SS concentration value to stabilize and press ENTER to save the data. After the SS concentration value is stable ( $\pm 1$  NTU), it indicates that it has been marked. Press the ESC return to the main menu.

## 6.4 Compensation setting

Press the up and down keys in the main menu to select the parameter setting, press ENTER to enter the parameter setting menu, as shown below, the left picture is the first page, and the right picture is the second page. Press the up and down keys to select each setting. The first item is selected in this section.

1. Compensation setting
2. Alarm setting
3. 485 communication
4. Current output

5. Time of backlight
6. measure range setting
7. Restore factory setting

Press ENTER to the compensation setting. Press the MENU to pop up the cursor and move the cursor. Press the up and down keys to modify. Temperature compensation is divided into manual or automatic mode. Both modes cannot take effect at the same time. Press ENTER to save the data. Once the meter is equipped with a thermistor, the measuring value is true under the automatic. Besides, if the meter is not equipped with a thermistor, you can choose manual mode. Press ESC return to the previous menu.

Temperature compensation:  
manual  
  
Temperature: 25°C

Temperature compensation:  
manual  
  
Temperature: 25°C

## 6.5 Alarm Setting

Select the alarm setting in the parameter setting menu and press the ENTER. Press the MENU to pop up the cursor and move the cursor. You can press the UP and DOWN keys to modify it.



Upper limit alarm H:	1000
Delayed figure H:	0010
lower limit alarm L:	0000
Delayed figure L:	0000

Upper limit H: Upper limit setting of warmer; Delay “H”: Delayed alarm of upper limit; lower limit L: Lower limit setting of warmer; Delay “L”: Delayed alarm of lower limit.(Note: Delayed figure was set between upper limit~lower limit.)

In order to avoid the relay from fluctuation or controlling SS value of the solution, the instrument sets this function. The specific operation is as follows: Press the up and down keys adjust to delayed figure.

Upper limit relay: It will be activated when the actual measured value is higher than the upper limit alarm setting value HIGH value, and the actual measured value will fall again below (Upper limit H value - Delayed figure H value).

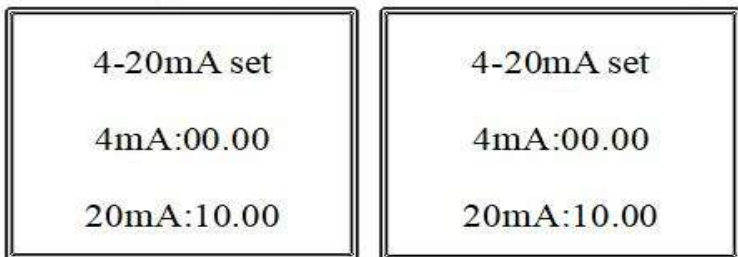
Lower limit relay: It will be operated when the actual measured value is lower than the lower limit alarm setting value LOW value, and the actual measured value will rise again when it rises above (lower limit L value + Delayed figure L value). Useful to extend the life of the relay or AC contactor. Therefore, the user must set the high, low and hysteresis according to the actual situation.

## 6.6 485 Setting



Select the 485 communication setting in the parameter setting menu and press the ENTER. Press MENU to pop up the cursor, you can press the UP and DOWN keys to adjust. Communication address (hexadecimal), press ENTER to save the data, press ESC return to the previous menu. (Note: Please consult the manufacturer or distributor for specific protocol specifications)

## 6.7 Current output setting



The factory value of the 4-20mA output is corresponds to default measurement range of meter, but the user can arbitrarily set the corresponding value according to his own requirements to meet the

industrial control needs. Press ENTER to pop up the cursor, move the cursor. You can press the up and down keys to modify. Press ENTER to save the data, press ESC return to the previous menu. Press the ESC return to previous menu.

Note: Output current (mA)

Forward control:  $I=16 \times (C-A)/(B-A)+4$        $4\text{mA} \leq I \leq 20\text{mA}$

Reverse control:  $I=16 \times (A-C)/(A-B)+4$        $4\text{mA} \geq I \geq 20\text{mA}$

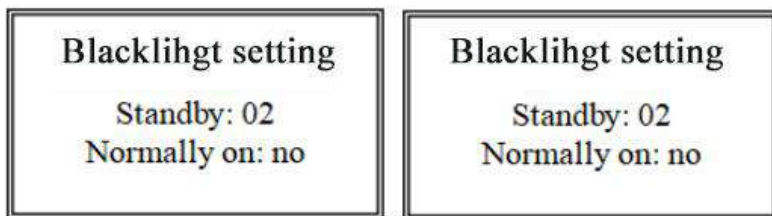
I is the output current value

C is the current measured PH value of the meter,  $0.00 \leq C \leq 14.00$ .

A is the value corresponding to 4 mA in the setting

B is the value corresponding to 20mA in the setting

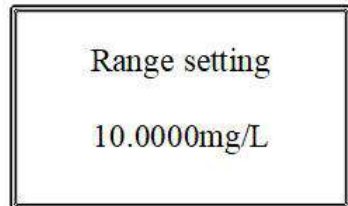
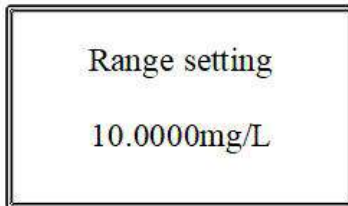
## 6.8 Backlight setting



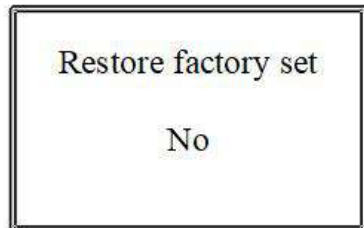
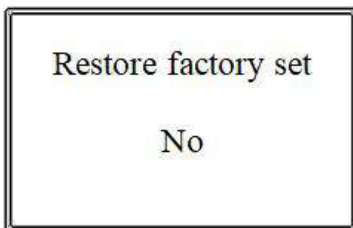
Select backlight setting in the parameter settings menu and press ENTER. Press MENU to pop up the cursor, move the cursor. You can press the up and down keys to modify. Press ENTER to save the data, press ESC return to the previous menu. Press the ESC return to previous menu. Backlight control allows the meter to save power, protect the display and extend life.

## 6.9 Range setting

Select range settings in the parameter settings menu and press ENTER. Press the MENU to pop up the cursor and move the cursor. You can press the up and down keys to modify. Press ENTER to save the data, press ESC return to the previous menu. The user can modify the range of the meter display as needed. This function is only valid for the meter, and the sensor range cannot be modified on the meter.



## 6.10 Restore factory Setting



If the instrument has misoperation, miscalibration or incorrect data detection during use, the instrument can be resaved to factory settings. Press ENTER to pop up the cursor, move the cursor, change “No” to “Yes” and press ENTER to resave the factory settings. At this point, the meter needs to be matched with the electrodes for calibration and other settings.

## 7. Daily maintenance points

- ✧ The instrument is generally calibrated before leaving the factory and can be used directly by the user.
- ✧ On normal circumstances, the instrument has a low failure rate.

### **Maintenance:**

1. When using the instrument for the first time, please test it after 24 hours.
2. After the instrument has been used for a period of time, if the automatic cleaning interval is too long, the optical path lens of the sensor will be stained, which will cause a big measurement error. At this time, depending on the situation, set a shorter interval time, or reset the interval time to perform immediate cleaning and re-timing.
3. If the attached dirt cannot be cleaned by the automatic cleaning wiper, it can be cleaned as follows after the instrument and sensor are powered off

### **Submerged type sensor:**

Use tweezers to clean the sediment on the optical path lens until it is clean.

### **Flow type sensor:**

After draining the water sample inside the sensor, unscrew the black plastic part of the sewage outlet (tool is a No. 27 wrench). Use the attached test tube brush or other soft brush to clean the optical lens from the bottom of the sensor. Detergent should be used for cleaning (the center of the optical lens is 105mm from the bottom, one on the front and one on the left, and they are 90° to each other. ). After cleaning, flush the foam inside the sensor with water. Then install the black plastic part of the sewage outlet, re-flow the water to adjust the water flow, and add a proper amount of raw material tape to seal the thread.

4. Do not disassemble the instrument to avoid affecting or damaging the performance of the instrument.



## TEST / CALIBRATION CERTIFICATE

Calibration Date: \_\_\_ / \_\_\_ / 20\_\_\_

### ITEM DETAILS

Name : TSS Analyzer  
 Make : MicroSet  
 Model : MS TSS 791  
 Serial No : \_\_\_\_\_  
 Input : TSS Sensor : SN : \_\_\_\_\_

### READING

Standard Solution mg/L	Observed Reading Before Calibration mg/L	Observed Reading After Calibration mg/L	Observed Reading After Calibration mA

Relay RL-1 Working OK

Relay RL-2 Working OK

Calibrated By,

*Sign*

*Seal*

*Initials*







## WARRANTY CERTIFICATE

MicroSet warrants each instrument to be free from defects in material & workmanship. This obligation to servicing or part returned to the company for that purpose & making good any parts thereof which shall be within warranty period, returned to the company under a written intimation & which to the company's satisfaction to be found defective. The company reserves the right to decide the workplace for the repair work. The freight for defective material will have to be borne by the buyer, & the transit risk for such material will rest with the buyer. The warranty is applicable only if the instrument is used within its specification.

**THIS WARRANTY IS VALID UP TO 12 months from date of Tax Invoice (Sensors Carry No Warranty since Consumables)**

### ITEM DETAILS

Name : TSS Analyzer  
Make : MicroSet  
Model : MS TSS 791  
Serial No : \_\_\_\_\_

*Seal*