

# DIGITAL CONDUCTIVITY METER

Model: Sigma 2008A

## OPERATING INSTRUCTIONS



Xiamen Tianyan Instrument Co., Ltd

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*Thank you very much for selecting the portable style Eddy Conductivity Meter of series of Sigma 2008A, Products of this series are the first generation of Digital Conductivity Meter designed with eddy phase. These products may be used for distinguishing, grading, and state detecting for non-ferromagnetic metal. These are commonly used in industries of machinery, electric power, aviation, aerospace, nuke, military, etc.*

## **1. APPLICATION FIELDS**

- Distinguishing and examining alloy
- Examining heat-treating state, during manufacturing, as well as inspecting over-heated damage during service (such as airplane).
- Detecting grades of materials
- Metal classification
- Detecting the density of powder-metallurgical parts
- Detecting the conductivity of conductors during manufacturing and servicing.

## **2. CHARACTERISTICS OF THE INSTRUMENT**

- Beautiful appearance, easy to carry about and grasp, simple and convenient to use.
- Big screen, big character typeface; displaying measured result, working frequency, temperature, temperature coefficient, etc. simultaneously.
- Properly designed with back-light illumination for reading measured data in poor-light environment.
- Special temperature coefficient setting and auto calibrating mode, convenient and reliable for user to operate.
- Excellent design of lift-off compensation and temperature compensation of the instrument to ensure the precision of measurement.
- With interchangeable probes of the instrument, the user oneself is able to change probes provided by our company without matching.
- With built-in data memory, enough to record 16000 groups of measured data and important measuring parameter; to connect to a computer for forming a complete report.
- Two kinds of measuring units (MS/m or %IACS) for convenient selection. It is easy to switch to resistivity value directly on the measurement interface.

- Three kinds of language selection: Simplified Chinese Characters, Japanese and English.

### 3. TECHNICAL PARAMETER

Model of product Items	Sigma 2008 A1	Sigma 2008 A
<b>Working Freq.</b>	60KHz, sine wave	60KHz, sine wave
<b>Measurement range for conductivity</b>	7.76 %IACS to 112 %IACS, or 4.5 MS/m to 65 MS/m or resistivity 0.01538 to 0.22222Ω•mm <sup>2</sup> /m	0.51 %IACS to 112 %IACS, or 0.3 MS/m to 65 MS/m, or resistivity 0.015388 to 3.33333Ω•mm <sup>2</sup> /m
<b>Resolving power</b>	0.01%IACS(when <51%IACS); 0.1%IACS(51%IACS to 112%IACS )	
<b>Measuring precision</b>	±1% ( temp range, 0℃ to 40℃ ) ±0.5%( temp range, 20℃ )	
<b>Lift-off effect</b>	Probe compensation 0.5mm	
<b>Temp. measurement</b>	0℃ to +50℃(precision 0.5℃)	
<b>Function of auto compensation</b>	Measured result of conductivity, adjusting to value at temp. 20℃ automatically	
<b>Normal working environment</b>	Temp. 0℃ to +50℃; relative humidity, 0 to 95%	
<b>Display</b>	Liquid crystal big screen, back-light designed, multiple items of important parameter displayed simultaneously.	
<b>Power supply</b>	Equipped with a lithium ion battery of 2200mA/h	
<b>Probes</b>	One probe of diameter ϕ14mm, working freq. 60KHz, for instrument model A; Probes are interchangeable.	
<b>Reading memory</b>	Storage for 16000groups of measured data files.	
<b>Communication with PC machine</b>	RS 232 interface	
<b>Weight of host machine</b>	0.5kg (including batteries)	
<b>Dimension of host machine</b>	220mmx95mmx55mm	
<b>Shell of</b>	Engineering plastic, high impact-resistance, waterproof shell for this	

<b>instrument</b>	instrument
<b>Package and protection</b>	High impact-resistance, waterproof, portable box made of aluminium alloy; inside of it there are instrument, probes, communication cable, operation manual, conductivity blocks, recharger, instrument stand, U-disk (or optical disk).
<b>Accessories</b>	2 pieces of standard conductivity blocks for model A1; 3 pieces of standard conductivity blocks for model A. You can purchase more blocks if you wish.

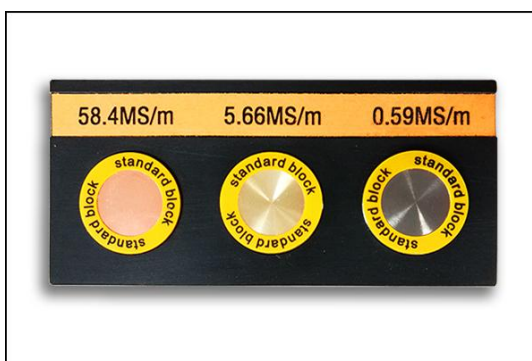
#### 4. PRODUCT COMPONENTS



1.Host machine of conductivity meter



2. Detecting probes (φ 14mm、60KHz)



3. Conductivity standard blocks  
(Type A with 3 pieces, type A1 with 2 pieces)



4. U-disk



5. Host machine stand



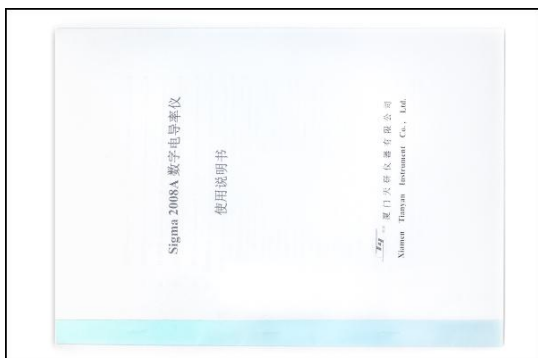
6. Batteries recharger



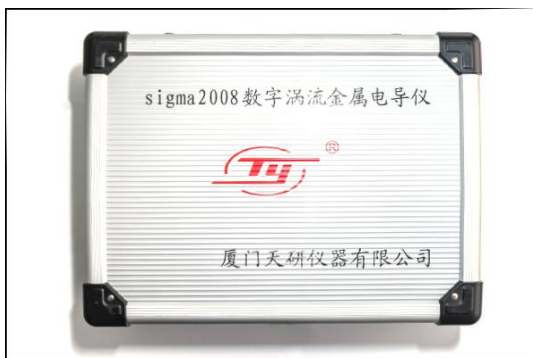
7. RS 232 communication cable



8. Hexagon wrench



9. Operation manual



10. Portable protective box

## 5. OPERATING INSTRUCTIONS

### 5.1 Keyboard Instructions

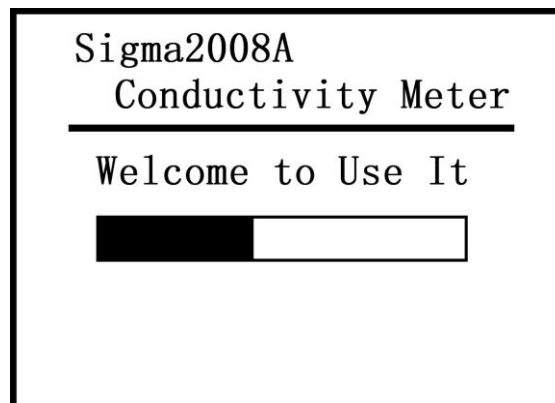
- 5.1.1 “MEAS”: key for fast measurement
- 5.1.2 “STORE”: key for storing data (effective for manual storing)
- 5.1.3 “CAL”: key for fast calibration
- 5.1.4 “SET”: key for function setting
- 5.1.5 “OK”: key for confirmation

- 5.1.6 “DEL UNIT”: UNIT key for measuring unit selection (effective for measurement interface)/ DEL key for deleting (effective for query interface)
- 5.1.7 “a<sub>0</sub>”: key for temperature coefficient selection
- 5.1.8 “☼” or “ $\frac{T_A}{\eta(\varphi)}$ ”: key for liquid-crystal screen in back-light environment
- 5.1.9 “ON OFF”: key for turn on/ turn off
- 5.1.10 “↑”: key for increasing progressively or moving upwards
- 5.1.11 “↓”: key for decreasing progressively or moving downwards

## 5.2 Operation Methods

### 5.2.1 Turn on/Turn off

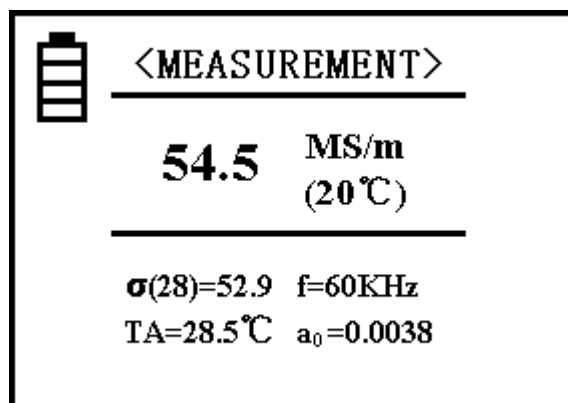
- 5.2.1.1 In turning off condition, press key “ON OFF” for 2 seconds, the instrument is turned on and welcome interface appears on the screen, shown in the following figure.




- 5.2.1.2 You can press measurement key “MEAS” to go into the interface corresponding directly, or go into the measurement interface automatically after finishing the welcome interface.
- 5.2.1.3 In turning on condition, press key “ON OFF” for about 2 seconds, this instrument is turned off and current setting information is stored.

### 5.2.2 Measuring

- 5.2.2.1 It will show the measuring interface on the screen by pressing "MEAS" key directly under the the welcome, calibration or setting interface.



**Remarks:**

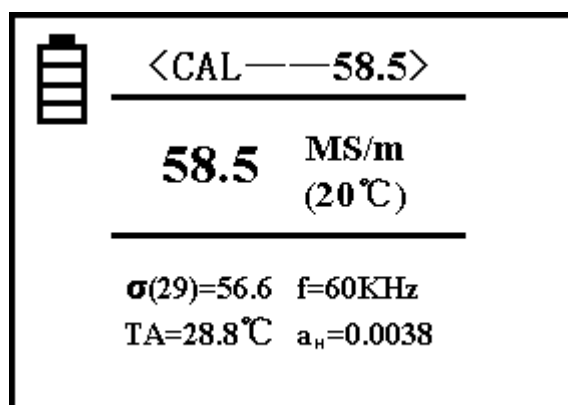
- a. The word (measurement) at the upper side on the screen indicates the function of this interface. “” indicates the current residual energy of the battery.
  - b. The big typeface digits in the middle row indicates the conductivity value of the tested sample at +20°C MS/m or %IACS is the measurement unit of the conductivity (How to set the measurement unit, please read the instruction at 5.2.4.8 and the remark of the key “DEL UNIT” at 5.2.2.3).
  - c. At the lower part on the screen,  $\sigma(28)=\square\square\square\square$  indicates the measured conductivity value at current temperature, the measurement unit is the same as that in the middle row. The value inside the bracket of  $\sigma(28)$  indicates the compensation temperature value TC (Please read 5.2.4.3 to understand the compensation temperature setting).
  - d.  $TA=\square\square\square\square^{\circ}\text{C}$  indicates the current environmental temperature value (The measurement value of the temperature sensor connected to the host).
  - e.  $F=\square\square\square\text{KHz}$  means the working frequency of the probe.
  - f.  $a_0=\square\square\square\square$  indicates the current temperature coefficient of the tested sample material (about the method to change  $a_0$  value, please read “How to select temperature coefficient” at 5.2.6).
- 5.2.2.2 When measuring interface, put flatly the probe (in the air >5cm above the sample) onto the tested sample surface vertically, for a period of 2 seconds. The instrument gives out a prompt sound, then the conductivity measurement is completed and the measured data is held automatically till the next measuring procedure begins.
- 5.2.2.3 When measurement interface, if you want to know measured data value in other measurement unit quickly, you may press key “DEL UNIT”. After each key-pressing, it switches to another measurement unit automatically (measurement units: MS/m, %IACS,  $\Omega\cdot\text{mm}^2/\text{m}$ ). Turning on after off condition, or returning to the measurement interface from other interface, the measurement unit returning to originally set unit.
- 5.2.2.4 During measuring, you should select correct temperature coefficient and



compensation temperature value TC of the tested material, otherwise it would affect the measuring precision directly. As for setting method, please read “How to select temperature coefficient” at 5.2.6, and “Compensation temperature TC setting” at 5.2.4.3.

### 5.2.3 Calibration

5.2.3.1 When measuring or setting interface, press the calibration key “CAL” then there appears calibration interface, shown in the following figure.



#### Remarks:

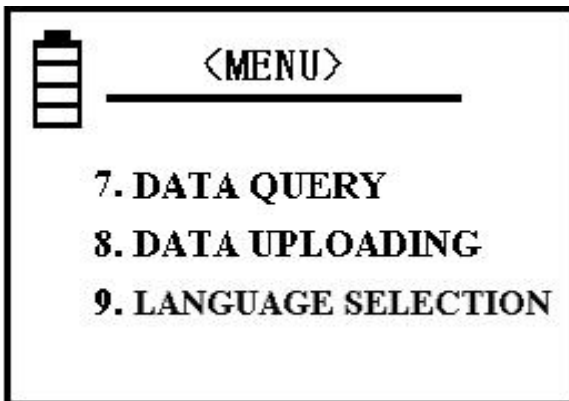
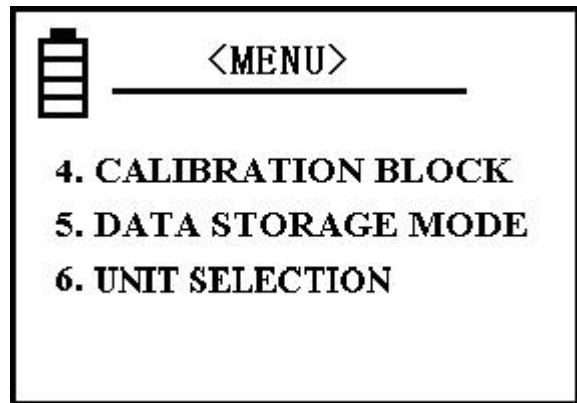
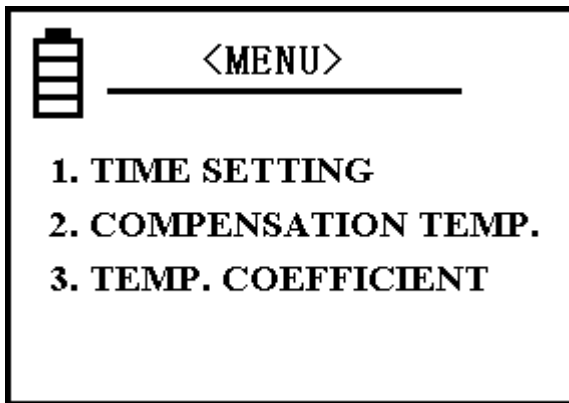
- a. At the upper part on the screen, “CAL” means the function of this interface. The digits nearby—□□□□ indicate the conductivity value of the calibrated block at +20°C (about the setting method of this value, please read item 5.2.4.5). This value must be the same as that of the conductivity of the current calibration block.
  - b. In the middle part on the screen, it shows the conductivity value of the tested calibration block. Its meaning is the same as the remark b of measurement interface.
  - c. At the lower part on the screen, there appears the high value  $a_H$  or the low value  $a_L$  of the temperature coefficient for the relevant calibrated block. Meaning of other symbols is the same as that of remark c in the measurement interface.
- 5.2.3.2 While getting into the calibration interface, firstly, this instrument carries out calibrating the high value block (At the upper part on the screen, the digits nearby “Calibration” show the setting value  $a_H(20)$  for the high-value block; and at the lower part, it means the temperature coefficient value  $a_H$  for this block). Put the probe flatly onto the surface of the high-value block vertically, it measures out the conductivity value.
- a. When the measured value is equal to the set value  $a_H(20)$ , you don’t need to calibrate the high value. Put the probe back to the air, and press key “OK”. This instrument is ready for low-value block calibration.

- b. When the measured value is not equal to the set value, keep the probe touching the block, press key “OK”. The instrument completes calibration automatically. After calibrating, the instrument gives out a prompt signal sound.
  - c. Measure the calibration block once more. If the error is more than 0.3%, calibrate it again following step b, till the measured value meets our requirement. Put the probe back to the air and press key “OK” to get ready for calibrating the low-value block.
- 5.2.3.3 Calibrating low-value block (at the upper part on the screen, digits nearby “Calibration” indicate the set value  $a_L(20)$  of the low-value block. At the lower part on the screen, it indicates the temperature coefficient value  $a_L$  for this block).
- a. The probe touches the block. Press key “OK”. The instrument gets into calibration automatically. After completing, the instrument gives out a prompt signal sound.
  - b. Measure the calibration block once more. If the error is more than 0.3%, calibrate it again following step a till the measured value meets our requirement. Put the probe back to the air and press key “OK”, the instrument quits from the calibration interface.
- 5.2.3.4 On the mid-way of calibration, if you press the measuring key “MEAS” or the setting key “SET”, the instrument quits from the current calibration interface and the calibrated data become invalid. The instrument returns to the relevant interface.
- 5.2.3.5 Additional remarks to instrument calibration.
- a. Calibration principles: This instrument is calibrated at two points, such as high-value block  $\sigma_H$  and low value block  $\sigma_L$ .
  - b. The selection regulation for calibration blocks: The value  $\sigma_H(20)$  of the high-value block is commonly selected larger than the conductivity value of the tested material. The value  $\sigma_L(20)$  of the low-value block is commonly selected smaller than the conductivity value of the tested material.

## 5.2.4 Function Selecting

### 5.2.4.1 Menu

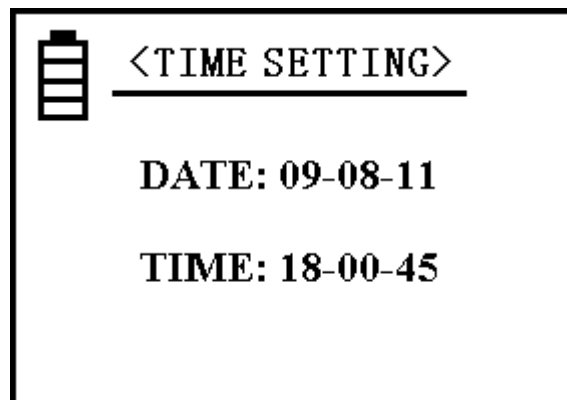
When any interface, press the setting key “SET” directly, there appears setting main interface on the screen, shown in the following figure.



**Remarks:**

- a. There are 10 setting items on the screen. The user may press the upward key “↑” or the downward key “↓” to select one item, and press key “OK” to get into that setting.
- b. While getting into that item setting, press setting key “SET” or press measuring key “MEAS”, the instrument returns to the relevant interface.
- c. When the setting main interface, press measuring key “MEAS” or calibrating key “CAL”, the instrument quits and returns to the relevant main interface.

**5.2.4.2 Time Setting**



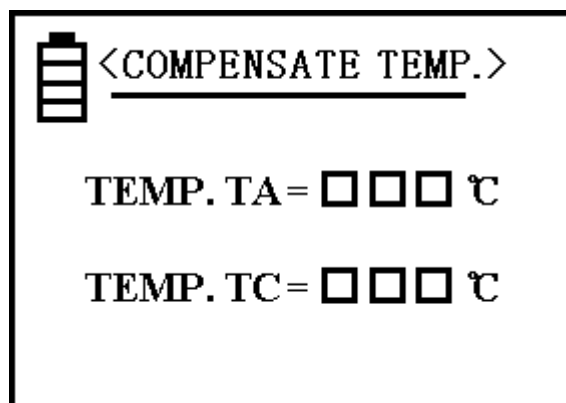
**Remarks:**

- a. Press the upward key “↑” or the downward key “↓” to move the cursor to the

selected item DATE or TIME. For the first item DATE, press the confirmation key “OK”. Move the cursor to the first group of digits of the selected item, then use the upward key “↑” or the downward key “↓” to revise the number, then press key “OK” to store the first location digits. Move the cursor to the second group of digits, the rest may be deduced by analogy, till completing the revision of the third group of digits, then press key “OK” to store the third group of digits and the instrument quits from this item. Move the cursor to the next item TIME. If the instrument quits from TIME item, it will return to the setting main interface.

- b. Digits in the first group of DATE may be set as “00-99” for year. Digits in the second group may be set as “00-12” for month. Digits in the third group may be set as “00-31” for day.
- c. Digits in the first group of TIME may be set as “00-24” for hour. Digits in the second group and the third group may be set as “00-60” for minute and second.
- d. While the cursor points on digits, and if you press the upward key “↑” or the downward key “↓”, you can revise the digits quickly.

#### 5.2.4.3 Compensation Temperature Setting



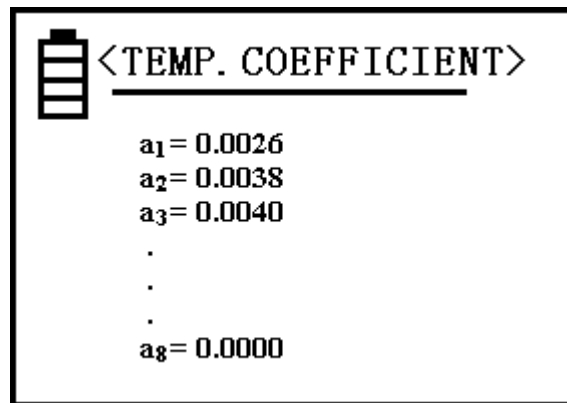
#### Remarks:

- a. The current temperature TA indicates the environment temperature value during measuring (with built-in temp. sensor).
- b. While the cursor staying on compensation temp. TC, press the confirmation key “OK” and move the cursor to the digital part and press the upward key “↑” or the downward key “↓” to revise numerical value. While completing this step, press the confirmation key “OK” to store data, the instrument quits and returns to the setting main interface.
- c. During setting numerical value, if you press the upward key “↑” or the downward key “↓” continuously, you can change numerical value quickly.

d. Regulations for selecting compensation temperature value:

- (1) If it is normal temperature and the range of temperature variation is not large, for simplifying the measuring procedure, you can carry out measurement without temperature revision. That is, you can input 20°C into the compensation temperature TC location (at this time, the temperature coefficient value of the tested sample is invalid). While measuring, keep the temperature of the calibration block the same as the temperature of the tested sample. After calibration of the instrument, you can carry out your measurement immediately, without regarding the temperature and the temperature coefficient of the tested sample.
- (2) When the temperature of standard block is different from the testing material, you can choose the method of measuring the temperature of the input compensation TC, first setting the temperature of standard block into TC when calibration, then go back calibration interface. Setting temperature of testing material into TC when measuring, then go back measuring interface and choose temperature coefficient  $a_0$ , now start measurement.

#### 5.2.4.4 Temperature Coefficient Setting

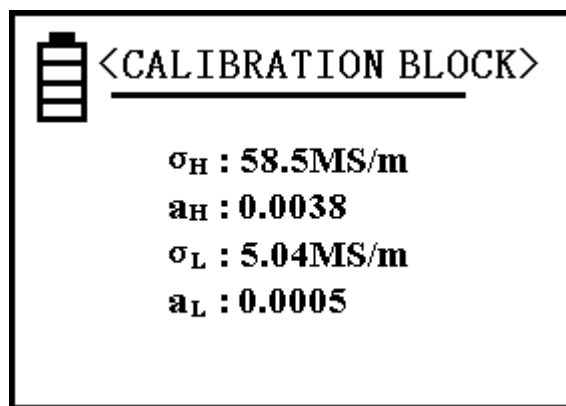


#### Remarks:

- a. There are 8 numerical values about the temperature coefficient setting for the tested material during measuring. As for the selecting method, please read "How to select temperature coefficient" at 5.2.6.
- b. The values of  $a_1$  and  $a_2$  are useful temperature coefficient values.  $a_1$  is the average value of the temperature coefficient.  $a_2$  is the temperature coefficient of copper product or aluminium product. These are set by the manufacturing factory and cannot be replaced. The user can input temperature coefficient value of different material in proper order of  $a_3 \sim a_8$ .

- c. As for the revision method, press the upward key “↑” or the downward key “↓” to move the cursor to select an. Press the confirmation key “OK” to get into numerical value an, press the upward key “↑” or the downward key “↓”, to revise the value. After completing, press the confirmation key “OK”, the cursor moves downward to an-1 automatically and the set value an is stored.
- d. The setting range for an value is “0.0000—0.0300”.
- e. During the numerical value setting, if you press the upward key “↑” or the downward key “↓” continuously, you can change numerical value quickly.

#### 5.2.4.5 Calibration Block Setting



#### Remarks:

- a. The numerical values on the right hand of  $\sigma_H$  ,  $\sigma_L$  may be set as conductivity value of high-value block and low-value block at 20°C for usage of calibration of this instrument. As for the measurement unit MS/m or %IACS, please read UNIT SELECTION at 5.2.4.8,  $a_H$  or  $a_L$  may be set as the temperature coefficient value of the relevant block.
- b. Press the upward key “↑” or the downward key “↓” and move the cursor to the item to be revised. Press the confirmation key “OK” and move the cursor into the numerical value location, then move the upward key “↑” or the downward key “↓” to revise the numerical value. After completing, press the confirmation key “OK” to store data and the cursor moves to the next item automatically. The rest may be deduced by analogy, till the value  $a_L$  appears. Then, press the confirmation key “OK”, the instrument quits and returns to the setting main interface.
- c. The setting range for  $\sigma_H$  and  $\sigma_L$  is “0.45—64.0 MS/m or 0.77—111.0%IACS”.
- d. For Model Sigma 2008A1, the numerical value of setting range is “4.50—64.0MS/m or 7.70—111.0%IACS”.
- e. The setting value  $\sigma_H$  of the high-value block should be larger than value  $\sigma_L$  of the

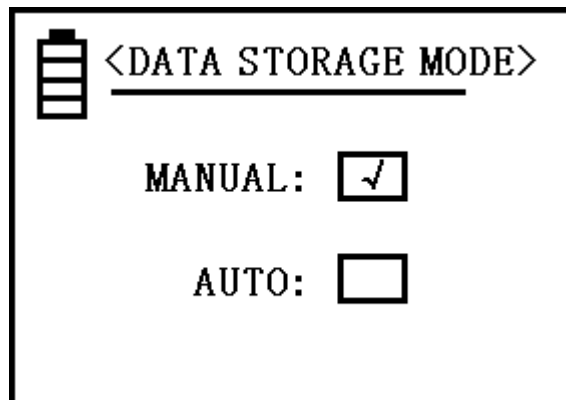
low-value block.

f. The setting range of  $a_H$ ,  $a_L$  is “0.0000—0.0300”.

g. When the cursor points to the numerical value row, and if you press the upward key “↑” or the downward key “↓”, you can revise numerical value quickly.

**Note:** For preventing someone who knows nothing about from misleading to the setting interface of the calibration block, before getting into this interface, you must firstly get onto the password verification interface, then you should press key “STORE” 4 times continuously (filling 4 black dots into the password boxes “□”; it is invalid while filling in more or less than 4 dots). Then, press the confirmation key “OK”, so you can get into the setting interface. While verifying the password, if you press other key wrongly, it is invalid at all.

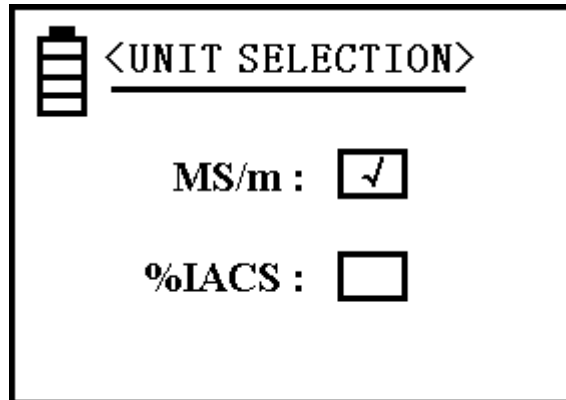
#### 5.2.4.6 Data Storage Mode



**Remarks:**

- The data storage mode is set with this interface. The application of storage function, please read “How to store measured data” at 5.2.5.
- Press the upward key “↑” or the downward key “↓”, move the cursor to the selected item (input a √ inside the box). Then, press the confirmation key “OK”, the instrument quits and returns to the setting main interface.
- Turning on the instrument each time after it was turned off, this instrument tacitly approves the Manual Storage Mode..

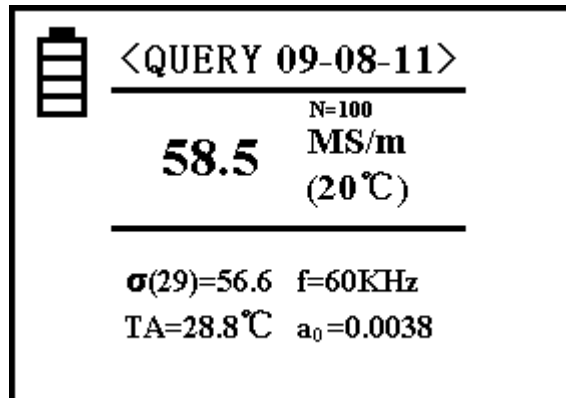
#### 5.2.4.7 Unit Selection:



#### Remarks:

- After you select one of these measurement units, the conductivity values are all in this unit. And, the conductivity value will be converted automatically according to the conversion formula.
- The selection method is the same as the working frequency selection method said above at 5.2.4.7 REMARK b.

#### 5.2.4.8 Data Query



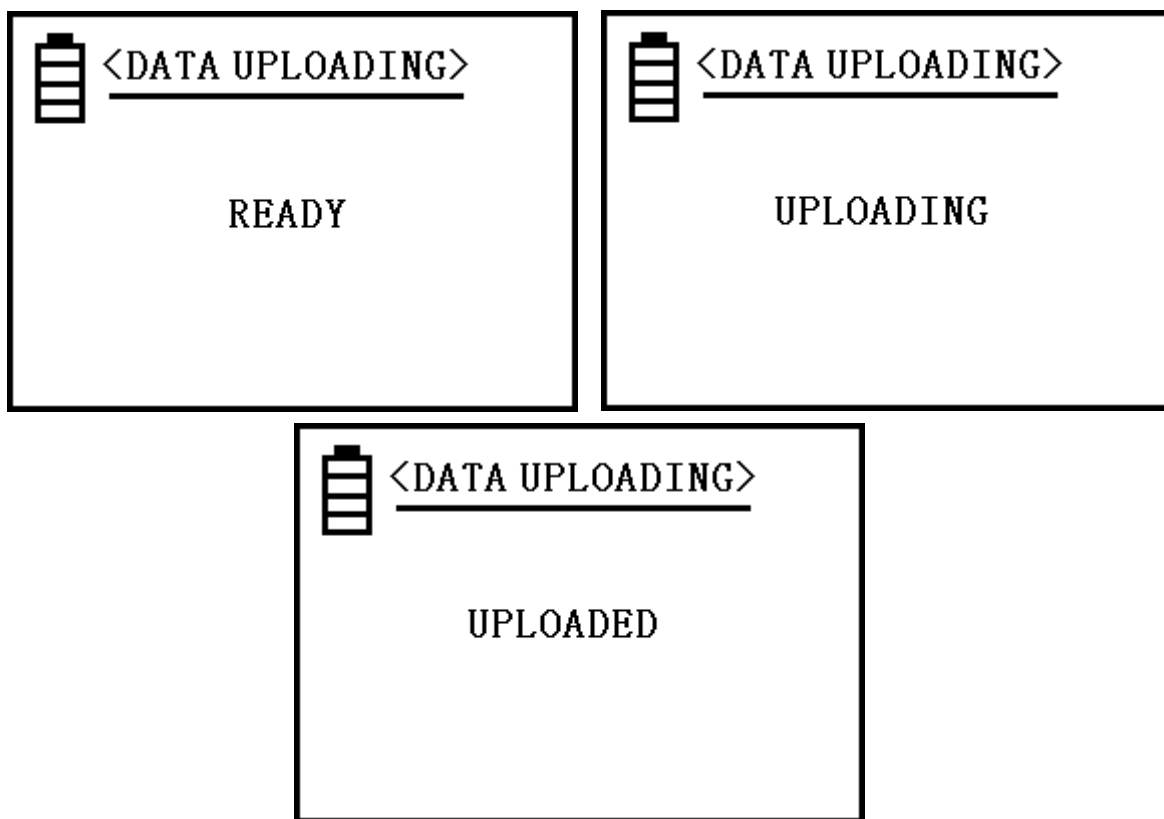
#### Remarks:

- You can check the measured data stored in this instrument before (there are 16000 groups in all).
- At the upper part on the screen, at the right side of “Query”, the digits indicate the date when those data on this page were measured.
- In the middle on the screen, the English letter N indicates the storage number of these data on this page. The order of the number is arranged from the smaller one to the larger one. That is, the data measured currently is numbered as the first group. The data measured last time will be numbered as the second group. The rest may be deduced by analogy. There are 16000 groups in all.



- d. After getting into Query interface, there appears firstly the page where the storage number is 1. Press the upward key “↑” or the downward key “↓”, you can query the former group or the later group of those stored data. After querying, press the confirmation key “OK”, this instrument quits and returns to the setting interface.
- e. How to delete storage data: On some data query page, press the deleting key “DEL” for about 3 seconds, you can delete all stored data. After deleting all stored data, there appears the prompt term “Empty”. Press the confirmation key “OK”, the instrument quits and returns to the setting interface.

#### 5.2.4.9 Data Uploading



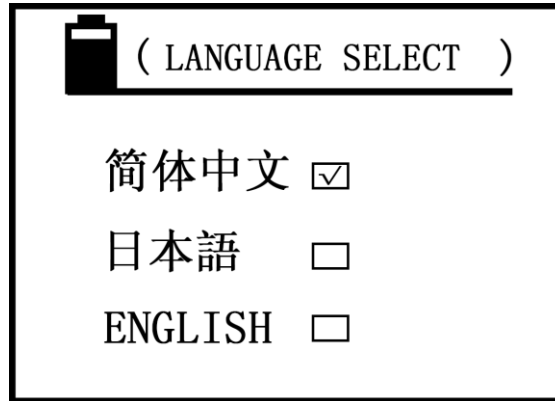
#### Remarks:

- a. This function is for uploading measured data to the upper position PC machine.
- b. Uploading begins from page 1 of stored data to the last page.
- c. While getting into uploading function, there appears firstly the prompt term “READY” on the screen. At this time, the user can carry out all preparing work for uploading. When the confirmation key “OK” is pressed, the instrument begins to upload data, there appears the prompt term “UPLOADING”.
- d. After uploading, there appears the prompt term “UPLOADED” on the screen. Press the confirmation key “OK”, the instrument quits and returns to the setting main

interface.

- e. Instruction for driving the upper-position PC machine, please refer to the U- disk (or optical disk) accompanying with this instrument.

#### 5.2.4.10 Language Selection



#### Remarks:

Press the upward key “↑” or the downward key “↓” to move the cursor to the selected item (input a tick √ inside the box). Press the confirmation key “OK” (the instrument keeps on this selected item till the next selection). the instrument quits and returns to the setting main interface.

#### 5.2.5 How to Store Measured Data

5.2.5.1 There are two methods for storing data, such as Manual and Auto. You can select one of these two methods referring to the fifth item of setting function (please read section 5.2.4.6). These two storing modes are valid only on the measurement main interface. The stored information is the current measured data “ $\sigma(20)$ ,  $\sigma(TC)$ , measurement unit, temp. TA, measuring freq. f, value  $a_0$ , date, etc”, you can store 16000 groups of measured data in all.

5.2.5.2 Manual storing: When the measuring main interface, after measuring the conductivity value of the sample, keeping the probe touching the sample, press the storing key “STORE”, symbols N=XXX in the middle row on the screen flash quickly. That means the measured data on this page have been stored.

5.2.5.3 Auto storing: Each time, the instrument gets effective measured data, symbols N=xxx in the middle row on the screen flash quickly. It means that the measured data on this page have been stored automatically.

#### Remarks:

- a. Each time, after turning on, the instrument tacitly approves the manual storing

function.

- b. During the data storing procedure, the numerical value of N=XXX shows the data group stored currently in the internal memory. When the data group number comes up to 16000, the prompt term “FULL” appears. The user should delete all data groups in the internal memory. Then, the instrument is able to store new data. (Method of deleting stored data in the internal memory, please refer to Data Query Remarks “e” at 5.2.4.9).
- c. The unit of conductivity of the stored data is the same as the unit selected during measuring. And, it is independent of the unit selected with key “DEL UNIT” on the measuring interface.

## **5.2.6 How to Select Temperature Coefficient**

- 5.2.6.1 In the method of measuring the temperature of the input compensation TC you should select  $a_0$  value according to the temperature coefficient of that tested material. Press the temperature coefficient key “ $a_0$ ” on the measurement main interface. There appears a box cursor on the temperature coefficient  $a_0$ . Press the confirmation key “OK”, the cursor moves onto the digit line. Then, press the upward key “ $\uparrow$ ” or the downward key “ $\downarrow$ ” to select the temperature coefficient among stored values “ $a_1$  to  $a_8$ ”. When you select a decided value, press the confirmation key “OK”. The instrument quits and revises the tacit value  $a_0$  to the selected value automatically and keeps it till the next selection. If you don't press the confirmation key “OK”, the instrument will regain the original  $a_0$  value automatically after 5 seconds.
- 5.2.6.2 During measuring, for temperature coefficient  $a_0$  of unknown material, you can select the average value of temperature coefficient  $a=0.0026$  for reference.
- 5.2.6.3 There are 6 groups of values ( $a_3$  to  $a_8$ ) for the user to select temperature coefficient value by himself (please read item 5.2.4.4) for measuring.

## **5.2.7 How to Recharge Batteries**

- 5.2.7.1 Equipped with a lithium ion battery of 2200mA/h.
- 5.2.7.2 When the indicating bar in the figure shows the residual energy being lower than 1/3, the instrument may give out two successive prompt sounds of each 30 seconds to remind the user to recharge batteries timely.
- 5.2.7.3 Methods for recharging batteries: Plug the accompanying special-purpose adapter into the AC 220v or 110v socket of the electricity supply. Then, plug the DC pin into the DC jack of the instrument. At this time, the indicator of the adapter lights glowing red.

It means that batteries are being recharged. When the adapter indicator becomes green or recharging lasts for 5~6 hours, it means that batteries are recharged fully. You can wait for about 10 minutes recharging. Then, pull out the DC pin and the AC plug from their recharging positions.

## **6. POINTS FOR ATTENTION AND MAINTENANCE**

**\*Before the instrument and probe are removed from the packing box, they should be stationary for about 1 minute, or wipe the shell of the main engine with a slightly wet cotton cloth, and then turn on for use. This is to avoid possible electrostatic damage to the instrument for some reason.**

- 6.1 During calibration or measurement, you need to keep the probe touching the sample surface vertically and smoothly, putting down or picking up gently, handling with even strength.
- 6.2 It is no good to hold the probe with your hand for a long time. If you hold the probe for a long time, it will cause the temperature value to increase and it will affect the measurement precision.
- 6.3 It is necessary to keep the block, the sample, the instrument and the probe to work at stable environment temperature as much as possible.
- 6.4 It is suggested to use and store the instrument and the standard blocks under conditions without disturbing from corrosion, shaking, and electro-magnetic field.
- 6.5 Measuring work should be carried out in the condition of normal temperature (0~40℃).
- 6.6 Measuring work should be carried out on the place far from heating radiator, electric fan, heating stove, without direct sun-shining.
- 6.7 It is strictly forbidden to touch the end of the probe, the block, the tested part of the sample with your fingers.
- 6.8 If there is any grease or dirt on the block, the sample, the end of the probe, you should clean it timely.
- 6.9 You should prevent the instrument, the probe from shaking, collision. The surface of the block is strictly forbidden to be scratched.
- 6.10 If the end of the probe is worn seriously, you need to get a new probe to ensure measuring precision.
- 6.11 It is strictly forbidden to touch the temperature sensor with fingers.

## **7. NOTICE TO USERS**

- 7.1 This instrument is guaranteed to keep in good repair for one year.

7.2 Our company or authorized institution will not repair the instrument freely in the following cases: but we would offer paid service.

7.2.1 The product has trouble or is damaged because the user does not operate the product following the Instrument Instructions, such as connecting, operating, maintaining, safeguard.

7.2.2 Overdue the warranty period.

7.2.3 The number on the warranty card is not coincident with the number on the product itself.

7.2.4 The host machine or component has been disassembled or repaired by someone who is not the professional servicer of our company or authorized by our company.

7.2.5 Components not within warranty-range (such as the detecting probe, rechargeable batteries, the shell, keyboard, linking wire or cable).

7.2.6 The product is damaged due to unexpected reason or human behavior.

7.2.7 The product has trouble or is damaged caused by irresistible factors, such as earthquake, fire disaster, etc.

**APPEDIX1: TABLE OF CONDUCTIVITY VALUE FOR COMMON MATERIAL AND TEMPERATURE COEFFICIENT**

METAL	CONDUCTIVITY (20℃)		TEMP. COEFFICIENT (20℃)
	%IACS	MS/m	
Copper	100	58	0.0038
Aluminum	29~61	17~35.4	0.0040
Gold	70.7	41	0.0034
Silver	108	62.5	0.0038
Brass (H90)	43.10	25	0.0018
Aluminum bronze	9	5.2	~0.0008
Titanium	3.6	2.08	0.0040
Lead	7.8	4.5	0.0039
Zinc	30	17.4	0.0037
Nickel	22	12.8	0.0060
Magnesium	38	22	0.0040
Nickel silver	8.6	5	0.00068

<b>Titanium alloy</b>	<b>1.02</b>	<b>0.59</b>	<b>0.0002</b>
<b>Tungsten</b>	<b>31.46</b>	<b>18.25</b>	<b>0.0052</b>
<b>Platinum</b>	<b>17.24</b>	<b>10</b>	<b>0.000374</b>
<b>Constantan</b>	<b>3.92</b>	<b>2.27</b>	<b>0.000005</b>
<b>Manganin copper</b>	<b>4.1</b>	<b>2.38</b>	<b>0.000005</b>

## **APPEDIX2: CONTACTS**

**Name: Xiamen Tianyan instrument co.,Ltd.**

**Address: Room 614 chuangye building pioneering part,hi-tech zone, huli block,  
Xiamen,China.**

**Mail: ty@xmtty1.com | Post code: 361009**

**Wedsite: www.xmtty1.com**

**Fax: 0592-3195307**

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**Sales telephone: 0592-3195306/ 18060926989**

**0592-3195308/ 18050108768**