# **Model CON900**

# Conductivity/TDS/Salinity/Resistivity Meter

**Operation Manual** 

## 900 Series of Portable Meters

- 1. Model PH900 pH / mV Meter
- 2. Model CON900 Conductivity / TDS / Salinity / Resistivity Meter
- 3. Model DO900 DO Meter
- 4. Model EC900 pH / mV / Conductivity / DO Meter

# **Table of Contents**

1. Brief Introduction	3
2. Technical Parameters	4
3. Instructions to the Meter	5
3.1. LCD Display	5
3.2. Operation Keys	· 6
3.3. The Storage, Recall and Elimination of the Measuring Information	7
4. Conductivity Measurement	8
4.1. Preparation Work	8
4.2. Meter Calibration	8
4.3. Sample Test	8
4.4. Important Statement	9
4.5. Parameter Setting	11
4.6. Considerations	15
5. Meter's Complete Kit	16
6. Warranty	16
Chart I Meter Parameter Setting Schedule	
Chart II Meter Restore to Producer Setting Schedule	
Chart III Code Icon and Abbreviation Schedule	

#### 1. Brief Instruction:

Thanks for buying and using the model CON900 Conductivity / TDS / Salinity / Resistivity Meter (the following called "meter" in short).

Before using this meter, please read the operation manual carefully in order to help use and maintain it correctly. On the basis of improving instrument of performance constantly, we reserve the right of changing the content of this manual and accessories in case of not notifying in advance.

This meter is a perfect combination with the most advanced electronic technology, sensor technology and software design. The meter can measure the parameters of conductivity, TDS, salinity, resistivity, and temperature for high accuracy water solution. It is the best portable conductivity meter with the highest performance and the lowest cost. It is suitable for the trade such as the mining industry, power plant, water treatment projects and environmental protection, etc., especially has more extensive application in the field and spot test.

Built-in microprocessor chip, beautiful appearance, multi-functional and easy to use, this meter has the following prominent features:

- 1.1.Built-in microprocessor chip, with the intelligent functions of automatic calibration, automatic temperature compensation, data storage, function setting and automatic power off and low voltage display etc. Equipped with calibration solution and carrying case, easy to use.
- 1.2. Adopts digital filter and step slipping technology to intelligently improve meter's response speed and result accuracy. " " will appear when reading to be stable.
- 1.3. Adopts advanced automatic frequency convertible and voltage regulation technology to enlarge the measuring range of conductivity electrode which constant K=1 to 10 times.

It can meet measuring accuracy requirement for range within 0 to 200mS/cm by using only one-point calibration. It is the particular one-point calibration function for this meter.

- 1.4. Automatically recognize 8 kinds of conductivity standard solution. User can choose anyone from two series of standard solutions: Europe & USA series and CHINA series.
- 1.5. Automatically select conductivity measuring range, the meter will do non-linearity temperature compensation test for purified water and high purified water less than  $10 \mu$  S/cm, which greatly improve the measuring accuracy. It is especially suitable for use in fields of electric power, microelectronics and medicine.
- 1.6. Meter's circuit board adopts SMT film-covering technology to improve meter's production reliability.
- 1.7. Meter has the back light LCD display monitor.
- 1.8. Dustproof and waterproof meter meets IP57 rating.

#### 2. Technical Parameters:

## 2.1. Conductivity:

Measuring range	Conductivity: $(0.00 \text{ to } 19.99)  \mu  \text{S/cm}$ $(20.0 \text{ to } 199.9)  \mu  \text{S/cm}$ $(200 \text{ to } 1999)  \mu  \text{S/cm}$ $(2.00 \text{ to } 19.99)  \text{mS/cm}$ $(20.0 \text{ to } 199.9)  \text{mS/cm}$ TDS: $(0 \text{ to } 100)  \text{g/L}$ Salinity: $(0 \text{ to } 100)  \text{ppt}$
	Resistivity:(0 to 100) MΩ • cm
Resolution	$0.01/0.1/1 \mu \text{ S/cm}  0.01/0.1 \text{ mS/cm}$
Accuracy	Meter: ±1.0% FS, connect meter with electrode: ±1.5% FS
Temp. compensation range	(0 to 50) °C (automatic)
Electrode constant 0.1 / 1 / 10 cm <sup>-1</sup>	
Benchmark temperature	25℃, 20℃ and 18℃

#### 2.2. Other Technical Parameters:

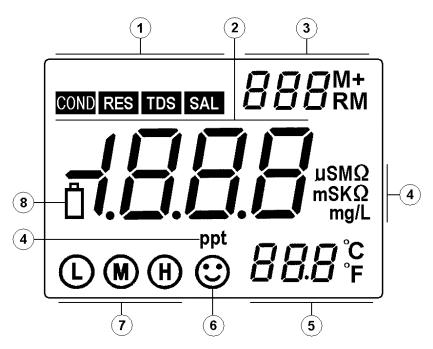
Data storage	100 groups		
Storage content	Series number, measuring value, measuring uni		
	and temperature,		
Power	Two AA batteries (1.5V x2)		
Size and weight	Meter: (65×120×31)mm/180g; Carrying case:(255 x 210x 50)mm/790g		
Quality and safety certification	ISO9001:2000, CE and CMC		

# 2.3. Working Condition:

Environment temperature	5 to 35 °C (0.01 grade)
Environmental humidity	≪85%
IP rating	IP57 Dustproof and waterproof

## 3. Instructions to the Meter:

# 3.1. LCD Display:



- ① —— Parameters mode icon
- 2 Measuring value
- 3 Serial number and icon as measuring value to be stored and recalled, and

indication icon for special state.

M+ — measuring value to be stored icon;

RM — reading to be recalled icon;

- 4 Measuring unit
- ⑤ Temperature measuring value and unit
- 6 Measuring value to be stable icon
- 7 Electrode calibration indicate icon
- 8 Indication icon of low voltage, appears when the voltage less than 2.4V, call attention to change the batteries.

#### 3.2. Operation Keys:

The meter has 5 operation keys in all.

- 3.2.1. ON OFF Switch key
- 3.2.2. CAL Calibration key
  - (a) When in the measurement state, press this key to enter into calibration mode.
  - (b) When in the parameter setting state, press this key to change the number or the ON/OFF state.
- 3.2.3. MODE Function key

Press the key to enter into the parameter setting mode P1, P2, P3...

- 3.2.4. Back light and Entrance key
  - (a) When in the measuring state, short press (less than 1.5s) to open or close the back light display;
  - (b) When in the calibration state or the parameter setting state, press this key to confirm, and then the meter enters into measuring state;
  - (c) When in COND mode, long press the key to in turn change parameter mode: TDS (total dissolved solid)→ SAL (salinity) → RES (resistivity)→ COND (conductivity),

and then release the key.

# 3.2.5. $\frac{M+}{RM}$ — The combination key of memory and recall

- (a) Short time press (press time less than 1.5s) to save the measuring data; long time press (press time more than 2s) to recall the saved measuring data when in the measurement state.
- (b) When in the parameter setting state, press this key to alter the number or ON/OFF state.

### 3.3. The Storage, Recall and Elimination of the Measuring Information:

#### 3.3.1. Store the measuring information:

In the measuring mode, when the measuring data is stable and appear the " $\mathfrak{S}$ ", short-time press  $\mathfrak{M}^+$  key(<1.5s), LCD will display " $\mathfrak{M}^+$ " icon and storage serial number, and meanwhile memory all the measuring information Meter can totally store 100 groups of measuring information

# 3.3.2. Recall measuring information:

- (a) Under the measuring mode, depress the M+ key, meter will recall the last stored information, and the storage number and "RM" icon will appear in the lower right corner of the LCD, and the complete measuring information. Again press CAL or M+ key, meter will in turn recall all the measuring information, depress CAL or key can quickly query;
- (b) In the recalling mode (there are "RM" and storage serial number in the lower right corner of the LCD), press key to return to the measuring mode.

# 3.3.3. Eliminate the stored measuring information:

In the recalling mode, depress the key for 5 seconds, LCD will appear "[[] " " for 2 seconds. It means the storage has been eliminated, and returns to measuring mode.

## 4. Conductivity Measurement:

#### 4.1. Preparation Work:

- 4.1.1. Press OFF key to turn on the meter;
- 4.1.2. Connect the 2301-S conductivity electrode into the meter.

#### 4.2. Meter's Calibration:

Press CAL key, "[]]" is flashing on the LCD, indicate enters into the calibration mode, and wash the conductivity electrode with purified water and dry it, then insert it into the 1413μS/cm calibration solution, still it after stirring, when "②" icon appears, means the display values is stable and again press CAL key, LCD will display flashing "1413μS/cm", several seconds later the "End" icon will appear and return to the measuring mode, at this time, LCD will display stable measuring value 1413μS/cm and calibration icon " M", indicates the calibration is finished. If measuring value is unstable, can repeat calibrating until it is stable.

- Note: (1) The meter has been calibrated before leaving factory, so generally users can use it directly.
  - (2) Meter only can be calibrated under the mode of COND, and can not be calibrated in mode of RES, TDS and SAL, must shift to COND mode, and again shift to the original mode after finishing calibration.

# 4.3. Sample Test:

- 4.3.1. Wash the conductivity electrode and throw off the water on it, then insert it into the solution, still it after stirring, take the reading after "©" appears, which is the conductivity values of this solution.
- 4.3.2 Depress key can display the value of the TDS, salinity or resistivity value which against the conductivity value.

# **4.4. Important Statement:**

- 4.4.1. This meter build-in below two kinds of calibration solution series, please set up in the parameters P1;
  - (a) **Δ5** (Europe & U.S.A. series) 84μS/cm, 1413μS/cm, 12.88 mS/cm and 111.9 mS/cm
  - (b) **[H** (China series)  $146.6\mu$ S/cm,  $1408\mu$ S/cm, 12.85mS/cm and 111.3 mS/cm
- 4.4.2. This meter has an unique one-point calibration function, to choose one calibration solution based on the principle of the water samples and calibration solution conductivity as close as possible, in general the most common calibration solution is 1413  $\mu$ S/cm. Use the equipped 2301-S conductivity electrode (K = 1 cm<sup>-1</sup>), and do calibrate with 1413  $\mu$ S/cm calibration solution, can use within the range of less than 100 mS/cm. Please choose refer to the chart (4-1).

Note: When you choose to use DJS-0.1-S conductivity electrode (optional accessories, K=0.1 cm<sup>-1</sup>, no temperature element), you can install the meter Manual Temperature Compensation model: long time press MODE (press time more than 2s), at this time, the value of temperature is twinkling, press CAL or



to change the value of temperature and then press



is ok.

Chart (4-1)

Measuring range	0.05 to 20μS/cm	0.5μS/cm to 200mS/cm		
Electrode	K=0.1cm <sup>-1</sup> (flow test)	K=1.0cm <sup>-1</sup>		
constant	K=0.1cm (now test)		K-1.0CIII	
Calibration	84μS/cm	84μS/cm	1413μS/cm	12.88 mS/cm
solution				111.9 mS/cm
Calibration	Ū	Ð	(M)	(H)
indication icon	<u> </u>	<u> </u>		•

4.4.3. There are two kinds of method which are standard solution calibration method and constant calibration method for conductivity electrode calibration which have been set in meter, the statement in item 4.2. "electrode calibration" is the standard calibration

method, and when the accuracy of standard solution is accurate then suggest the standard solution calibration method is priority selected, it can ensure the best accuracy. If user used to use constant calibration method, please set the electrode constant in the parameter set of P5. (See P13 item4.5.6.). The two methods can choose freely and won't influence each other. When adopting the constant calibration method, LCD won't display the calibration indicator symbol.

4.4.4. The temperature compensation coefficient of the meter setting is 2.00% by producer. However, the conductivity temperature coefficient is different for solution of different variety and concentrations, the user can refer chart (4-2), as well as the data which they own get in the experiment, to set in the parameters setting of P4. At the same time, meter will do automatic non-linear temperature compensation in the high purified water which less than  $10~\mu$  S / cm.

Note: When the coefficient of temperature compensation is set to be 0.00, that is, there is no temperature compensation when testing, the measuring value based on current temperature.

Chart (4-2)

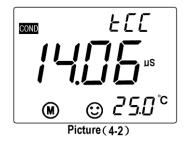
Solution	Temperature compensation coefficient
NaCl salt solution	2.12%/℃
5%NaOH solution	1.72%/℃
Dilute ammonia solution	1.88%/℃
10% hydrochroric acid solution	1.32%/℃
5% sulfuric acid solution	0.96%/℃

- 4.4.5. The other parameters setting, please see the chart (4-3)
- 4.4.6. Special attention: when the content of parameter setting is consistent with content of producer setting, conductivity measuring interface will display as picture



(4-1), when the content of parameter setting is different with content of producer setting, conductivity measuring interface will display as picture (4-2), the code icon will appear on the upper right of LCD, when parameters with code icon to

be set more than two, LCD just display one of the code symbols, user should enter into the parameter setting interface and carefully check the contents of setting or restore the meter to producer setting and again set needed parameters.



### 4.5. Parameter Setting:

4.5.1. Conductivity measuring parameter setting schedule (chart (4-3))

Chart (4-3)

Prompt Mark	Parameter Setting Items	Code	Parameter	
P1	Standard solution series selection	50L	USA (84μS/cm, 1413μS/cm, 12.88 mS/cm, 111.9 mS/cm) CH (146.6μS/cm, 1408μS/cm, 12.85mS/cm, 111.3mS/cm)	
P2	Electrode constant selection	Con	0.1, 1, 10	
Р3	Benchmark temperature selection	rEF	25℃ 20℃ 18℃	
P4	Temperature compensation coefficient setting	FCC	0.00 to 9.99%	
P5	Electrode constant setting			
P6	Temperature unit setting		°C °F	
P7	Back light display time setting	ЫL	0-1-3-6min	
P8	Auto power off time setting	RL	0-10-20min	
P9	Restore to producer setting		OFF-On	

<sup>4.5.2.</sup> Conductivity calibration solution series selection (P1)

(a) Depress MODE key, meter is entering into P1 mode, see picture (4-3);

key to choose the standard solution series:



(c) Press MODE key to enter into the next parameter setting or press KINTER key return to measuring mode.

#### 4.5.3. Electrode constant selection (P2)

- (a) Under P1 mode to short press the MODE key and enter into P2 mode, see picture (4-4);

COND

(b) Press CAL or  $\frac{M+}{RM}$  key to change the constant setting:  $0.1 \rightarrow 1.0 \rightarrow 10.0$ .

Picture (4-4)

Con

- (c) Press MODE key to enter into the next parameter setting or press ENTER key return to measuring mode.
- (d) The producer setting of P2 is K=1.

## 4.5.4. Benchmark temperature selection (P3)

(a) Under P2 mode to short press MODE key and enter into the P3 mode, see picture (4-5);



CAL or  $\frac{M+}{RM}$  key to choose the benchmark (b) Press temperature:  $25^{\circ}\text{C} \rightarrow 20^{\circ}\text{C} \rightarrow 18^{\circ}\text{C}$ ;

Picture (4-5

- (c) Press MODE key to enter into the next parameter setting or press key return to measuring mode.
- (d) The producer setting of P3 is  $25^{\circ}$ C.

Attention: If change the benchmark temperature to 20°C or 18°C, the LCD will 

- 4.5.5. Temperature compensation coefficient setting (P4)
  - (a) Under P3 mode to short press MODE key and enter into P4



mode, show as the picture (4-6);

(b) Press CAL or M+ key to change the number, the changing range of data is from 0.00 to 9.99; Depress CAL or M+ to quickly change it.

Attention: When the number set as 0.00, means there is no temperature compensation, for details please see P8 item 4.4.4;

- (c) Press MODE key to enter into the next parameter setting or press key return to measuring mode.
- (d) The producer setting of P4 is 2.00%.

Attention: If change the temperature coefficient to other numerical value, upper-right corner of LCD will display "  $\vdash \prod$ " icon when in measuring mode.

- 4.5.6. Constant calibration setting (P5)
  - (a) Under P4 mode to press MODE key and enter into P5 mode, LCD display last calibration constant. For example the 0.96cm<sup>-1</sup> shown as picture (4-7);



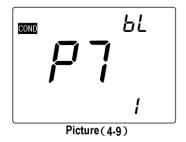
- (b) Press CAL or M+ key to change number when the Picture (4-7)

  number is flashing, and finish setting the constant which marked on the housing of conductivity electrode.
- (c) Press MODE key to enter into the next parameter setting or press key return to measuring mode.
- (d) If need to do calibration for other conductivity electrode which constant is not 1, such as conductivity electrode with constant 10.3, should enter into constant setting P2 to set the constant to be "10", then enter into P5 mode and set the constant to be 10.3.
- 4.5.7. Temperature unit  $^{\circ}$ C/ $^{\circ}$ F setting (P6)
  - (a) Short press MODE key in mode P5 to enter into mode P6, see picture (4-8).

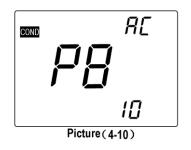


Picture (4-8)

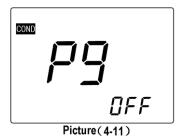
- (b) Press CAL or  $\frac{M+}{RM}$  key to choose temperature unit:  $^{\circ}$ C or  $^{\circ}$ F.
- (c) Press MODE key to enter into next parameter setting or press key to conform and return to measuring mode.
- 4.5.8. Back light display time setting (P7)
  - (a) Short press MODE key in mode P6 to enter into mode P7, see picture (4-9).
  - (b) Press CAL or M+ key to choose the time of back light auto power off: 0 min, 1 min, 3 min or 6 min. The back light display function will be closed if choosing a 0min.



- (c) Press MODE key to enter into next parameter setting or press key to conform and return to measuring mode.
- (d) The producer setting for P7 is 1min.
- 4.5.9. Auto power off time setting (P8)
  - (a) Short press MODE key in mode P7 to enter into mode P8, see picture (4-10).
  - (b) Press CAL or M+ key to choose the time: 0min, 10min or 20min. The auto power off function will be closed if choosing 0min.



- and return to measuring mode.
- (d) The producer setting for P8 is 10 min.
- 4.5.10. Restore to producer setting (P9)
  - (a) Short press MODE key in mode P8 to enter into mode P9,



key to conform

see picture (4-11).

(b) Press CAL or M+ key to choose " In", means that parameters have been restored to the producer setting mode, and restore to measuring mode after 2 seconds.

#### 4.6. Considerations:

- 4.6.1. The conductivity electrode has been calibrated before meter leaving factory, user can directly use it under normal circumstance;
- 4.6.2. Recommend calibrating one time every month under the normal circumstances; It is necessary to calibrate the newly purchased conductivity electrode or used after a period time;
- 4.6.3. Keeping the conductivity electrode clean and wash it with purified water, then throw off the water on it before and after testing. It's better to rinse electrodes with sample solution:
- 4.6.4. The surface of 2301-S conductivity electrode is plated with a layer of metal platinum black to used as lowering the electrode polarization, enlarge measuring range, so can not polish the surface of platinum black, only can wash it in water by shaking, in case to damage the platinum black coating; for organic stained things can be washed with hot water with detergent or alcohol.
- 4.6.5. Conductivity electrode before use can be immersed in purified water, to prevent the platinum black from passivation, if found the platinum black plated electrode is invalid, can immerse it into 10% nitric acid solution or 10% hydrochloric acid for 2 minutes, then rinse with purified water and again test. If the situation does not improve, then need to replace platinum black, or replacing a new conductivity electrode.
- 4.6.6. When it appears an abnormal reading when calibrating or displaying, please set P9 as "ON" to make the meter restore to producer setting mode, and then do calibrate and measure again.

# **5. Meter's Complete Kit:**

5.1. Model CON900 Conductivity/TDS/Salinity/Resistivity meter	1unit
5.2. 2301-S plastic conductivity electrode	1pc
5.3. 1413µS/cm conductivity standard solution (50mL)	1bottle
5.4. Screw driver	1pc
5.5. Spare AA batteries	2pcs
5.6. Packing list	1pc
5.7. Carrying case	1unit

## 6. Warranty:

- 6.1. We warrant this meter to be free of charge maintain, replace the parts or products under normal using circumstances, from purchased time within one year caused by manufacturing bad and unable to work.
- 6.2. Attached electrodes do not belong to this warrant range. But, if the newly purchased electrode went wrong without using, it's free of charge to maintain and replace.
- 6.3. The above warranty is not apply to defects resulting from action of user such as misuse, improper wiring, operation outside of specification, improper maintenance or repair, or unauthorized modification.

# **Chart I Meter Parameter Setting Schedule**

Mode	Prompt Mark	Parameter Setting Items	Code	Parameter
	P1	Standard solution series selection	50L	USA(84μS/cm, 1413μS/cm, 12.88 mS/cm, 111.9 mS/cm) CH (146.6μS/cm, 1408μS/cm, 12.85mS/cm, 111.3 mS/cm)
	P2	Electrode constant selection	Con	0.1, 1, 10
	Р3	Benchmark temperature selection	rEF	25°C 20°C 18°C
Conductivity	P4	Temperature compensation coefficient setting	FCC	0.00 to 9.99%
	P5	Constant calibration setting		
	P6	Temperature unit setting		°C °F
	P7	Back light display time	Ы	0-1-3-6min
	P8	Auto power off time setting	AE.	0-10-20min
	P9	Restore to producer setting		OFF-On (shut-set)

# Chart $\, \mathrm{II} \,$ Meter Restore to Producer Setting Schedule

Mode	Prompt Mark	Parameter Setting Items	Producer Setting Content	Non Producer Setting Content Icon
	P2	Electrode constant type selection	K=1	Con
Conductivity	P3	Benchmark temperature selection	25℃	rEF
	P4	Temperature compensation	2.0%	FCC
		coefficient setting		

# **Chart III Code Icon and Abbreviation Schedule**

Code and Abbreviation	English	Explanation
50L	Solution	Standard solution
[Η	China	China series standard
USA	USA	Europe & U.S.A series standard
Con	Constant	Electrode constant setting
FCC	Temperature compensation coefficient setting	Temperature compensation coefficient setting
rEF	Temperature Reference	Benchmark temperature setting
	Constant Calibration	Constant setting
End	End	
EAL	Calibration	
COND	Conductivity	
RES	Resistivity	
TDS	Total Dissolved Solid	
SAL	Salinity	