Benchtop Conductivity Meter
DW-102 Series

User
Manual

Declaration

The functions described in this manual are for the entire benchtop pH/ion meter. The specific available functions and parameters depend on the configuration of the model you purchased.

We have compiled this manual with great care, but we cannot guarantee the complete accuracy of its content and shall not be liable for any losses incurred by users due to this manual. Meanwhile, our products are constantly being improved, including this manual, so we reserve the right to modify this manual at any time without notice.

Notes

Dear User,

Thank you very much for purchasing the instruments and meters of Zhongke Tk (Shandong) Intelligent Technology Co., Ltd. To ensure the designed performance and service life of this product, anyone who uses or maintains this product must fully comply with this instruction manual. By reading and understanding this instruction manual carefully, you can fully understand the functions, operation and maintenance methods of this product.

Attention

Zhongke Tk benchtop pH/ion meter is a precision testing instrument. Please maintain good usage norms and maintenance to exert the best performance of the instrument.

- Use and store the instrument in a suitable environment.
- Avoid severe shaking, collision and pulling during transportation and use.
- Do not disassemble or assemble the instrument without permission except for battery replacement. Maintenance shall be carried out by special personnel.

Product Quality Statement

We warrant that our products are free from defects in materials and workmanship. All customers who purchase our products and operate them in accordance with our guidelines are entitled to a one-year warranty. Within the warranty period, the company is responsible for free repair in case of malfunctions caused by the instrument's own quality problems (non-man-made). Beyond the warranty period, the company provides lifetime repair services.

Content

1. Product Introduction

1.1 Overview

Our conductivity meter is not only a cost-effective and easy-to-operate benchtop measuring instrument, but also has the following outstanding features:

- Intelligent Electrode Management Technology: The meter can automatically identify high-precision intelligent electrodes and transmit the latest set of calibration data from the electrode chip to the meter, making data more secure and reducing errors.
- User-Friendly Interface: 7-inch full-view LCD screen with intuitive menu wizard for easier operation.
- Easy Measurement Switching: Switch between various parameters easily before and after measurement.
- IP54 Water Resistance: Subject to the meter, electrode and connection. The meter housing is resistant to liquid leakage and can be cleaned with a damp cloth.
- Strong Flexibility: An electrode stand is configured on the right side of the meter for more flexible operation. The new structure of the electrode stand can be operated with one hand and moved up and down vertically to place the electrode in an ideal position for optimal measurement performance, making measurement faster and more convenient, and reducing the risk of overturning sample containers or damaging measuring electrodes.
- Easy Measurement Operation: One-key operation for measurement, calibration, storage and other functions, simple and convenient.
- Multiple Data Storage and Transmission Modes: Direct data printing is available.

1.2 Safety Measures

1.2.1 Operator Protection Measures

Do not work in an explosive environment! The meter housing is not airtight (explosion risk may be caused by sparks or corrosion from intruding gases). When using chemicals or solvents, follow the operating guidelines provided by the supplier and laboratory safety regulations.

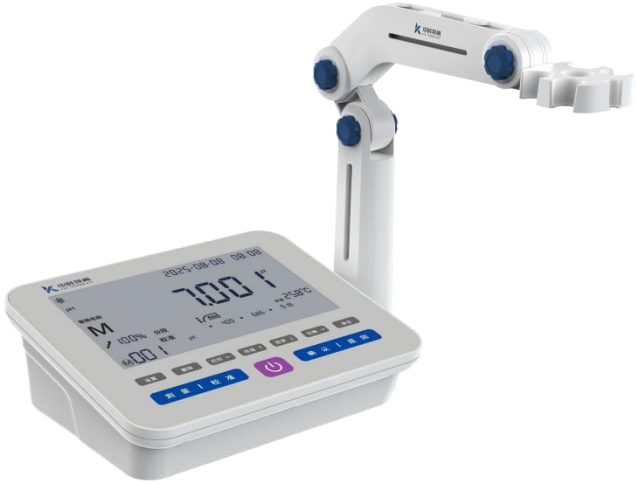
1.2.2 Operator Operational Safety Precautions

Do not separate the meter housing; only our technical staff are allowed to repair the meter!
Wipe off any liquid splashed on the instrument immediately! Some solvents may cause housing corrosion.

1.2.3 Avoid the Following Environmental Factors

Severe vibration, long-term direct sunlight, atmospheric humidity exceeding 80%, corrosive gases, ambient temperature below 0℃ or above 45℃, strong electric or magnetic fields.

1.3 Appearance and Composition



1.4 Installation

1.4.1 Unpacking

Carefully unpack and take out the meter, keep the outer box, certificate of conformity and instruction manual properly, and connect the 12V DC power supply to the matching connector of the meter.

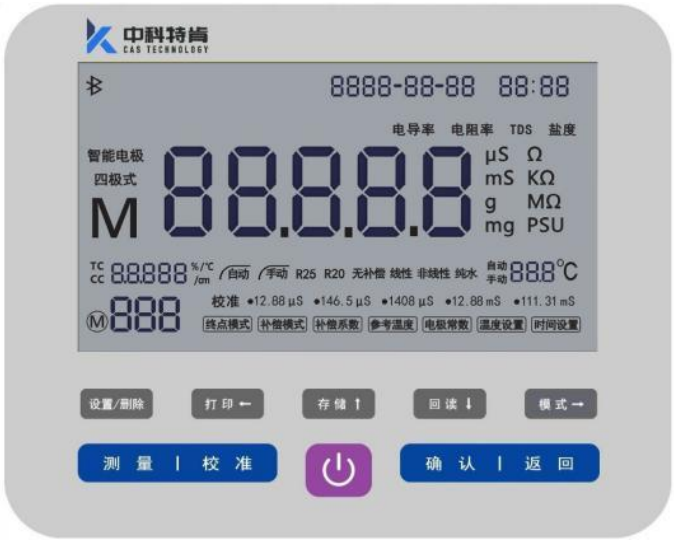
1.4.2 Stand Installation

The electrode stand can be installed on the right side of the meter as required, and the height of the electrode stand can be adjusted up and down according to usage habits. Use tools to connect the stand.

1.5 Description

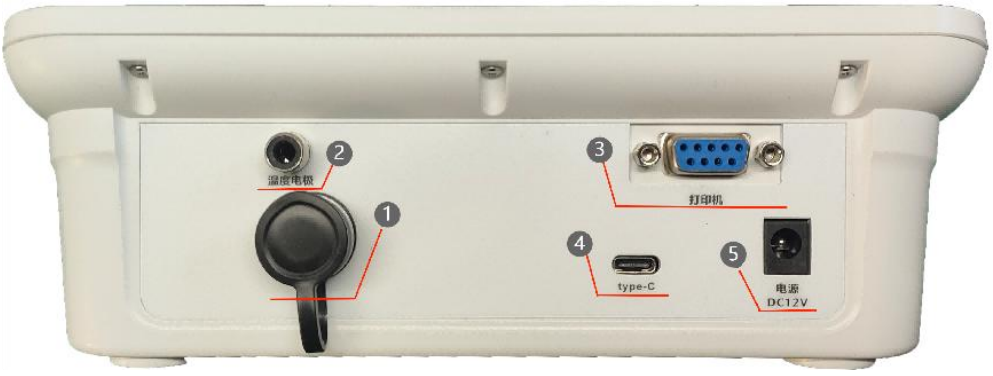
1.5.1 Key Control

This product adopts key operation mode, with 12 keys on the instrument.



Key	Function
Power On/Off	Short press to power on or off the instrument
Calibration	Press to enter the calibration mode and confirm the calibration result
Measurement	Short press to start or end the sample measurement
Confirm	Has different functional effects under different operation interfaces (refer to the detailed operation steps)
Return	Short press to return to the main test interface; long press to restore factory settings
Setting/ Delete	Short press to enter the instrument setting mode and delete all stored measurement data
Print/Direction Left	Short press to print measured or stored data; act as the left direction key for parameter adjustment
Store/Direction Up	Short press to manually store measured data; act as the up direction key for parameter adjustment
Recall/Direction Down	Short press to view stored measurement data; act as the down direction key for parameter adjustment
Switch/Direction Right	Short press to quickly switch measurement modes; act as the right direction key for parameter adjustment

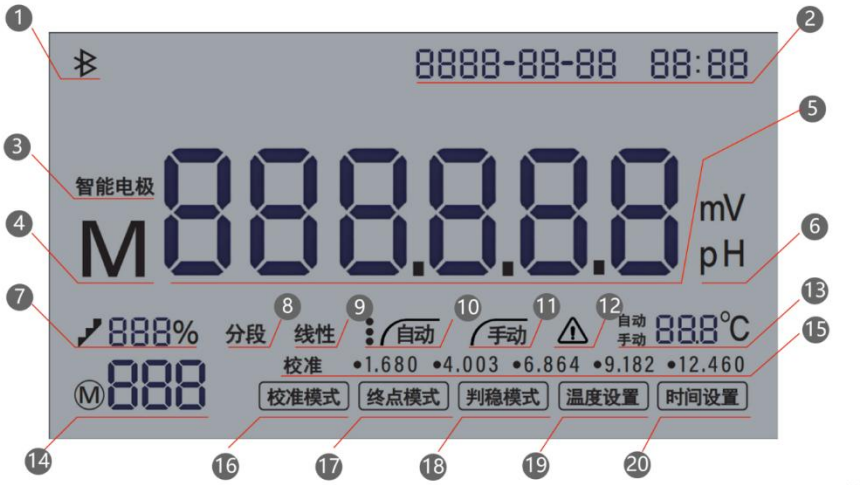
1.5.2 Jack Indication



1. 6-core aviation jack: Electrode recognition and temperature input

2. Independent temperature electrode jack
3. RS232 printer port: Connect to printer for signal transmission
4. Type-C port: For factory upgrade and maintenance
5. DC power port: 12V dedicated power input

1.5.3 Display Description



1. Bluetooth connection prompt
2. Date and time
3. Measurement mode indicator
4. Electrode type indicator
5. Data storage icon
6. Measured value
7. Measurement unit
8. Electrode constant (CC x.xxx/cm) and compensation coefficient (TC x.xxxx%/°C)
9. Auto end mode
10. Manual end mode
11. Reference temperature 25°C (R25)
12. Reference temperature 20°C (R20)
13. Compensation mode (no compensation, linear, non-linear, pure water)
14. Temperature setting (auto/manual) and temperature display
15. Storage icon and data number
16. Calibration mode: Select standard solution
17. End mode: Auto/manual selection
18. Compensation mode: No/linear/non-linear/pure water
19. Compensation coefficient: Manual input
20. Reference temperature: 25°C / 20°C
21. Electrode constant: Manual input
22. Temperature mode: Auto / manual

23. Time setting: Adjust date and time

Item		DW-102A	DW-102B	DW-102C	DW-102D	DW-102RO
Con	Range	0.00μS ~ 200mS/cm	0.000μS ~ 1000mS/cm	0.000 ~ 2000mS/cm	0.000μS ~ 200mS/cm	0.000 ~ 200μS/cm
	Minimum Resolution	0.01μS/cm	0.001μS/cm	0.001μS/cm	0.001μS/cm	0.001μS/cm
	Accuracy	± 1.0% FS	± 0.5% FS	± 0.5% FS	± 0.5% FS	± 0.5% FS
Res	Range	5.00Ω·cm ~ 20.00MΩ·cm	5.00Ω·cm ~ 20.00MΩ·cm	5.00Ω·cm ~ 100.00MΩ·cm	5.00Ω·cm ~ 100.00MΩ·cm	5.00Ω·cm ~ 100.00MΩ·cm
	Minimum Resolution	0.01Ω·cm	0.01Ω·cm	0.01Ω·cm	0.01Ω·cm	0.01Ω·cm
	Accuracy	± 1.0% FS	± 0.5% FS	± 0.5% FS	± 0.5% FS	± 0.5% FS
TDS	Range	\	0.00mg/L ~ 500.00g/L	0.000mg/L ~ 1000.000g/L	0.000mg/L ~ 1000.000g/L	0.000mg/L ~ 1000.000g/L
	Minimum Resolution	\	0.01mg/L	0.001mg/L	0.001mg/L	0.001mg/L
	Accuracy	\	± 0.5% FS	± 0.5% FS	± 0.5% FS	± 0.5% FS
Sal	Range	\	0.00ppt ~ 100.00ppt	0.00ppt ~ 100.00ppt	0.00ppt ~ 100.00ppt	0.00ppt ~ 100.00ppt
	Minimum Resolution	\	0.01ppt	0.01ppt	0.01ppt	0.01ppt
	Accuracy	\	± 0.2%	± 0.2%	± 0.2%	±0.1%
Temp	Range	-5.0℃ ~ 95.0℃	-5.0℃ ~ 110.0℃	- 10.0℃ ~ 135.0℃	- 10.0℃ ~ 135.0℃	- 10.0℃ ~ 135.0℃
	Temperature Compensation	Auto	Auto	Auto	Auto	Auto/Man
	Minimum Resolution	0.1℃	0.1℃	0.1℃	0.1℃	0.1℃
	Accuracy	± 0.2℃	± 0.2℃	± 0.1℃	± 0.1℃	± 0.1℃
Basic Parameter	Electrode Identification	Auto	Auto	Auto	Auto	Auto
	Calibration	3	5	Multi-point	Multi-point	5
	Data Storage	100 groups	500 groups	999 groups	999groups	999 groups
	Dimensions (mm)	203*163*70				
	Ambient Conditions	Temp：0 ~ 50°C Humidity：≤95%				

1.6 Technical Parameters

2. Product Operation

2.1 Electrode Connection

2.1.1 General Electrode Connection

To connect the conductivity electrode or temperature electrode to the meter, first remove the protective cap from the aviation port on the meter. Then connect the electrode and ensure the connector is fully inserted. If using a separate temperature electrode, plug its connector into the ATC RCA jack.

2.1.2 Intelligent Electrode Description

When connecting a smart conductivity electrode to the meter, attach the cable to the 6- pin aviation plug (7- pin for 4- pole conductivity electrodes). Align the red dot on the plug with the mark on the port and insert until you hear a click, indicating it is locked automatically.When the meter is powered on, calibrated, or measuring, the calibration data stored inside the electrode is automatically transferred from the chip to the meter and used for subsequent measurements.

2.1.3 Intelligent Electrode

The meter adopts **smart electrode management technology**, which is compatible with CAS Teken smart conductivity electrodes, making data more secure, reliable, and error- resistant.

After connecting a smart electrode, the meter **automatically recognizes** it, and internal information such as calibration data and electrode constant is transferred to the meter automatically. This allows direct visibility of the electrode status, helping users determine whether the electrode needs calibration, cleaning, or replacement.

After connecting a smart electrode, calibration data set on the meter is automatically saved to the electrode chip. The electrode stores the latest calibration data, which is then automatically loaded and used for all subsequent measurements.

2.2 Power On

Press the power key; a beep indicates startup. The meter auto-detects the electrode and displays date, time, electrode type, measurement mode, value, unit, end mode, reference temperature, compensation mode, temperature coefficient, temperature mode, electrode constant, storage count, and calibration points. Backlight turns on automatically and shuts off after 10 minutes; press any key to reactivate.

2.3 Meter Settings

Press Set/Del to enter setup mode. Use arrow keys to select: End Mode → Compensation Mode → Compensation Coefficient → Reference Temperature → Electrode Constant →

Temperature Setting → Time Setting

2.3.1 End Point Mode

Press the SET key; the End Point Mode will flash. Press ENTER to enter the mode. The meter provides two end point modes selectable via arrow keys:

Auto End: The meter determines the end of a measurement based on the connected electrode and selected stability criteria, ensuring simple, fast, and accurate measurements.

Manual End: The user presses the MEAS key to end the measurement, and presses it again to resume measurement.

The meter automatically exits to the setting menu after selection.

2.3.2 Compensation Mode

Use arrow keys to select Compensation Mode, then press ENTER to enter. Use arrow keys to select No Compensation, Linear, Non-Linear, Pure Water, then press ENTER to confirm.

No Compensation: Displays conductivity at the current temperature.

Linear: For medium to high-conductivity solutions.

Non-Linear: For natural water (0 – 36 °C only). Conductivity at current temperature is compensated to and displayed at reference temperature (20 °C or 25 °C).

Pure Water: Uses optimized temperature compensation.

Explanation

Linear

Conductivity of solutions increases with temperature. For most solutions, conductivity has a linear relationship with temperature. The measured conductivity is compensated and displayed using:

GTRet = GT / (1 + α(T − TRet)/100%)

- GT: Measured conductivity at temperature T (mS/cm)
- GTRet: Displayed conductivity compensated to reference temperature TRet (mS/cm)
- α: Linear temperature compensation coefficient (%/°C); α=0 means no compensation
- T: Measured temperature (°C)
- TRet: Reference temperature (20 °C or 25 °C)

Compensation coefficients for pure salt solutions are available in references. Otherwise, determine α by measuring conductivity at two temperatures:

α = (GT1 − GT2) × 100% / (T1 − T2) / GT2

- T1: Typical sample temperature
- T2: Reference temperature
- GT1: Conductivity at T1
- GT2: Conductivity at T2

Non-Linear

Natural water exhibits strong non-linear temperature characteristics. Use non-linear compensation for natural water.

Measured conductivity is multiplied by temperature coefficient f25 to obtain compensated value at 25 °C:

GT25 = GT × f25

For 20 °C reference: **GT20 = (GT × f25) / 1.116**

Pure Water

A different non-linear correction is used for pure/ultrapure water, covering 0.005–5.00 µS/cm at 0–50 °C (except 25 °C). A flow cell is strongly recommended to reduce CO_2 interference.

Pure water mode is valid only at **0–50 °C**.

If conductivity exceeds 5.00 µS/cm, compensation behaves like linear mode with α=2.00 %/°C.

2.3.3 Compensation Coefficient

Compensation coefficient is the TDS factor. Use arrow keys to select it, press ENTER, then edit TC x.xxxx%/°C with arrow keys.TDS = Conductivity × TDS factor (0.10…2.00).

See appendix for conductivity- to- TDS conversion details.

2.3.4 Reference Temperature

Use arrow keys to select Reference Temperature, press ENTER, then choose R25 or R20 and confirm.

R25: Conductivity compensated to 25 °C

R20: Conductivity compensated to 20 °C

2.3.5 Electrode Constant

If the electrode constant is known, enter it directly. The value will be shown during calibration. Use arrow keys to select Electrode Constant, press ENTER, then modify the value with arrow keys.

2.3.6 Temperature Setting

If no temperature probe is detected, Manual appears. Manually enter sample temperature (0 –99.9 °C).Use arrow keys to select Temperature Setting, press ENTER. Use left/right arrows to select digits; up/down arrows to adjust value. Press ENTER to save and exit.Auto is shown with ATC electrode; manual setting is not needed.

2.3.7 Time Setting

Use arrow keys to select Time Setting, press ENTER.Use left/right arrows to select fields; up/down arrows to set date (YYYY- MM- DD) and time (24- hour format).

2.4 Calibration

2.4.1 Conductivity Calibration

The meter supports 1- point or multi- point calibration using standards:12.88 µS, 146.5 µS, 1408 µS, 12.88 mS, 111.31 mS. Temperature compensation is auto- selected based on temperature electrode connection.

2.4.2 pH One-Point Calibration

① Place electrode in standard solution; press CAL to enter calibration mode.

② Meter operates per selected end mode.

③ Auto End: Meter identifies solution; beeps when stable; press ENTER to save and exit.

④ Manual End: Verify solution; wait for stability; press ENTER; long press ENTER (beep) to save and exit.

⑤ Press BACK to abort calibration.

Note: For second calibration point: expose electrode to air (0 S/m). Long press ENTER (beep) to finish zero calibration. Verify electrode constant regularly with standard solutions

2.5 Sample Measurement

Place electrode in sample; press MEAS to start. The meter auto- switches between µS/cm and mS/cm. End icon flashes during measurement; stops flashing when stable.

Auto End: Measurement stops and locks automatically.

Manual End: Press ENTER to stop and lock.

Note: Lock releases if reading fluctuates >4%.Short press MODE to switch: Conductivity → Resistivity → TDS → Salinity.

See appendix for test methods.

2.6 Data Storage

The meter stores up to 999 data sets (marked M001–M999).Press STORE after measurement to save. Storing beyond M999 overwrites the last entry.

2.7 Recall Stored Readings

Press RECALL to view stored data. Use up/down arrows to browse (M0 = start). Press BACK to return to measurement.

2.8 Data Print & Transmission

① Connect meter and printer via RS232 cable.

② Select data; press PRINT. Printout includes date, time, value, unit, temperature, cell

constant, compensation mode, reference temperature.

③ Printer settings:

Baud: 9600
Data bits: 8
Stop bits: 1Parity: None
Handshake: None

2.9 Data Deletion

Press RECALL to view stored data.
Long press SET/DEL (beep) to clear all stored data.
Long press CAL (beep) to clear calibration data.

2.10 Factory Reset

Long press BACK in measurement mode (beep) to clear all stored and calibration data.

2.11 Temperature Compensation

Use built‑ in or separate temperature electrode (NTC 10 kΩ only).
Auto is displayed with temperature electrode; Manual without. Enter temperature manually if needed.

2.12 Power Off & Storage

2.12.1 Power Off

Press power key to shut down. Wipe the meter and probe (do not touch the membrane). Unlock the aviation plug before removing the electrode; replace the protective cap.

2.12.2 Storage

Store in clean, dry, dark environment. Avoid direct sunlight and temperatures <0 °C.

Disconnect power when idle. Power on weekly; calibrate monthly with standard solutions.

2.12.3 Transportation

Handle with care. Unplug cables, remove electrode stand, and use original packaging.

2.12.4 Waste Disposal

Do not dispose as household waste. Dispose per local regulations for electrical and electronic equipment.

3 Maintenance

2.13.1 Power Off

Do not disassemble the housing. Clean the case occasionally with a damp cloth and mild detergent; wipe spills immediately.Housing material: ABS/PC. Avoid organic solvents (toluene, xylene, MEK).IP54 rated: Do not immerse in liquid.

4. Accessories

Adapted Electrodes

Name	**Model**	**Part No.**	**Measuring Range**	**Description**
Smart Conductivity Electrode K=1	CC-100PR	02020388	2–20000 µS/cm	Graphite, 2-pole, 10K NTC, 1 m cable, 6-pin aviation plug
Smart Conductivity Electrode K=0.1	CC-200PR	02020387	0.05–2000 µS/cm	Graphite, 2-pole, 10K NTC, 1 m cable, 6-pin aviation plug
Smart Conductivity Electrode K=0.32	CC-300PR	04010311	0–200 mS/cm	4-pole graphite, NTC-10K, 1 m cable
Pure Water Conductivity Electrode K=0.01	CC-400PSR	04010467	0.0000–500.0 µS/cm	316L stainless, flow cell, 30K thermistor
Smart Conductivity Electrode K=10	CC-500PR	04010538	1–2000 mS/cm	2-pole, 10K NTC, 1 m cable, 6-pin aviation plug

5 Appendix

5.1 Conductivity Standard Solutions (Reference: 25 °C)

T [°C]	146.5 µS/cm	1408 µS/cm	12.85 mS/cm	111.3 mS/cm
15	118.5	1141.4	10.455	92.12
18	126.7	1220.0	11.163	97.80
20	132.2	1273.7	11.644	101.70
25	**146.5**	**1408.3**	**12.852**	**111.31**
35	176.5	1687.6	15.353	131.10

5.2 Practical Salinity Standard (UNESCO 1978)

$$S = \sum_{j=0}^{5} a_j R_T^{j/2} - \frac{(T-15)}{1+k(T-15)} \sum_{j=0}^{5} b_j R_T^{j/2}$$

$a_0 = 0.0080$	$b_0 = 0.0005$	$k = 0.00162$
$a_1 = -0.1692$	$b_1 = -0.0056$	
$a_2 = 25.3851$	$b_2 = -0.0066$	
$a_3 = 14.0941$	$b_3 = -0.0375$	
$a_4 = -7.0261$	$b_4 = 0.0636$	
$a_5 = 2.7081$	$b_5 = -0.0144$	

$$R_T = \frac{R_{Sample}(T)}{R_{KCl}(T)}$$

5.3 Temperature Correction Coefficient f25 for Non-Linear Correction

°C	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
0	1.918	1.912	1.906	1.899	1.893	1.887	1.881	1.875	1.869	1.863
1	1.857	1.851	1.845	1.840	1.834	1.829	1.822	1.817	1.811	1.805
2	1.800	1.794	1.788	1.783	1.777	1.772	1.766	1.761	1.756	1.750
3	1.745	1.740	1.734	1.729	1.724	1.719	1.713	1.708	1.703	1.698
4	1.693	1.688	1.683	1.678	1.673	1.668	1.663	1.658	1.653	1.648
5	1.643	1.638	1.634	1.629	1.624	1.619	1.615	1.610	1.605	1.601
6	1.596	1.591	1.587	1.582	1.578	1.573	1.569	1.564	1.560	1.555
7	1.551	1.547	1.542	1.538	1.534	1.529	1.525	1.521	1.516	1.512
8	1.508	1.504	1.500	1.496	1.491	1.487	1.483	1.479	1.475	1.471
9	1.467	1.463	1.459	1.455	1.451	1.447	1.443	1.439	1.436	1.432
10	1.428	1.424	1.420	1.416	1.413	1.409	1.405	1.401	1.398	1.384

11	1.390	1.387	1.383	1.379	1.376	1.372	1.369	1.365	1.362	1.358
12	1.354	1.351	1.347	1.344	1.341	1.337	1.334	1.330	1.327	1.323
13	1.320	1.317	1.313	1.310	1.307	1.303	1.300	1.297	1.294	1.290
14	1.287	1.284	1.281	1.278	1.274	1.271	1.268	1.265	1.262	1.259
15	1.256	1.253	1.249	1.246	1.243	1.240	1.237	1.234	1.231	1.228
16	1.225	1.222	1.219	1.216	1.214	1.211	1.208	1.205	1.202	1.199
17	1.196	1.193	1.191	1.188	1.185	1.182	1.179	1.177	1.174	1.171
18	1.168	1.166	1.163	1.160	1.157	1.155	1.152	1.149	1.147	1.144
19	1.141	1.139	1.136	1.134	1.131	1.128	1.126	1.123	1.121	1.118
20	1.116	1.113	1.111	1.108	1.105	1.103	1.101	1.098	1.096	1.093
21	1.091	1.088	1.086	1.083	1.081	1.079	1.076	1.074	1.071	1.069
22	1.067	1.064	1.062	1.060	1.057	1.055	1.053	1.051	1.048	1.046
23	1.044	1.041	1.039	1.037	1.035	1.032	1.030	1.028	1.026	1.024
24	1.021	1.019	1.017	1.015	1.013	1.011	1.008	1.006	1.004	1.002
25	1.000	0.998	0.996	0.994	0.992	0.990	0.987	0.985	0.983	0.981
26	0.979	0.977	0.975	0.973	0.971	0.969	0.967	0.965	0.963	0.961
27	0.959	0.957	0.955	0.953	0.952	0.950	0.948	0.946	0.944	0.942
28	0.940	0.938	0.936	0.934	0.933	0.931	0.929	0.927	0.925	0.923
29	0.921	0.920	0.918	0.916	0.914	0.912	0.911	0.909	0.907	0.905
30	0.903	0.902	0.900	0.898	0.896	0.895	0.893	0.891	0.889	0.888
31	0.886	0.884	0.883	0.881	0.879	0.877	0.876	0.874	0.872	0.871
32	0.869	0.867	0.866	0.864	0.863	0.861	0.859	0.858	0.856	0.854
33	0.853	0.851	0.850	0.848	0.846	0.845	0.843	0.842	0.840	0.839
34	0.837	0.835	0.834	0.832	0.831	0.829	0.828	0.826	0.825	0.823
35	0.822	0.820	0.819	0.817	0.816	0.814	0.813	0.811	0.810	0.808

5.4 Temperature Coefficients

Chemical Substance at 25°C	Concentration [%]	Temperature α Coefficient [%/°C]
HCl (Hydrochloric Acid)	10	1.56
KCl (Potassium Chloride)	10	1.88
CH_3COOH (Acetic Acid)	10	1.69
NaCl (Sodium Chloride)	10	2.14
H_2SO_4 (Sulfuric Acid)	10	1.28
HF (Hydrofluoric Acid)	1.5	7.20

About Zhongke Tk

Zhongke Tk (Shandong) Intelligent Technology Co., Ltd. was founded in 2015, with its headquarters located in Jinan, Shandong Province. It is a high-tech enterprise specializing in the R&D, production, sales and service of water quality analysis equipment.

The company has a professional R&D team. With profound professional knowledge and rich practical experience, the team members continuously promote the innovation and progress of water quality analysis technology to ensure that the products are always at the advanced level of the industry.

Our products cover a variety of water quality analysis equipment, including hydrogen conductivity meter, dissolved oxygen meter, pH meter, conductivity meter, multi-parameter water quality analyzer, etc. At the same time, the company also provides customized solutions for customers, tailoring suitable water quality analysis equipment and monitoring schemes according to their specific needs.

Adhering to the business philosophy of Technological Innovation, Quality First, Service Supreme, we continuously improve product quality and service level, provides customers with suitable water quality analysis equipment and solutions, and makes greater contributions to the development of the water quality analysis industry.

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