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DDS-12DW Benchtop Conductivity Meter

Instruction Manual

Introduction

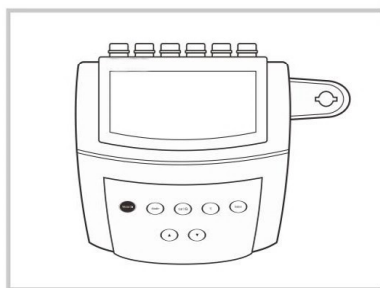
Thank you for selecting the DDS-12DW benchtop conductivity meter. This manual provides a step-by-step guide to help you operate the meter, please carefully read the following instructions before use.

Unpacking

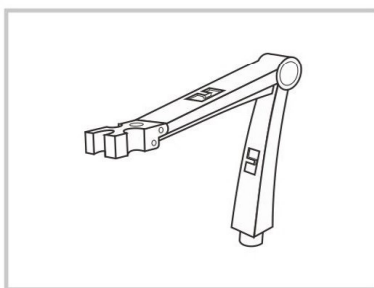
Before unpacking, ensure that the current work environment meets following conditions.

- Relative humidity is less than 80 %.
- Ambient temperature is greater than 0°C and less than 60°C.
- No potential electromagnetic interference.

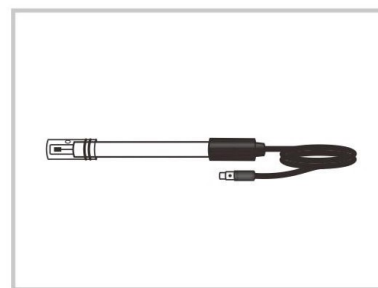
The following list describes the standard components of the meter. After the unpacking, please check all components are complete. If any are damaged or missing, please contact nearest distributor.



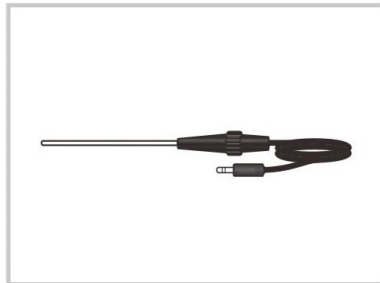
DDS-12DW Conductivity Meter



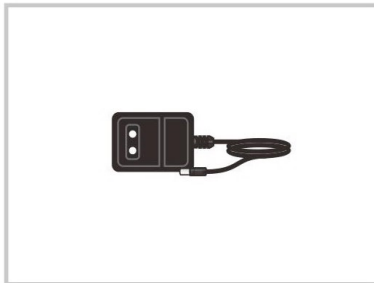
Electrode Arm



CON-1 Conductivity Electrode



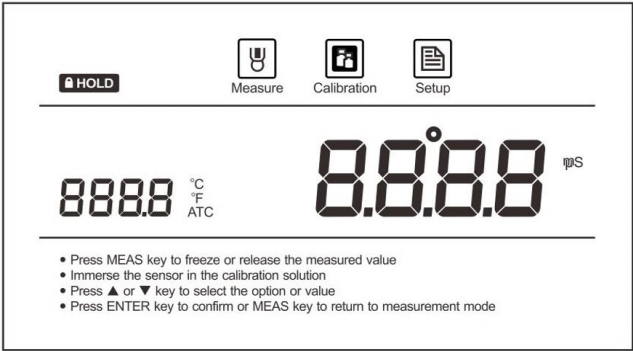
TP-10K Temperature Probe







DC9V Power Adapter

Display

The DDS-12DW conductivity meter is equipped with an easy-read LCD display that used to show the measured values and mode icons. The following table describes the function of each icon.





INDEX:

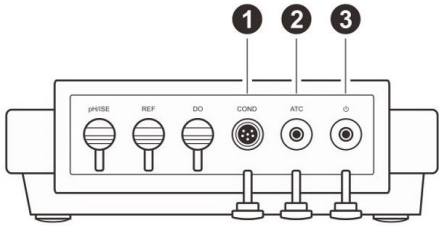
 <p>Measure</p>	<p>Measurement mode icon: Indicates the meter is in the measurement mode.</p>	 <p>HOLD</p>	<p>Hold icon: Indicates the measuring value has been locked.</p>
 <p>Calibration</p>	<p>Calibration mode icon: Indicates the meter is in the calibration mode.</p>	<p>ATC</p>	<p>Automatic Temperature Compensation: Indicates the temperature compensation is enabled.</p>
 <p>Setup</p>	<p>Setup mode icon: Indicates the meter is in the setting mode.</p>		

Keypad

The meter has a succinct membrane keypad, names and symbols describe the each function key controls.

KEY	FUNCTION
MEAS 	<ul style="list-style-type: none"> • Switches the meter ON/OFF. • Locks the measured value, press the key again to resume measuring. • Exits the calibration or setting and returns to measurement.
CAL	<ul style="list-style-type: none"> • Starts calibration.
	<ul style="list-style-type: none"> • Enters the setup menu.
°C	<ul style="list-style-type: none"> • Sets the temperature.
▲	<ul style="list-style-type: none"> • Increase the setting value.
▼	<ul style="list-style-type: none"> • Decrease the setting value.
ENTER	<ul style="list-style-type: none"> • Confirms the calibration, settings or displayed options.

Connectors

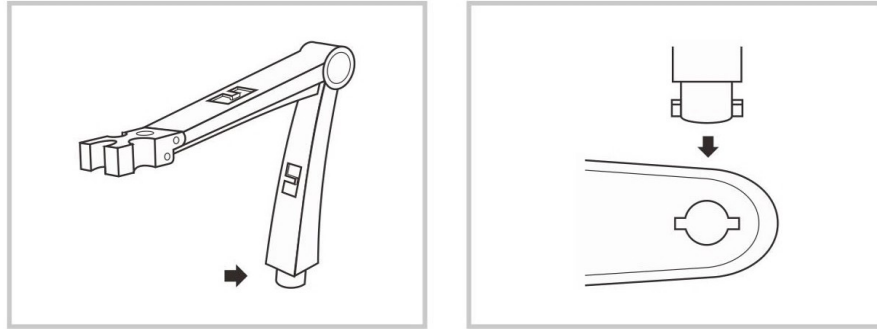


INDEX:

NO.	CONNECTOR	DESCRIPTION
1	COND	Used for connecting the conductivity electrode
2	ATC	Used for connecting the temperature probe
3	⏻	Used for connecting the power adapter

Installing the Electrode Holder

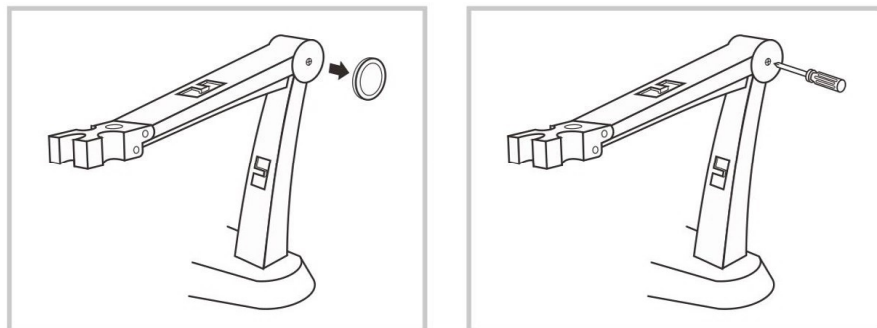
Take out the electrode arm from the packaging. The base plate of the electrode holder has a circular hole, the electrode arm has a connecting rod. Insert the connecting rod into the circular hole and swivel the electrode arm 90°. Electrode holder is now ready to swing into desired position.



Adjustment of electrode arm

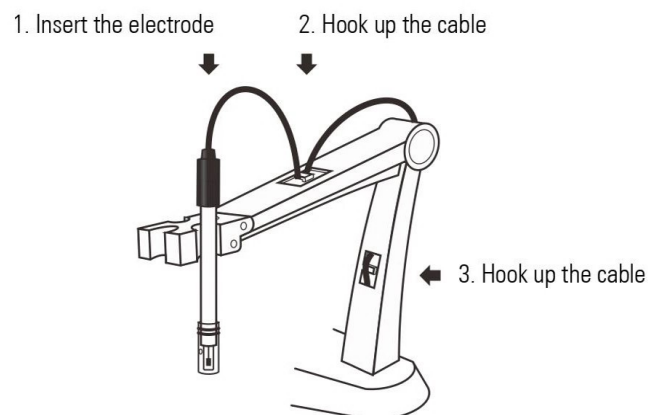
After installation, if the electrode arm automatically rises or falls, you need to adjust the screws until arm locate at any position.

1. Remove the plastic cover from the electrode arm.
2. Use the screwdriver to tighten the screw moderately.
3. Insert the plastic cover to previous position. Installation is completed.

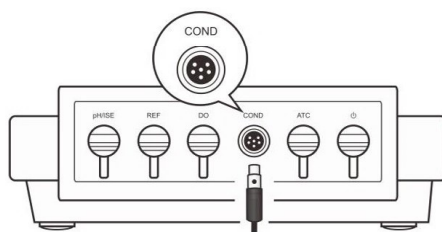


Connecting the Electrode

1. Take out the conductivity electrode from the packaging. Follow the steps below to place the electrode into left or right side of the electrode arm.

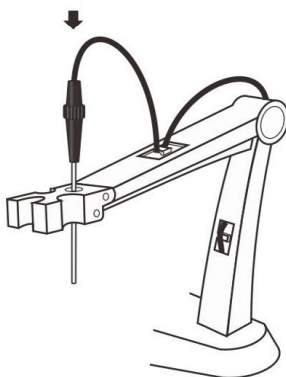


2. Insert the 6-pin connector into the connector socket labeled COND. After the connection is completed, DO NOT pull on the cable. Always make sure that the connector is clean and dry.

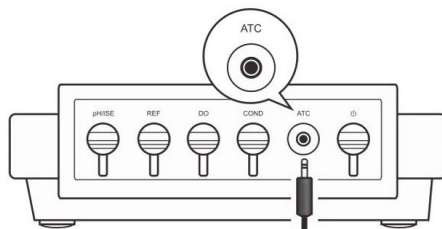


Connecting the Temperature Probe

1. Place the temperature probe into the circular hole of the electrode arm.

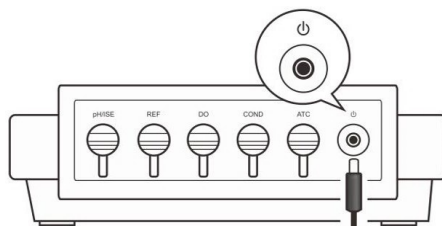


2. Insert the phone plug to the connector socket labeled ATC. Ensure the connector is fully seated.



Connecting the Power Adapter

1. Before plugging in the power adapter, ensure that its voltage matches the local main voltage.
2. Insert the connector to the power socket. The meter is now ready for use.



Prior to Use

Soak the conductivity electrode for a few minutes in tap water to remove dirt and oil stains on the electrode.

Switching the Meter On and Off

- Press the **Meas** key to switch on the meter, the display shows the measured values.
- Press and hold the **Meas** key for 5 seconds, the meter will switch off.




 To enable the Auto-Power Off feature, please refer to chapter SETUP MENU.

Setup Menu

The DDS-12DW conductivity meter contains an integrated setup menu that is used to customize the displayed option to meet measurement requirements. The following table describes the functions of the menu items.

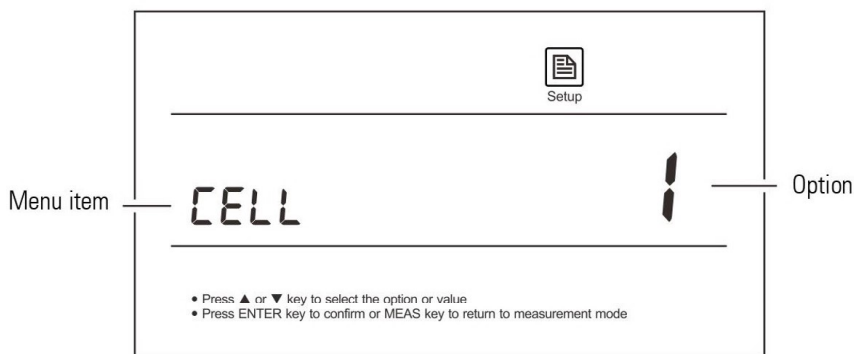
MENU	DESCRIPTION	OPTIONS	DESCRIPTION	DEFAULT
CELL	Set the cell constant to match connected electrode.	0.1	K=0.1	K=1
		1	K=1	
		10	K=10	
		USER	User-Defined	
CARL	Set the number of calibration points.	1	1 point	1 point
		2	2 points	
		3	3 points	
COE	Set the linear temperature compensation coefficient.	2.10	Range: 0.0~10.0%/°C	2.1/°C
UNIT	Set the default temperature unit.	°C	Degrees Celsius	°C
		°F	Degrees Fahrenheit	
HOLD	When the option is enabled, the meter will automatically sense a stable reading and lock the measurements.	YES	Enable	Disable
		NO	Disable	
OFF	When the option is enabled, the meter will automatically switch off if no key is pressed within 3 hours.	YES	Enable	Disable
		NO	Disable	
RST	When the option is enabled, all of the calibration data and selected parameters will back to factory default settings, the meter must be recalibrated.	YES	Enable	Disable
		NO	Disable	

Setting a default option

- In the measurement mode, press and hold the  key for 3 seconds to enter the setup menu.
- Press the  or  key select the desired option.
- Press the **Enter** key to confirm and move to the next menu item.
- Repeat the steps above until the meter returns to the measurement mode. Setting is completed.



- If the **USER** is selected, the user only need to input a constant value labeled on the electrode for calibration. The meter will use this value as a slope parameter to calculate the measurement result. For more information, please refer to chapter MANUAL CALIBRATION. Note, once the "USER" is enabled, the Cal key will invalid.
- If you want to exit the setting, press the **Meas** key.

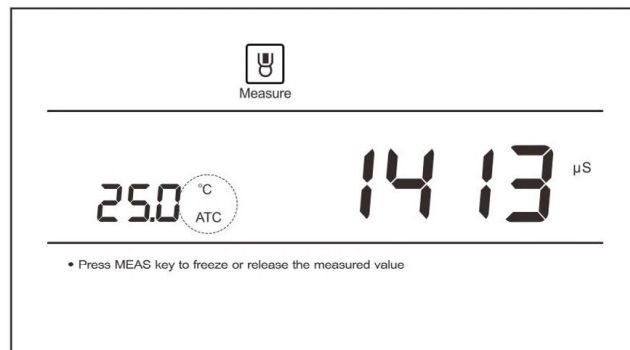


Temperature Compensation

For better accuracy, we recommend the use of either a sensor with a built-in or a separate temperature probe for the calibration or measurements.

Automatic Temperature Compensation

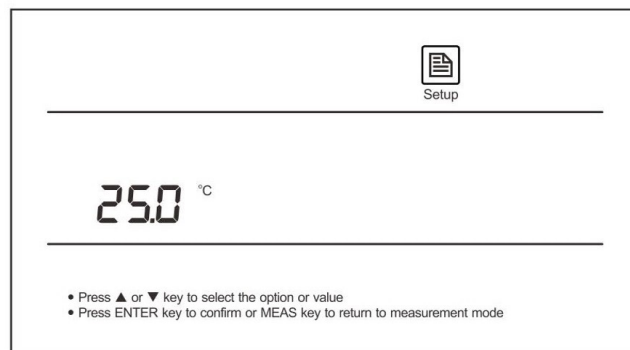
Connect the temperature probe to the meter (Refer to page 5 "Connecting the Temperature Probe"). The ATC icon immediately appears on the display, the meter is now switched to the automatic temperature compensation mode.



Manual Temperature Compensation

If the meter does not detect a temperature probe, the °C icon will show on the display indicating that the meter is switched to the manual temperature compensation mode. To set the temperature value of sample, follow the steps below.

1. Press the °C key to enter the temperature setting mode.
2. Press the ▲ or ▼ key to modify the temperature value.
3. Press the **Enter** key to confirm.



- ① Press the ▲ or ▼ key once, the setting value will increase or decrease by 0.1. Press and hold the ▲ or ▼ key, the setting value will increase or decrease by 1.

Selecting the Conductivity Electrode

The DDS-12DW conductivity meter is capable of using the 3 types of conductivity electrodes. Prior to the calibration and measurement, you need to select the different sensors as per your sample concentration. The table below shows available electrode and its effective measuring ranges.

CONDUCTIVITY ELECTRODE	MEASURING RANGES	CELL CONSTANT
CON-0.1	0.1~100 μ S/cm	K=0.1
CON-1	10 μ S/cm~10mS/cm	K=1
CON-10	100 μ S/cm~200mS/cm	K=10

Automatic Calibration

Make sure that you selected the cell constant between 0.1, 1 or 10 in the setup menu. If the current option is "USER", the automatic calibration function will be disabled (Refer to chapter SETUP MENU).

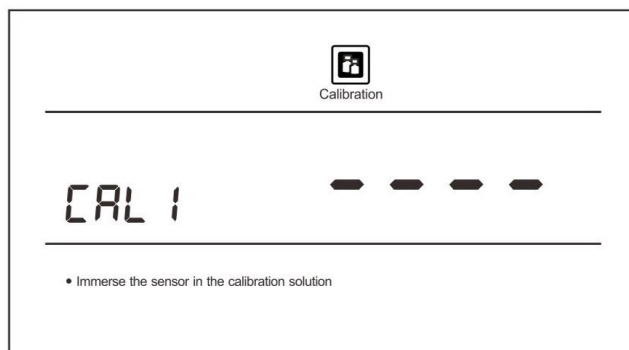
The meter allows 1 to 3 points calibration in the automatic calibration mode. To ensure higher accuracy, we recommend that you perform 3 points calibration or select a standard value close to the sample value you are measuring. The meter will automatically detect these conductivity standard solutions and prompt the user to calibrate the meter. When the calibration is completed, all new calibration values will automatically override existing data.

The following table shows acceptable conductivity range of standard solution for each measuring range.

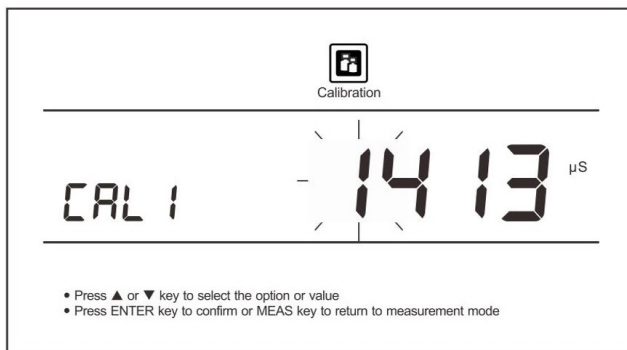
MEASURING RANGE	CALIBRATION SOLUTION RANGE	DEFAULT
0~20 μ S/cm	7~17 μ S/cm	10 μ S/cm
20~200 μ S/cm	70~170 μ S/cm	84 μ S/cm
200~2000 μ S/cm	700~1700 μ S/cm	1413 μ S/cm
2~20mS/cm	7~17mS/cm	12.88mS/cm
20~200mS/cm	70~170mS/cm	111.8mS/cm

Single point calibration

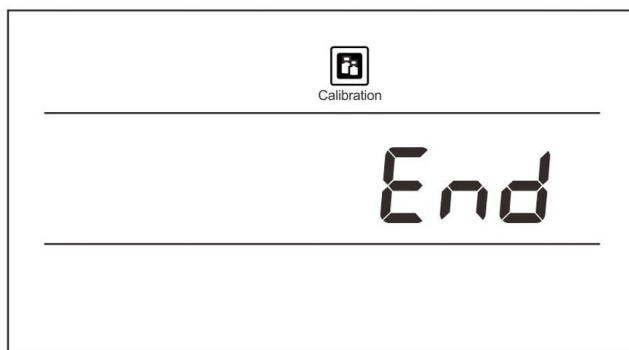
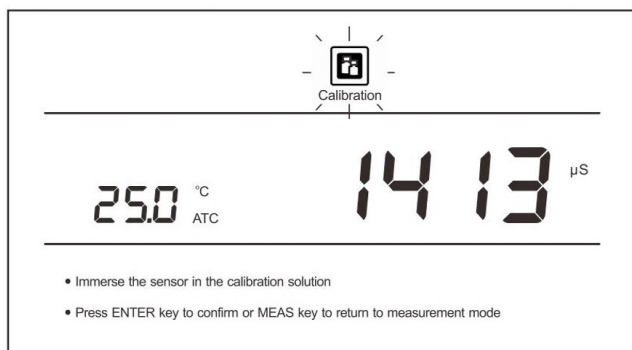
- 1.1 Make sure that you have selected 1 point calibration in the setup menu.
- 1.2 Rinse the conductivity electrode with distilled water, then rinse with a small amount of standard solution.
- 1.3 Press the **Cal** key, the display shows "CAL1" and waits for recognizing the standard solution.



- 1.4 Place the electrode into the conductivity standard solution, the meter automatically shows current calibration standard (e.g., 1413 μ S/cm).
- 1.5 Press the **Enter** key, the default calibration value begins flashing.

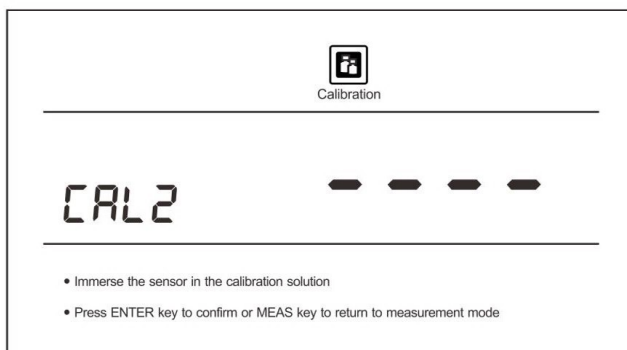


- 1.6 Press the ◀ or ▶ key to set the calibration value, press the **Enter** key to confirm and move to next digit. When the setting is completed, ensure that displayed value matches your calibration standard.
- 1.7 Press the **Enter** key, the meter begins the calibration, the Calibration icon will continuously flashing. Wait for the reading to stabilize, the display will show END. Single point calibration is completed.

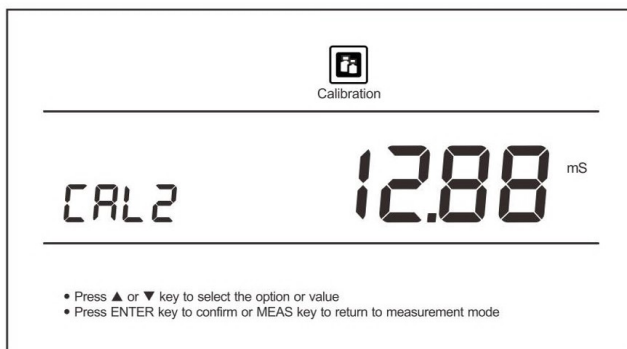


Multi-point calibration

- 2.1 Ensure that you have selected 2 or 3 points calibration in the setup menu.
- 2.2 Repeat steps 1.2 to 1.7 above, when the first calibration point is completed, the display will show "CAL2". The meter prompts you to continue with second point calibration.



- 2.3 Rinse and place the electrode into the standard solution, the display automatically shows current calibration standard (e.g., 12.88mS/cm).

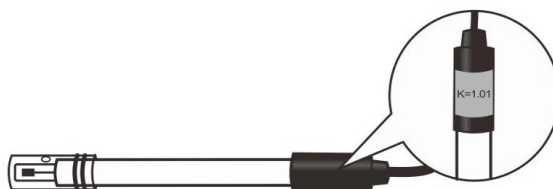


- 2.4 Press the **Enter** key, the default calibration value begins flashing.
- 2.5 Press the **◀** or **▶** key to set the calibration value, press the **Enter** key to confirm and move to next digit. When the setting is completed, press the **Enter** key, the meter begins the calibration, the Calibration icon will continuously flashing.
- 2.6 Wait for the reading to stabilize, the display will show "CAL3". The meter prompts you to continue with third point calibration.
- 2.7 Repeat the steps 2.3 and 2.5 above until the meter returns to the measurement mode. Calibration is completed.

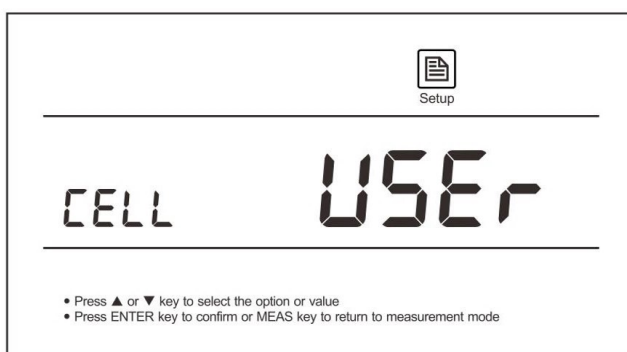
Manual Calibration

The DDS-12DW conductivity meter provides an easy manual calibration mode. If the conductivity standard solution is not ready, you are able to use this method for calibration.

- 3.1 Record the cell constant value on the conductivity electrode (e.g., $K=1.01$).



- 3.2 Press and hold the **Menu** key for 3 seconds to enter the setup menu.
- 3.3 Press the **Enter** key, the display shows "CELL/1".
- 3.4 Press the **◀** or **▶** key until the display shows "CELL/USER" (User-defined) option.



- 3.5 Press the **Enter** key, the default value begin flashing.
- 3.6 Press the **◀** or **▶** key to set each digit according to previous record.
- 3.7 Press the **Enter** key to confirm until the setting values stop flashing.
- 3.8 Press the **Meas** key to return to the measurement mode. Calibration is completed.

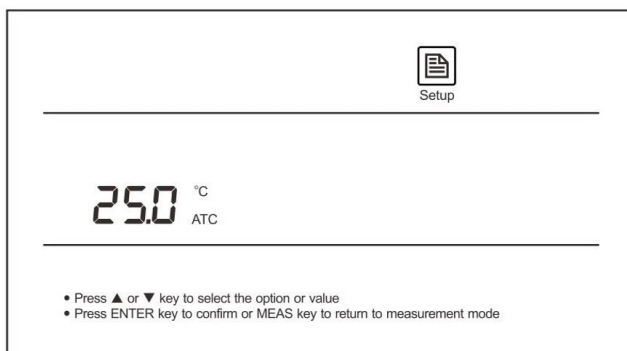
Exit the Calibration

During the calibration process, press the **Meas** key, the meter will exit the calibration and return to the measurement mode.

Temperature Calibration

During the measurement process, if the temperature reading displayed differs from that of an accurate thermometer, the meter needs to be calibrated.

1. Connect the temperature probe to the meter and place into a solution with a known accurate temperature.
2. Press the **°C** key to enter the temperature setting mode.
3. Press the **▲** or **▼** key to set the temperature value.
4. Press the **Enter** key, the meter returns to the measurement mode. Calibrating is completed.

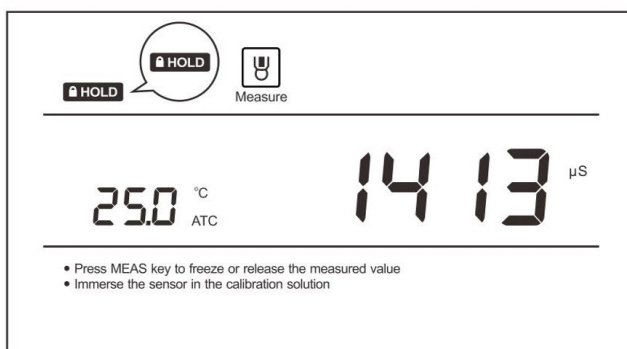


Conductivity Measurement

1. Rinse the conductivity electrode thoroughly with distilled water.
2. Place the electrode into the sample solution, stir the electrode gently.
3. Record the measured value when the reading is stable.

Auto-Hold

The DDS-12DW conductivity meter contains an Auto-Hold function. If enabled, the meter will automatically sense a stable reading and lock the measurements, the HOLD icon appears on the display. If disabled, press the **■** key, the meter will immediately lock the displayed value. Press the **Meas** key to resume measuring.



Electrode Care and Maintenance

- DO NOT touch the measurement area of electrode and always make sure that is clean.
- If there is a build-up of solids inside the measurement area, these should be removed very carefully with a cotton bud soaked in solvent, taking care not to touch the metal parts of the inner cell. After the solids are removed, the electrode must be recalibrated.



Troubleshooting

LCD DISPLAY	CAUSE	CORRECTIVE ACTION
---	Electrode dried out	Soak the conductivity electrode in tap water for 10 minutes.
	Measured value is out of range	Check the electrode whether dirty or broken.
Err	Electrode does not suit the current sample	Replace the conductivity electrode.
	Setting value does not match calibration solution	Reset the calibration value or check the calibration solution.
	Electrode is broken	Replace the conductivity electrode.

Specifications

Conductivity	Model	DDS-12DW
	Range	0.01~20.00, 200.0, 2000μS/cm, 20.00, 200.0mS/cm
	Accuracy	±1% F.S
	Resolution	0.001, 0.01, 0.1, 1
	Calibration Points	1 to 3 points
	Calibration Solutions	10μS/cm, 84μS/cm, 1413μS/cm, 12.88mS/cm, 111.8mS/cm
Temperature	Range	0~105°C, 32~221°F
	Accuracy	±1°C
	Resolution	0.1°C
	Calibration Points	1 point
General	Temperature Compensation	0~100°C, 32~212°F, Manual or Automatic
	Temperature Coefficient	0.0~10.0%/°C
	Cell Constant	K=0.1, 1, 10
	Normalization Temperature	25°C
	Connector	6-pin
	Display	LCD (135 × 75mm)
	Power Requirements	DC9V, using AC adapters, 220VAC/50Hz
	Dimensions	210 (L) × 205 (W) × 75 (H)mm
	Weight	1.5kg

Addendum 1: Preparation of Conductivity Standard Solutions

Place AR potassium chloride reagent in a 50ml beaker and dry in an oven for 3 to 5 hours at 105°C, then cool to room temperature in desiccator.

CALIBRATION SOLUTIONS	REAGENT
84μS/cm	Accurately weigh out 42.35mg of KCL and dissolve in 1 litre deionised water.
1413μS/cm	Accurately weigh out 745.9mg of KCL and dissolve in 1 litre deionised water.
12.88mS/cm	Accurately weigh out 7.45g of KCL and dissolve in 1 litre deionised water.
111.8mS/cm	Accurately weigh out 74.5g of KCL and dissolve in 1 litre deionised water.

Stir the solution until the reagent has thoroughly mixed. Preparation is completed.

Addendum 2: How to calculate the temperature coefficient

To determine the temperature coefficient of sample solution use the formula below:

$$T_c = \frac{C_{TB} - C_{TA}}{C_{TA}(T_B - 25) - C_{TB}(T_A - 25)} \times 100\%$$

Where:

T_C = Temperature coefficient

C_{TA} = Conductivity at Temperature A

C_{TB} = Conductivity at Temperature B

T_A = Temperature A

T_B = Temperature B

1. Press and hold the **°C** key for 3 seconds to enter the temperature setting.
2. Press the **▲** or **▼** key to set the temperature to 25°C.
3. Place the electrode into the sample solution A and record the temperature value T_A and conductivity value C_{TA} .
4. Condition the sample solution and electrode to a temperature that is about 5°C to 10°C different from T_A . Record the temperature value T_B and conductivity value C_{TB} .
5. Calculate the temperature coefficient according to the formula above.

Hazardous Substance Statement

Instruments is committed to the reduction and eventual elimination of all hazardous substances in both the manufacturing process and finished products we supply. We have an active manufacturing and procurement program to minimize and eliminate the use of harmful heavy metals such as cadmium, lead, mercury and the like. New technologies and design parameters are also promoting these efforts and we expect to have little or no such materials in our product in the coming years. We welcome our customer suggestions on how to speed up these efforts.



Warranty

The warranty period for meter is one year from the date of shipment. Above warranty does not cover the sensor and calibration solutions. Out of warranty products will be repaired on a charged basis. The warranty on your meter shall not apply to defects resulting from:

- Improper or inadequate maintenance by customer.
- Unauthorized modification or misuse.
- Operation outside of the environment specifications of the products.

For more information, please contact the nearest authorized distributor.