

Operation Manual

MODEL 3173/3173R

**MICROCOMPUTER BASED
Conductivity/Salinity/TDS
& Temperature
BENCH METER**



3173/3173R

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3173/3173R

INITIAL INSPECTION

Carefully unpack the instrument and accessories. Inspect for damages made in shipment. If any damage is found, notify your **Jenco** representative immediately. All packing materials should be saved until satisfactory operation is confirmed.

GENERAL INTRODUCTION

The **Jenco Model 3173/3173R** Bench System is a microprocessor based instrument designed for use in field, laboratories and process control applications. Using a two-wire electrode cell, it is user-friendly for the precise measurements of conductivity, salinity, TDS (Total Dissolved Solids) and temperature.

The model 3173/3173R micro-processor allows the user to easily recalibrate the parameters for the probe. A few keystrokes will adjust all the parameters for compensated and uncompensated conductivity and will also give the user the option to select three types (**0.1, 1.0, 10**) of probe cell constant for a better selection of available probes and applications. And the user can input **K** value of the cell by keyboard directly.

The system simultaneously displays temperature in along with either Compensated Conductivity, Uncompensated Conductivity, Salinity or TDS. The user can switch back and forth from all these displays by just pushing a single [**MODE**] key.

This instrument is powered by six AAA-size alkaline batteries or with a UL approved AC adapter (OUTPUT: DC 9V). The instrument also displays a "**LO BAT**" message when the batteries are in need of replacement.

Optional RS-232C can trace all displayed values and interface the meter with recorders, printers, or computers, etc. This is only for 3173R.

Other features include large LCD display, touch keys with audio feedback, percentage of power supply display, auto-ranging conductivity, auto-saving calibration values and high 50/60Hz AC noise rejection.

USING THE METER

THE DISPLAY

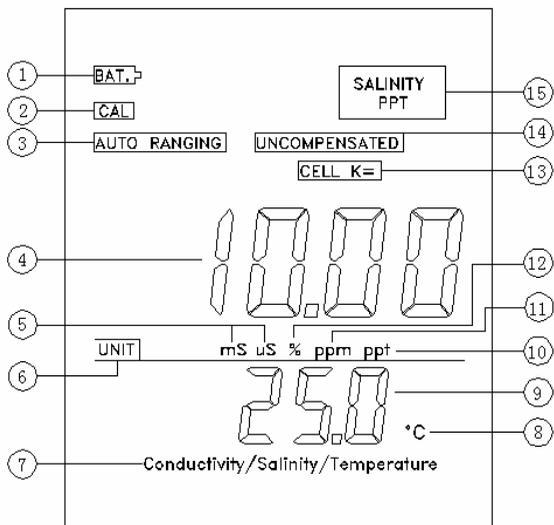


FIGURE 1

- | | |
|-------------------------------------|-------------------------------|
| 1.BAT. | : Low battery indicator. |
| 2.CAL | : Calibration mode indicator. |
| 3.AUTO RANGING | : Auto ranging indicator. |
| 4.10.00 | : Main display. |
| 5. mS、 uS | : Unit indicator. |
| 6. UNIT | : Conductivity units. |
| 7.Conductivity/Salinity/Temperature | : Parameters of this meter. |
| 8. | : Temperature unit. |
| 9.25.0 | : Secondary display. |
| 10.ppt | : TDS unit or salinity unit. |
| 11.ppm | : TDS unit. |
| 12.% | : Percentage unit. |
| 13.CELL K= | : K value. |
| 14.UNCOMPENSATED | : Uncompensated indicator. |
| 15.SALINITY ppt | : Salinity and its unit. |

THE KEYPAD

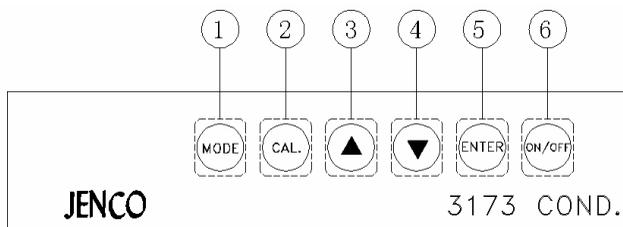


FIGURE 2

1. The [**MODE**] key. In normal operation this key will change the display to Conductivity, compensated Conductivity, Salinity and TDS displays. In calibration mode this key will exit the current parameter calibration and go to the next calibration parameter.
2. The [**CAL**] key. During normal operation this key will change the mode from normal to calibration mode. See section **CALIBRATION SET-UP**.
3. The [**▲**] key. This key is used during calibration to increment the value / choose parameters of the display.
4. The [**▼**] key. This key is used during calibration to decrement the value / choose parameters of the display.
5. The [**ENTER**] key. During calibration set-up, this key will save the current parameter.
6. The [**ON/OFF**] key. This key will turn on or turn off the instrument. The last display mode will be saved.

CONNECTORS

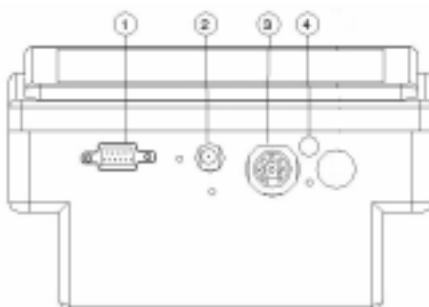


FIGURE3

- | | |
|--|-------------------------|
| 1. RS-232C connector (for 3173R only) | 2. AC ADAPTER connector |
| 3. PROBE connector | 4. No use |

REPLACING THE BATTERIES

Follow the procedures to replace the internal batteries.

1. Replace batteries when the **BAT** indicator appears on the LCD. The instrument can operate within specifications for approximately one hour after **BAT** starts to appear.
2. The battery compartment is located at the bottom side of the meter (Refer to Figure 4).
Flip the meter over so that the bottom side is facing up. Lift the battery compartment cover to expose the battery compartment.
3. Replace all six type AA batteries.
4. Replace battery compartment cover.

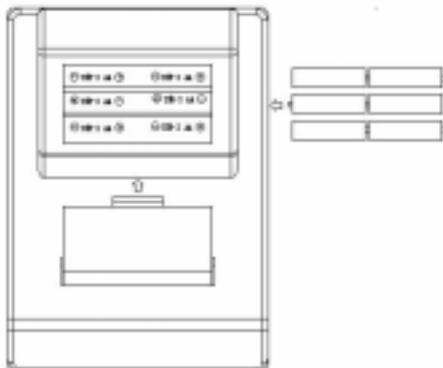


FIGURE 4

TURNING ON / OFF THE INSTRUMENT

Once the batteries are installed correctly and / or an AC adapter is plugged in the unit, it automatically turns on. If not, press the **[ON/OFF]** key to turn it on. It will activate all segments of display for a few seconds then it will display the current cell constant. After a little while it will display the percentage of power supply. After the self-diagnostic is completed the temperature will be displayed on the LCD and the instrument is ready to make a measurement. Immerse the probe half-way in the solution. If possible do not allow the probe to touch any solid object in the solution. There should be no air bubbles around the probe either. Shaking or moving the probe vigorously before recording any measurement will dislodge any bubble formed in the probe.

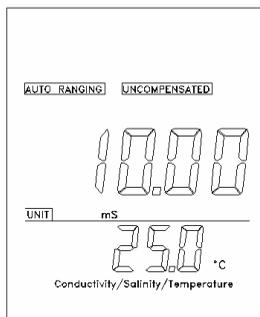
When the unit is not in use, the user should turn off the instrument by pressing the **[ON/OFF]** key to save battery life. **By just unplugging the AC adapter will not turn off the instrument if batteries are present, it would automatically switch to battery power and will continue to operate.**

MODES OF THE METER

This instrument has four modes as follow:

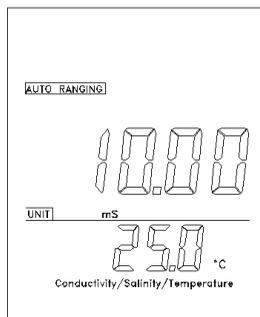
1. **Conductivity** (uS or mS):

A measurement of the conductive material in the solution with no regard to temperature.



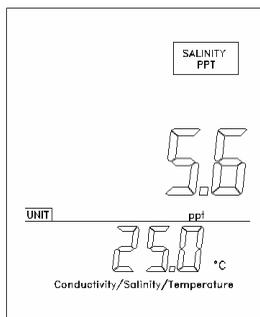
2. **Compensated Conductivity** (uS or mS):

Also known as temperature compensated conductivity which automatically adjusts to a calculated value which would have been read if the sample had been at 25 (or some other reference temperature which the user chooses). See section **CALIBRATION SETUP**.



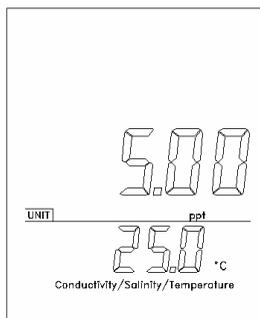
3. **Salinity** (ppt):

A measurement of the salinity in the solution, the calculation is based on the Conductivity and Temperature.



4. **TDS** (ppm or ppt):

A measurement of the total dissolved solids (TDS), the calculation is based on the Compensated Conductivity.



Temperature is always displayed in all modes.

To change between modes, simply press and release the [MODE] key, the unit will cycle through these four modes. When change mode, please carefully observe the annunciators on the LCD.

Note : Every time the unit is turned **OFF** the last mode will be saved so that when turn the instrument **ON** again it will return to this mode.

CALIBRATION SET-UP

BEFORE CALIBRATE

System calibration is rarely required as **Model 3173/3173R** were all factory pre-calibrated. However, from time to time it is wise to check the system calibration and make adjustment when necessary.

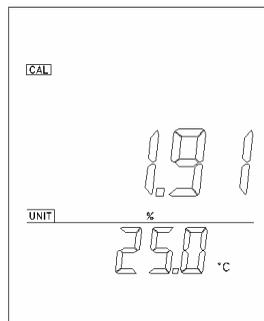
When the new probe / instrument is used, **CALIBRATION** should be performed, since the cell constant of conductivity probes may differ from each other.

CALIBRATION PROCESS

1. After the power-on diagnostics, press the [CAL] key and the **CAL** annunciator will appear on the display.

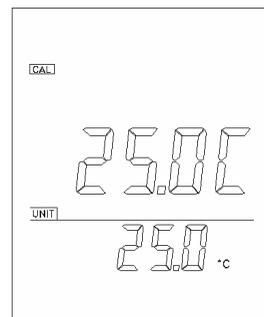
TEMPERATURE COEFFICIENT

- The unit will display **1.91%** or a value set previously using this procedure. Use the [Δ] and [▽] keys to change the value to the desired new **temperature coefficient**.
- Press the [ENTER] key to save the new value of **temperature coefficient** or press the [MODE] key to exit (and go to the next calibration parameter).



TEMPERATURE REFERENCE

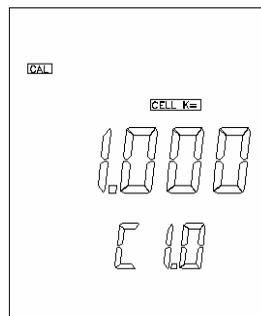
- The unit will display **25.0C** or a value set previously using this procedure. Use the [Δ] and [▽] keys to change the value to the desired new **temperature reference**.
- Press the [ENTER] key to save the new value of



temperature reference or press the [MODE] key to exit (and go to the next calibration parameter).

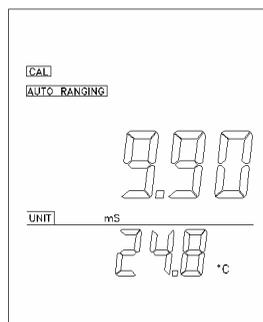
PROBE BASIC CELL CONSTANT

- The unit will display the actual (calibrated previously or default) cell constant while the lower part of the LCD will display the current selected **cell number**. Using the [Δ] and [∇] keys, you can now change the **probe basic cell constant** to that you use from the 3 available cell constants (**0.1, 1** and **10**).
- Press the [ENTER] key to save the new value of **probe basic cell constant** or press the [MODE] key to exit (and go to the next calibration parameter).



CELL CONSTANT CALBRATION

- Immerse the probe to a known standard conductivity solution (See section **PREPARING & STORAGE STANDARD SOLUTIONS**) that is chosen to calibrate your probe. The unit will display the conductivity value of the standard solution. During cell constant calibration, the following parameters are over-ridden: temperature reference (fixed to 25.0 °C) and temperature coefficient (fixed to 1.91%).
- Wait for the values of temperature and conductivity to stabilize for a few seconds.



*If you want input **K value** directly, please press the [MODE] key to go to the **Step 11**.*

Using the [Δ] and [∇] keys, you can now adjust the reading of the display until it matches the value of the known standard conductivity solution at 25 °C.

- Press the [ENTER] key to calculate and save the new value of **cell constant** or press the [MODE] key to exit (and go to the next calibration parameter).

K VALUE INPUT

11. The instrument will display the conductivity value of the standard solution with the **CELL K=** flashing.

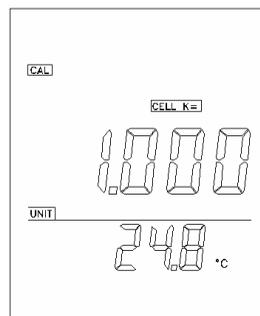
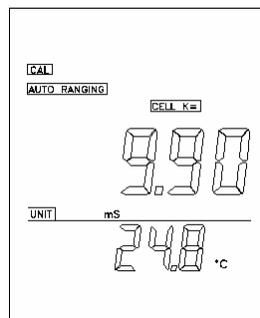
*If the **CELL CONSTANT** has been calibrated by using Step 9 & 10, please press the [MODE] key to exit calibration and return to normal operation.*

When you press the [Δ] or [▽] keys, the unit will display **K** value with the **CELL K=** staying on. Using the [Δ] and [▽] keys, you can now input the **K value** (from 70% to 130% of the probe basic cell constant).

After release the [Δ] or [▽] keys for 2 seconds, the unit will display the conductivity value with the **CELL K=** flashing again.

12. Adjust the **K** value until the conductivity value displayed on the LCD matches the value of the known standard conductivity solution at 25 .

13. Press the [ENTER] key to save the new **K value** of the cell or press the [MODE] key to exit calibration and return to normal operation.



MEASUREMENTS

The **Model 3173/3173R** is an autoranging instrument. This means that, regardless of the conductivity of the solution (within the specifications of the instrument), all you need to do to get the most accurate reading is to put the probe into the sample.

After immersing the probe into the solution, the unit will automatically find the right range for the solution. During the search, the unit will display “**rAnG**” on the LCD. The **AUTORANGING** will take a few seconds after which the measurement will be displayed. Press and release the [MODE] key to show values in other parameters.

RS-232C INTERFACE OPERATION (For 3173R only)

INTRODUCTION

The RS-232C interface feature can track all displayed values and interface your **Jenco** meter with recorders, printers, computers, etc. For example, the user can log all data simultaneously to an interfaced IBM PC/AT compatible computer.

This section assumes you are familiar with the basics of data communication, the RS-232C interface, programming with computer languages, like Delphi, VB, VC, etc. A simple program must be written in order to send command and receive data from the unit.

If you do not have that knowledge, you must have a rudimentary knowledge and a copy of the more popular Windows[®] 98 operating system or a later version of Microsoft's Windows[®] operating system capable of using COM port. In addition you must also have an interface cable of the DB-9 type (sometimes also called a Serial port connector) and that the wiring of that connector is wired to be compatible to the RS-232C standard for RxD, Receive Data and TxD, Transmit Data and Circuit Common.

To use the RS-232C interface, you must choose either to download on line from the **Jenco** website at <http://www.jencoi.com/> a general Windows[®] compatible program that allows you to receive data from the **Jenco** meter as pre-programmed by that Windows[®] compatible program or you must custom write your own simple program to send the commands you want to the **Jenco** meter and to receive back the specific data sampled at the time intervals you specify in your custom written program.

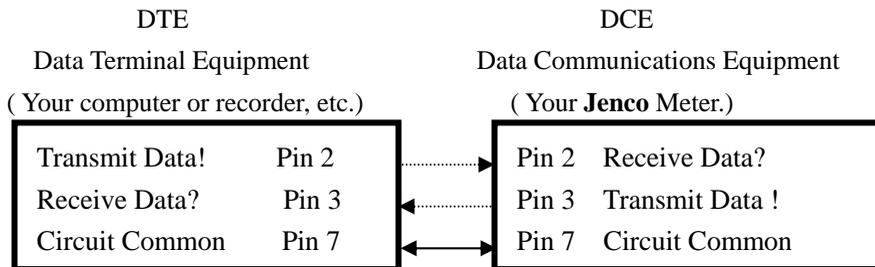
PREPARATION

The **Jenco** unit communicates with a PC computer (IBM PC/AT compatibles) through a DB-9 interface connector. The DB-9 must be configured to be compatible with the RS-232C standard for TxD, RxD and Circuit Common. (Please see accompanying diagram.) After you have connected the cable, turn on both the **Jenco** unit and the computer, you are now ready for the software part of the operation.

DB-9 CONNECTOR CABLE

Below is the wiring diagram showing the DB-9 connector wired to be compatible to the RS-232C standard for TxD, RxD and Circuit Common.

Note: The “Standard RS-232C” cable is a 25-Pin connector. The essential Circuit Common and TxD and RxD are shown here adapted to the DB-9 connector.



SOFTWARE

A demo program and the protocol are included in the accompanying CD. Using the demo, you can easily track or recall data from the **Jenco** meter. Please read the protocol to understand more about the procedure in detail. You may also choose to download from our website a pre-programmed Windows[®] compatible program but you will be limited to tracking and recalling data as preset in those programs.

PREPARING & STORAGE STANDARD SOLUTIONS

Suitable conductivity standards are available commercially or the user can prepare them using research grade reagents.

Here are some standard solutions the user can prepare to calibrate the probe of the **Model 3173/3173R**.

1. Standard solution of **1413 μ S at 25°C** : Accurately weight out **0.746 grams** of research grade dried Potassium Chloride (**KCl**). Dissolve it in **1000ml** of deionized water
2. Standard solution of **12.90 mS at 25°C** : Accurately weight out **7.4365 grams** of research grade dried Potassium Chloride (**KCl**). Dissolve it in **1000ml** of deionized water

3. Standard solution of **111.0 mS at 25°C** : Accurately weight out **74.2640 grams** of research grade dried Potassium Chloride (**KCl**). Dissolve it in **1000ml** of deionized water

You can store the remaining solution in a plastic container for one week but the air space between the cap and the solution must be kept to an absolute minimum. The storage life can be prolonged by storing the solution below 4°C. If you have any doubt of the accuracy of the stored solution, a fresh batch should be prepared.

ERROR DISPLAYS

Main Display	Secondary Display	Mode/State	Reasons
OuEr OuEr	-10.0 ~ 120.0 OuE/Und	Uncompensated conductivity measurement	Uncompensated conductivity is out of the range. Temperature is out of the -10.0 ~ 120 range.
OuEr OuEr LErr	-10.0 ~ 120.0 OuE/Und -10.0 ~ 120.0	Compensated conductivity measurement	Compensated conductivity is out of the range. Temperature is out of the -10.0 ~ 120 range. Temperature exceeds the limit (compute using the current temperature coefficient and temperature reference).
OuEr OuEr	-10.0 ~ 120.0 OuE/Und	Salinity measurement	Salinity value is out of the range. Temperature is out of the -10.0 ~ 120 range.
OuEr OuEr LErr	-10.0 ~ 120.0 OuE/Und -10.0 ~ 120.0	TDS measurement	TDS value is out of the range. Temperature is out of the -10.0 ~ 120 range. Temperature exceeds the limit (Compute using the current temperature coefficient and temperature reference).
OuEr Undr		Cell constant calibration	Cell constant calibration is greater than $\pm 30\%$ of the selected basic cell constant.
	OuE/Und	Temperature measurement	Temperature is out of the -10.0 ~ 120 range.

SPECIFICATIONS

DISPLAY	RANGE	RESOLUTION	ACCURACY	RANGE of TDS (0.5)
Conductivity (PROBE CELL CONSTANT = 0.1)	0 ~ 20.00 uS/cm	0.01 uS/cm	±0.5% FS	0 ~ 10.00 ppm
	20.0 ~ 200.0 uS/cm	0.1 uS/cm	±0.5% FS	10.0 ~ 100.0 pm
	200 ~ 2000 uS/cm	1 uS/cm	±0.5% FS	100 ~ 1000 ppm
Conductivity (PROBE CELL CONSTANT = 1)	0 ~ 200.0 uS/cm	0.1 uS/cm	±0.5% FS	0 ~ 100.0 ppm
	200 ~ 2000 uS/cm	1 uS/cm	±0.5% FS	100 ~ 1000 ppm
	2.00 ~ 20.00 mS/cm	0.01 mS/cm	±0.5% FS	1.00 ~ 10.00 ppt
Conductivity (PROBE CELL CONSTANT = 10)	0 ~ 2000 uS/cm	1 uS/cm	±0.5% FS	0 ~ 1000 ppm
	2.00 ~ 20.00 mS/cm	0.01 mS/cm	±0.5% FS	1.00 ~ 10.00 ppt
	20.0 ~ 200.0 mS/cm	0.1 mS/cm	±0.5% FS	10.0 ~ 100.0 ppt

DISPLAY	RANGE	RESOLUTION	ACCURACY
Salinity	0.0 ~ 80.0 ppt	0.1 ppt	±1% FS
Temperature	-10.0 ~ 120.0	0.1	±0.5

Temperature sensor	Thermistor, 10k , at 25
Cell constant	0.1, 1.0, 10 ; user selectable
Reference temperature	From 15.0 to 25.0 , default 25.0 ; user adjustable
Temperature coefficient	From 0.00 to 4.00%, default 1.91%; user adjustable
K value	From 70% to 130% of the probe basic cell constant
TDS constant	0.5 (Fixed)
LCD character size	21mm / 16mm high
Calibration Back-up	Yes
Automatic temperature compensation	Yes
Audio Feedback	All Touch Keys
Communication	RS-232C output (for 3173R only)
Power Supply	6 AA batteries / AC adaptor (Output: DC 9V)
Ambient temperature	From 0 to 50
Relative humidity	Up to 95%
Weight (Batteries not included)	About 650 grams
Dimensions	230mm x 165 mm x 80 mm

WARRANTY

Jenco Instruments, Ltd. warrants this product to be free from significant deviations in material and workmanship for a period of 3 years from date of purchase. If repair or adjustment is necessary and has not been the result of abuse or misuse, within the year period, please return-freight-prepaid and the correction of the defect will be made without charge. If you purchased the item from our **Jenco** distributors and it is under warranty, please contact them to notify us of the situation. **Jenco** Service Department alone will determine if the product problem is due to deviations or customer misuse.

Out-of –warranty products will be repaired on a charge basis.

RETURN OF ITEMS

Authorization must be obtained from one of our representatives before returning items for any reason. When applying for authorization, please have the model and serial number handy, including data regarding the reason for return. For your protection, items must be carefully packed to prevent damage in shipment and insured against possible damage or loss. **Jenco** will not be responsible for damage resulting from careless or insufficient packing. A fee will be charged on all unauthorized returns.

NOTE: Jenco Instruments, Inc reserves the right to make improvements in design, construction, and appearance of our products without notice.

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Version 03 (090629)

使用说明书					
机型	3173	编制人	豆林奇	编制日期	2004/09/06
文件编号	K3173-02	修改人	杨启娜	修改日期	2009-6-29
版本号	03	核准人		核准日期	

04-11-05:Because changing the input K value, the operation is not as same as the primary. So the manual should be rewrote. Version 2 .

09-6-29:修改或增加 EMAIL 地址信息