

OPERATION MANUAL

JENCO MODEL 9101 MICROCOMPUTER BASED Dissolved Oxygen/Temperature BENCH METER

JENCO ELECTRONICS, LTD.
MANUFACTURER OF PRECISION INSTRUMENTS

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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 9101 Bench Type Dissolved Oxygen, Temperature System is a rugged, microprocessor based instrument designed for use in laboratories and process control applications, using a polygraphic clark type sensor (available in two models, see ACCESSORIES and REPLACEMENTS), it is an essential tool for precise measurements of dissolved oxygen and temperature.

The model 9101 micro-processor allows the user to easily recalibrate the parameters for the probe. The system requires only a single calibration, regardless of which dissolved oxygen display you use.

The system simultaneously displays temperature in ° C along with either Dissolved Oxygen in % air-saturation or mg/L (milligrams per liter). The user can switch back and forth from the two displays by just pressing the [MODE] key.

A calibration bottle is included with the instrument. A small sponge in the bottle can be moistened to provide a water saturated air environment which is ideal for air calibration procedures. This bottle is also designed for transporting and storing the probe. When the probe is stored in the bottle, the moist environment will prolong effective membrane performance and probe life.

This instrument is powered by six AA-size alkaline batteries or with a UL approved AC adapter. The instrument also displays a "LO BAT" message when the batteries are in need of replacement.

The model 9101 comes with a RS232C interface with a proprietary driver which can easily let the user log all data simultaneously to interface with an IBM® PC/AT compatible computer, making it a versatile tool for dissolved oxygen/temperature applications.

USING THE JENCO MODEL 9101

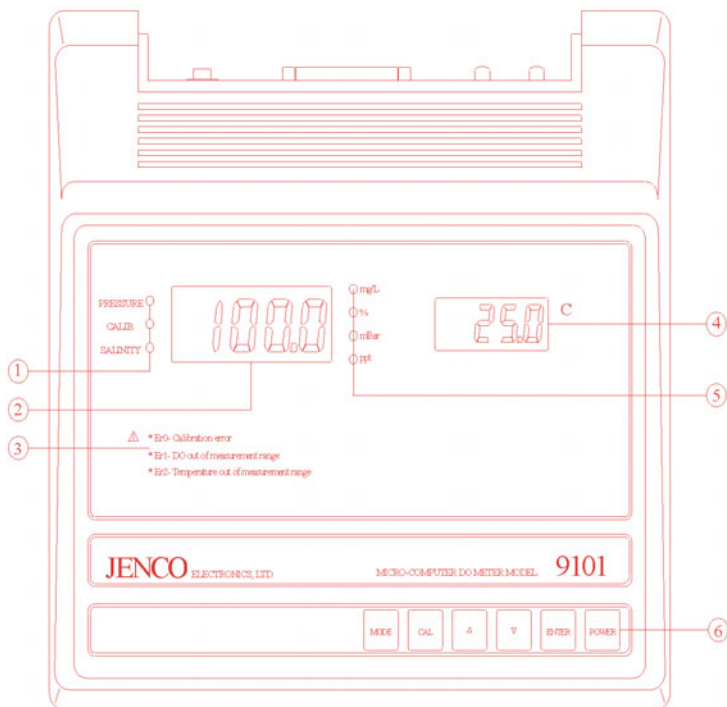


Figure 1

1. MODE LED indicators
2. DO display
3. ERROR codes
4. TEMPERATURE display
5. DO unit LED indicators
6. KEYPAD

PRECAUTIONS and MAINTENANCE

A. THE CASE

The Model 9101 front panel is SPLASH PROOF, but the instrument is not WATERPROOF. The SPLASH PROOF feature is to prevent permanent damage to the instrument when the front panel is accidentally splashed with a non-corrosive solutions.

B. THE PROBE

1. Membranes will last long time if installed properly and maintained regularly. Erratic readings are a result of damaged or fouled membranes or from large bubbles in the electrolyte reservoir. If unstable readings or sign of membrane damage occurs, you should replace the membrane and KCl solution. The average replacement interval is two to four weeks.
2. Unstable readings may occur if the membrane cap is coated with oxygen consuming (e.g. bacteria) or oxygen evolving (e.g. algae) organisms.
3. Chlorine, sulfur dioxide, nitric oxide and nitrous oxide can affect readings by behaving like oxygen at the probe.
4. Avoid any environment which contains substances that may damage the probe materials. Some of these substances are concentrated acid, caustics and strong solvents.
5. For the Jenco **Model 9101Y** , the probe's gold cathode must always be bright. If it is tarnished (which can result from contact with certain gases), or plated with silver (which can result from extended use with a loose or wrinkled membrane), the gold surface must be restored. To restore the cathode you may either return the instrument to your nearest Jenco representative, or clean it using the Jenco Probe Reconditioning kit. Never use chemicals or abrasives not supplied with this kit.

6. For the Jenco **Model 9101Y**, it is also possible for the silver anode to become contaminated, which will prevent successful calibration. To clean the anode remove the O-ring and membrane and soak the probe overnight in 3% ammonium hydroxide. Rinse the sensor tip and KCl reservoir with deionized water, add a new KCl solution, and install a new membrane and O-ring. Turn the instrument on and allow to stabilize for 30 minutes. If, after several hours you are still unable to calibrate, return the instrument to your authorized Jenco representative.

7. For the Jenco Model **9101Y**, if the O-ring is wrinkled or loose, replace it with the appropriate O-ring provided in the Jenco O-ring pack.

8. To keep the electrolyte from drying out, store the probe in the calibration bottle with the moistened sponge.

PROBE PREPARATION

The Jenco model 9101 probe is shipped dry. The protective cap on the probe must be removed and replaced the KCl solution before using the probe.

To prepare for installation of a membrane cap on your Jenco model 9101 probe :

1. Unscrew the probe membrane cap.
2. Thoroughly rinse the sensor tip and KCl reservoir with distilled water.
3. Prepare the electrolyte according to the directions on the KCl solution bottle

THE KEYPAD

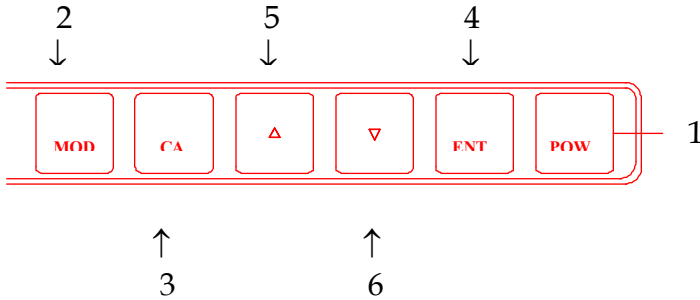
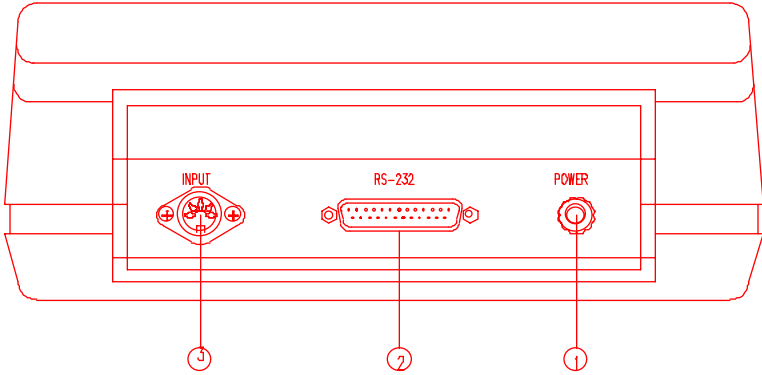


Figure 2

1. The [ON/OFF] key. This key will turn on or turn off the instrument. The last display mode will be saved.
2. The [MODE] key. In normal operation this key will change the display to Dissolved Oxygen in % air saturation or Dissolved Oxygen in mg/L. In Calibration mode this key will exit the current calibration and go to the next calibration parameter.
3. The [CAL] key. During normal operation this key will change the mode from normal to Calibration mode. See CALIBRATION SET-UP.
4. The [ENTER] key. During Calibration set-up, this key will save the current parameter to EEPROM.
5. The [Δ] key. This key is used during Calibration to increment the value of the display.
6. The [∇] key. This key is used during Calibration to decrement the value of the display.

CONNECTORS



1. DO input connector
2. RS-232 output connector
3. Power input connector

REPLACING THE BATTERIES

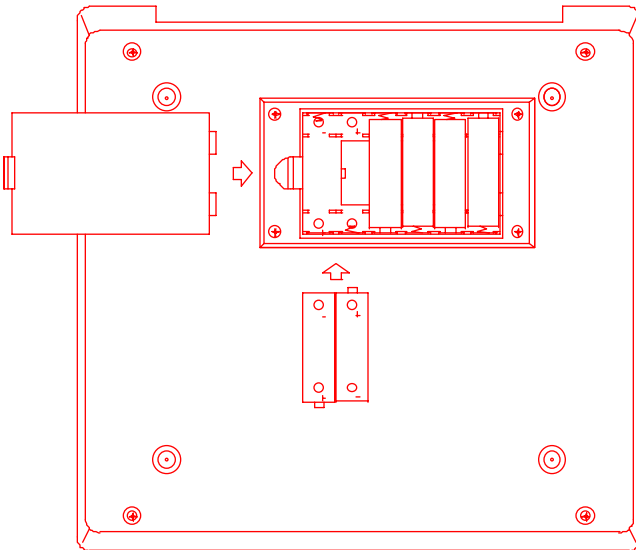


Figure 4

1. Replace the batteries when the LO BAT indicator on the LCD display starts to flash. The

instrument can operate within specifications for approximately one hour after the **LO BAT** starts to flash.

2. To replace the batteries, position the meter so that the bottom part of the meter is facing up . (Refer to figure 4.) Lift up the battery cover to expose the battery compartment.

3. Remove all of the old batteries and insert a new set of batteries ensuring the polarities are correct.

TURNING ON/OFF THE INSTRUMENT

Once the batteries are installed correctly and/or an AC adapter is installed, you can press the [ON/OFF] key to turn on or turn off the instrument. When the unit is not in use the user should turn off the instrument 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.

After the self-diagnostic is complete the temperature will be displayed in the lower right of the display and the instrument is ready to make a measurement. Just immerse the probe half-way to the liquid. 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 bubbles formed in the probe.

MODEL 9101 MODES

This instrument is designed to provide 3 distinct measurements:

1. Temperature - current temperature of the solution which is always displayed.
2. Dissolved Oxygen % - a measurement of oxygen in percent saturation.
3. Dissolved Oxygen mg/L - a measurement of oxygen in mg/L.

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

To choose any measurement mode (temperature is always included) simply press and release the [MODE] key . Carefully observe the LED annunciators units at the far side of the LCD.

PRESSURE ○
CALIB. ○
SALINITY ○

29.90

○ mg/L
• %
○ mBar
○ ppt

25.0 °C

Legends:

○ UNLIT LED
• LIT LED

For Dissolved Oxygen in % air saturation mode the unit is %.
If in Dissolved Oxygen mg/L mode the unit will be **mg/L**.

CALIBRATION SET-UP

CALIBRATION REQUIREMENTS

To accurately calibrate the Jenco Model 9101 you will need the following information:

1. The approximate pressure (in mbar) of the region in which you plan to take your dissolved oxygen measurements.
2. The approximate salinity of the water you will be analyzing. Fresh water has a salinity of approximately zero. Sea water has a salinity of approximately 35 parts per thousand (ppt).

CALIBRATION PROCEDURES

1. Place 5-6 drops of distilled water into the sponge inside the calibration bottle. Turn the bottle over and allow any excess water to drain out of the bottle. The wet sponge creates a 100% water saturated-air environment for the probe which is ideal for calibration, transport and storage of the Model 9101 probe.
2. Screw in the bottle into probe allowing at least 5 mm space between the probe and the sponge.
3. Turn on the instrument by pressing the [ON/OFF] key. Wait around 30 minutes for the dissolved oxygen and temperature readings to stabilize.

4. Press the [CAL] key.

PRESSUR	•	1013	○ mg/L
CALIB.	○		○ %
SALINITY	○		• mBar
			○ ppt

°C

5. The LCD will prompt you to enter the local pressure in mbar. Use the [Δ] or [▽] keys to increase or decrease the pressure respectively.

PRESSURE	○	98.8	○ mg/L
CALIB.	•		• %
SALINITY	○		○ mBar
			○ ppt

°C

6. When the proper pressure appears on the LCD, press the [ENTER] key once to view the calibration value in the lower right of the LCD and a second time to move to the salinity compensation procedure.

PRESSURE ○
CALIB. ○
SALINITY ●

0.0

○ mg/L
○ %
○ mBar
● ppt

°C

7. The LCD will prompt you to enter the approximate salinity of the water you about to analyze. You can enter any number from 0 to 40 parts per thousand (ppt) of salinity. Use the [Δ] or [∇] keys to increase or decrease the salinity compensation respectively. When the correct salinity appears on the LCD, press the [ENTER] key.

8. Once the calibration process is complete, the only keys you need to use are the [MODE] and [ON/OFF] keys. Unless you need to calibrate the instrument again. You can move back and forth from reading dissolved oxygen in % air saturation mode or mg/L mode by pressing the [MODE] key.

9. Each time the Jenco Model 9101 has been turned off, it may be necessary to re-calibrate before taking measurements again. All calibrations should be completed at a temperature which is close as possible to the sample temperature. Dissolved oxygen readings are only as good as the calibration.

RS232C INTERFACE OPERATION

INTRODUCTION

This section assumes you are familiar with the basics of data communication, the RS232C interface, a rudimentary knowledge and a copy of the following computer languages : Turbo BASIC, Quick BASIC, Turbo PASCAL and Turbo C.

This meter can only be operated using the RS232C interface by using a special software driver included with this meter. A simple program must be written in order to send your command and receive data from the meter by using any of the above mentioned computer languages.

An annotated sample program for each computer language and a more detailed explanation of the software driver are included in the accompanying disk.

PREPARING THE METER

This meter comes equipped with an RS232C interface. This meter communicates with a PC computer (100% IBM PC/AT compatibles) through a DB-25 interface connector. A standard RS232C cable used for interconnecting two IBM PC/ATs can also be used for this operation.

After you have connected the cable and turned on both the meter and the computer, you are now ready for the software preparation.

SOFTWARE

The accompanying disk includes a special driver to let you write a simple program to read data from the meter. By incorporating the driver into your software, you can then use the special commands

without worrying about the protocol between the meter and your computer.

Read the file "MAN9101.TXT" in the accompanying disk to jump-start you in using the meter with its RS232C interface.

ERROR DISPLAYS

MAIN DISPLAY	2NDARY DISPLAY	POSSIBLE CAUSE
"Er 0"		Instrument detects improper probe voltage during calibration.
"Er 1" or "ovr"		Dissolved oxygen reading is out of range.
	"Er 2" or "udr"	Temperature is less than -6.0 °C.
	"Er 2" or "ovr"	Temperature is greater than 46.0 °C.
"Er 4"		Sample O ₂ concentration is greater than 20.00 mg/L.
"Er 5"		Sample O ₂ concentration is less than -0.50 mg/L.
"Er 6"		Sample % air-saturation is greater than 200.0 %.
"Er 7"		Sample % air-saturation is less than -3.00 %.

SPECIFICATIONS

Display	Range	Accuracy	Resolution
Dissolved O ₂ (mg/L)	0 to 20.00 mg/L	±0.2 % of span	0.01 mg/L
Dissolved O ₂ % air-sat	0 to 199.9 %	±0.2 % of span	0.1 %
Temperature (°C)	-6.0 to 46.0°C	±0.1 °C ± 1 lsd	0.1 °C

Temperature

Sensor type : Thermistor, 10k Ω (model 9101A)
: Thermistor 2.252k Ω (model 9101Y)

Ambient temperature
operating range : 0 to 50 °C

PC Communication

Connector : RS232C compatible DB-25
connector, connects directly to
PC (IBM PC/AT 100% compatible)
serial port via a null modem
connector.

Software : Source code libraries are provided for
Turbo Basic, Quick Basic,
Turbo Pascal and Turbo C.
Supports Com1 to Com4.

Baud Rate : 300,600, 1200, 2400 & 4800

POWER

Power supply : 6 AA batteries/ 9V AC adapter

Battery Life (Alkaline) : ~ 50 Hours (typical)

DIMENSIONS

Main display : 15mm high
2ndary display : 8.7mm high
Case length : 240 mm
Case height : 100 mm
Width : 250 mm
Weight : 1010g (batteries included)

ACCESSORIES AND REPLACEMENTS

JENCO ORDER NUMBER	DESCRIPTION
9000DO	Model 9101A DO probe
9003DO	Model 9101A screw-on replacement cap
9001DO	Refill solution
5717	Model 9101Y DO Field probe
5716	Model 9101Y DO Lab probe
	Model 9101Y O-Ring pack
	Model 9101Y probe reconditioning kit
059880	Model 9101Y membrane kit

WARRANTY

Jenco Instruments, Ltd. Warrants this product to be free from significant deviations in material and workmanship for a period of 1 year 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.

JENCO INSTRUMENTS, INC.

7968 Arjons Drive, Suite C
San Diego, CA 92126 USA
TEL: 858-578-2828 FAX: 858-578-2886
Homepage:<http://www.jencoi.com>
E-MAIL: jencoi@ix.netcom.com

JENCO ELECTRONICS, LTD.

PO. BOX LINKOU 117
TAIPEI, TAIWAN
TEL: 02 601-6191 FAX: 02 601-7206
Homepage:<http://www.jenco.com.cn/big5/index.htm>
E-MAIL: jencoe@ms2.hinet.net

SHANGHAI JENCO ELECTRONICS, LTD.

18 Wang Dong Zhong Road
Sijing Town, Songjiang
SHANGHAI, CHINA
TEL: (86-021)5761-9599 FAX: (86-021)5761-9598
E-MAIL: jenco@public.sta.net.cn
Homepage:<http://www.jenco.com.cn>