

OPERATION MANUAL

MICROCOMPUTER BASED
pH/mV/ION/TEMP PORTABLE
METER MODEL 6250

JENCO ELECTRONICS, LTD.
MANUFACTURER OF PRECISION INSTRUMENTS

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 model 6250 is a precise instrument for the measurement of pH, mV, Ion and Temperature. A built-in microcomputer is used to store, calculate, and compensate for all the relevant parameters relating to pH determinations. These include temperature characteristics of the pH electrode, buffer solutions and electrode slope deviations.

This meter can measure specific ion concentration directly in the **ION** mode. The **ION** mode provides a digital readout in any concentration units.

The **RESOL.** key can select different resolution of pH and mV measurements.

Additional features include splash proof touch keys with audio feedback, buffer recognition, electrode slope recognition, ATC(Automatic Temperature Compensation) capabilities, temperature measurement to 0.1 °C, visual and audio operational error indicators, simplicity of operations, low battery indicator, large LCD that displays pH (mV/ion) and temperature values of the sample simultaneously. Model 6250 is an ideal "USER FRIENDLY" instrument for field, industrial, and laboratory applications.

Model 6250 uses 4.00, 7.00, and 10.01 pH standard buffers, while model 6250C uses 4.00, 6.86, and 9.18 pH standard buffers. *Make sure the model number corresponds to the correct buffer type you ordered.*

POWER SOURCE

The Jenco model 6250 operates on either six AAA size alkaline batteries or AC adaptor. When batteries need to be replaced, the LCD will display a “**LO BAT**” message. Insert batteries as described below.

BATTERY INSTALLATION

1. Replace batteries when the **LO BAT** indicator on the LCD display starts to flash. The meter can operate within specifications for approximately one hour after **LO BAT** starts to flash. You must replace the new batteries when **OFF** is displayed, i.e. automatic turn **OFF** to prevent incorrect measurements.
2. Position the meter so that the left side of the meter is facing up. Refer to **Figure 1**. With a coin, insert it in the closure slot on the side labeled **A**. With the coin tilted, thrust it upward to open the battery compartment and lift the closure up.
3. Insert the batteries and ensure polarities are correct.
4. Replace battery compartment closure.

TURN OFF INSTRUMENT

When the instrument is not in use, press the **ON/OFF** key to turn off the instrument. Unplugging the AC adaptor from the instrument or from the AC line does not turn off the instrument. It would automatically switch in the internal batteries. The instrument will continue to operate on the internal batteries.

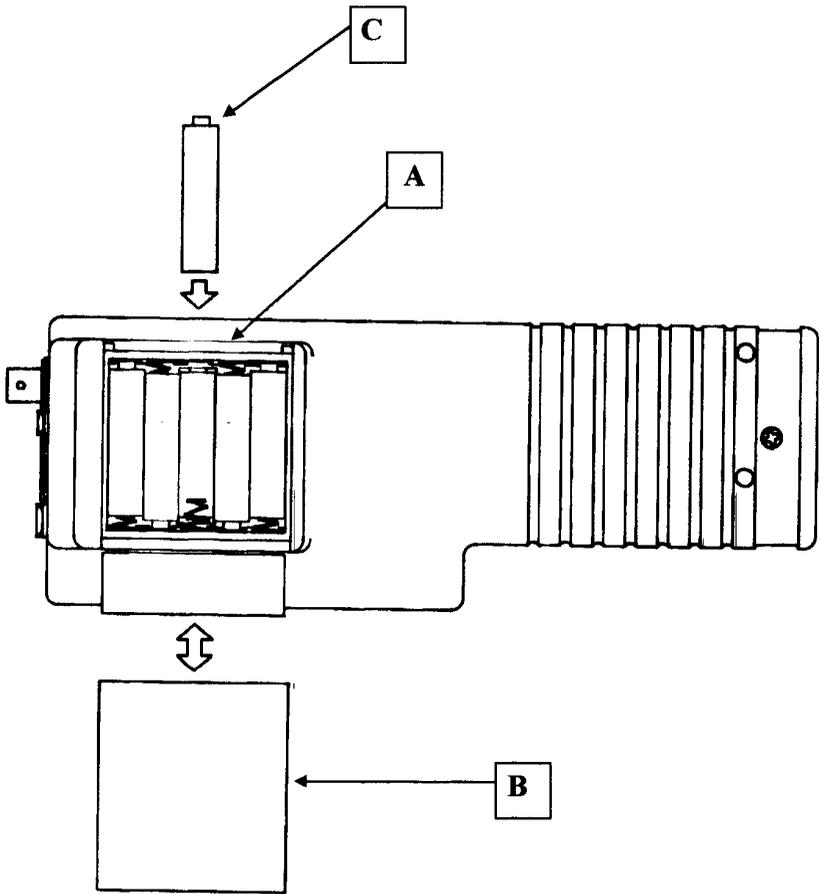


FIGURE 1. REAR VIEW (BATTERY COMPARTMENT)

- A. SIDE CLOSURE SLOT**
- B. CLOSURE**
- C. 6 AAA BATTERIES**

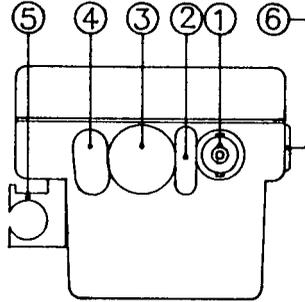


FIGURE 2. TOP VIEW

- 1. BNC CONNECTOR (for pH or Ion electrode)**
- 2. REF. ELECTRODE INPUT CONNECTOR**
- 3. ATC INPUT CONNECTOR**
- 4. AC ADAPTOR INPUT CONNECTOR**
- 5. ELECTRODE HOLDER**
- 6. RS-232C CONNECTOR**

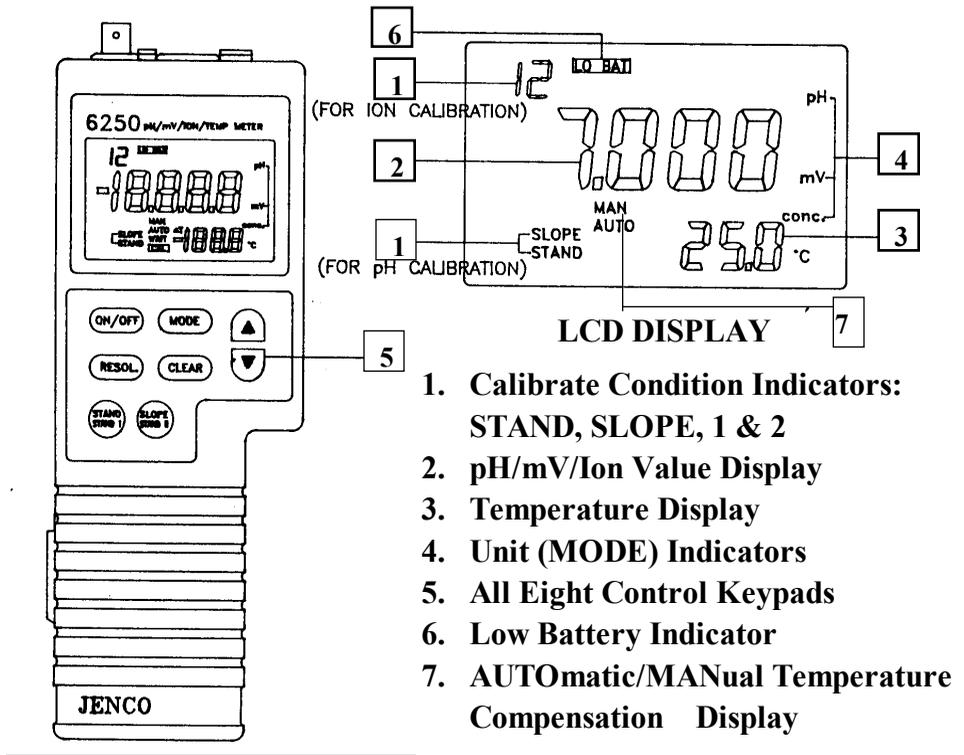


FIGURE 3. FRONT VIEW

SPECIFICATIONS

	RANGE	ACCURACY	RESOLUTION
pH	-2.000 to +16.000 Ph	$\pm 0.1\%$, ± 1 digit	0.01 pH or 0.001 pH (selectable)
mV	-1999.9 to +1999.9 Mv	$\pm 0.1\%$, ± 1 digit	1 mV or 0.1 mV (selectable)
TEMP °C	-5.0 to 125.0 °C	± 0.5 °C	0.1 °C
ION	0.0 to 119.8 conc.	± 2 LSD (resolution)	0.05 conc.(range 0.00 to 25.00) 0.1 conc. (range 25.0 to 50.0) 0.2 conc. (range 50.0 to 119.8)

pH TEMP. COMPENSATION	AUTO/MANual -5.0 to 125.0 °C
pH BUFFER RECOGNITION	4.01, 7.00, & 10.01 or 4.01, 6.86, & 9.18
pH BUFFER TEMP. RANGE	0 to 50.0 °C
pH ELECTRODE OFFSET RECOG.	± 90 mV at pH 7.00 or pH 6.86
pH ELECTRODE SLOPE RECOG.	$\pm 30\%$ at pH 4.01, 9.18, or 10.01
pH STANDARDIZATION	Single or Dual Point Standardization
ION STANDARDIZATION	Single or Dual Point Standardization
INPUT IMPEDANCE	$>10^{12}$ Ω
ATC PROBE: TH/PT	Thermistor (10K Ω at 25 °C)/ pt-100
AUDIO FEEDBACK	All Touch Keys
AMBIENT TEMP. RANGE	0 to 50 °C
DISPLAY: -pH/mV	15 mm High LCD
Temp.	8.7 mm High LCD
POWER SUPPLY:	-Batteries Six AAA size batteries Adaptor 9V AC adaptor
BATTERY LIFE (Alkaline Battery)	~25 Hours
POWER BACKUP	Memory Backup
WEIGHT (Includes batteries)	450 gm
COMMUNICATION	RS-232C OUTPUT
DIMENSIONS (W x D x H)	86 mm x 241 mm x 72 mm

TOUCH KEYS FOR THE MODEL 6250

1. **ON/OFF** key:

The **ON/OFF** key turns the instrument ON and OFF. The current mode and pH/Ion calibration values will not be erased when the instrument is turned OFF.

2. **MODE** key:

The **MODE** key selects the parameters to be displayed.

Pressing the key cycles the display sequentially from **pH**, **mV** and **Ion**. The calibration values are not affected by changing the display modes.

3. **STAND/STAND I** and **SLOPE/STAND II** keys:

The **STAND/STAND I** and **SLOPE/STAND II** keys are used for dual point calibration of the instrument.

4. **UP (Δ)** and **DOWN (∇)** keys:

These keys are used to manually enter the temperature values. They have no effect on the instrument when operating in the Automatic Temperature Compensation (**AUTO**) mode.

5. **RESOL.** key:

The **RESOL.** key adjusts the resolution of the instrument in the **pH** or **mV** mode, but not for the **Ion** mode.

6. **CLEAR** key:

The **CLEAR** key is used to clear the memory of the internal microcomputer. When the **CLEAR** key is pressed, all segments of the LCD will be on. After approximately 2 seconds, the instrument enters into the **pH** mode. The **STAND** annunciator will start to flash. This means that the instrument is waiting to be calibrated. The **CLEAR** key is intended to be used only when errors are made that require the instrument to be re-calibrated.

MEASUREMENT ERROR INDICATIONS

Two groups of buffers can be used with this meter: (4.00, 7.00, & 10.01 for model 6250) or (4.00, 6.86, & 9.18 for 6250C).

- Er 1 pH electrode offset is greater than ± 1.5 pH range.
Buffer 7.00 (6.86) is not correct or electrode is bad.**

- Er 2 pH electrode slope is off by more than ± 30 % of the ideal slope. Buffer 4.00, 9.18, or 10.01 is not correct.**

- Er 3 Temperature is out of the -5.0 to 125.0 °C range.**

- Er 4 Buffer temperature is out of the 0 to 50.0 °C range.**

- Er 5 pH value is out of the -2.000 to 16.000 pH range.
mV value is out of the -1999.9 to 1999.9 mV range.
Ion value is out of the 0 to 119.8 conc. range.**

OPERATIONAL PROCEDURES

pH CALIBRATION

Connect the AC adaptor to the AC power line. **Make sure the correct AC adaptor is used.** It is recommended to conserve the internal batteries by using AC power whenever it is available. Turn on the instrument by pressing the **ON/OFF** key. The instrument will be in the state of when it was last turned off. It is not necessary to press the **CLEAR** key. You also can press **RESOL.** key to select the optimum resolution you need.

1. Calibration with ATC/Temp probe in the pH mode.

A triaxle 3-in-1 pH/Ref/Temp electrode with user's electrode cable, #6005C, can be used in place of a combination pH electrode and a separate ATC/Temp probe.

- 1.1 Connect the pH electrode and the ATC/Temp probe to the appropriate connectors on top of the instrument. Refer to **Figure 2**. The **AUTO** annunciator will be on, indicating Automatic Temperature Compensation is in progress. Press the **MODE** key to enter into the **pH** mode. The **pH** indicator will be on and the **STAND** annunciator will flash.
- 1.2 Rinse the pH electrode and ATC/ Temp probe in distilled water, then immerse them in pH buffer 7.00 (6.86). The instrument will display the buffer temperature.
- 1.3 Allow sufficient time for the electrode and ATC/Temp probe to stabilize. Press the **STAND/STAND I** key. The **STAND** annunciator will be on and the **SLOPE** annunciator will flash. This means that standardization at buffer 7.00 (6.86) has been completed and the instrument is ready to be sloped at a second buffer. The instrument will display the buffer value corresponding to the temperature of the buffer 7.00 (6.86), as measured in 1.2. Refer to **Table 1**. If the reading still drifts, repeat 1.3 until a stable reading is obtained.

If **Er 1** is displayed, check to make sure that the correct buffer is used and that the electrode offset is less than ± 1.5 pH. Replace the buffer and/or the pH electrode. Press the **CLEAR** key and repeat from **1.1**. **Er 1** may appear if the **STAND/STAND I** key is pressed before the electrode and ATC/Temp probe settle to within ± 1.5 pH of the buffer value. Allow sufficient time for the electrode and ATC/Temp probe to stabilize before taking any action.

If **Er 4** is displayed, the buffer temperature is out of the 0 to 50.0 °C range. Bring the buffer temperature within range and repeat **1.2**. It is not necessary to press the **CLEAR** key.

1.4 Remove the pH electrode and ATC/Temp probe from buffer 7.00 (6.86). Rinse them in distilled water and then immerse in buffer 4.00, 9.18, or 10.01. The instrument will display the temperature of the second buffer.

1.5 Allow sufficient time for the pH electrode and ATC/Temp probe to stabilize. Press the **SLOPE/STAND II** key. The **SLOPE** indication will stop flashing and stay on. The instrument will display the second buffer value corresponding to the temperature of the second buffer as measured in **1.4**. Refer to **Table 1**. If reading still drifts, repeat **1.5** until a stable reading is obtained. The microcomputer inside the instrument will calculate and compensate for the pH electrode slope deviation corresponding to the values of the two calibration buffers. The instrument is dual point calibrated and is now ready for measurements.

If **Er 2** is displayed, check to make sure that the correct buffer is used and that the slope of the electrode is not off by more than $\pm 30\%$ from the theoretical slope. Replace the buffer and/or the pH electrode. Press the **CLEAR** key and repeat from **1.1**. Only buffer 4.00, 9.18, or 10.01 may be used to slope the instrument. **Er 2** may appear if the **SLOPE** key is pressed before the electrode and ATC/Temp probe settle to within $\pm 30\%$ of the buffer value. Allow

sufficient time for the electrode and ATC/Temp probe to stabilize before taking any action.

If **Er 4** is displayed, the buffer temperature is out of the 0 to 50.0 °C range. Bring the buffer temperature within range and repeat **1.2**. It is not necessary to press the **CLEAR** key.

2. Calibration with MANual Temperature Compensation in the pH mode.

- 2.1** Connect the pH electrode to the instrument. Refer to **Figure 2**. The **MANual** indicator will be on. Press the **MODE** key to enter the **pH** mode. The **pH** indicator will be on and the **STAND** annunciator will start to flash.
- 2.2** Rinse the pH electrode in distilled water and immerse in buffer 7.00 (6.86). Set the instrument to display the temperature of the buffer by pressing the (Δ) or (∇) key. The displayed temperature must be within 0.0 to 50.0 °C range.
- 2.3** Allow sufficient time for the electrode to stabilize. Press **STAND/STAND I** key. The **STAND** indicator will be on and the **SLOPE** annunciator will flash, indicating that standardization at buffer 7.00 (6.86) has been completed and the instrument is ready to be sloped at a second buffer. It will display the buffer value corresponding to the temperature of the buffer 7.00 (6.86) set in **2.2**. Refer to **Table 1**. If the reading still drifts, repeat **2.3** until a stable reading is obtained.

If **Er 1** is displayed, check to make sure that the correct buffer is used and that the electrode offset is less than ± 1.5 pH. Replace the buffer and/or the electrode. Press the **CLEAR** key and repeat from **2.1**. **Er 1** may appear if the **STAND/STAND I** key is pressed before the electrode settles to within ± 1.5 pH of the buffer value. Allow sufficient time for the electrode to stabilize before taking any action.

- 2.4** Remove the pH electrode from buffer 7.00 (6.86). Rinse it in

distilled water and immerse in buffer 4.00, 9.18, or 10.01. Set the instrument to display the temperature of the second buffer, as in **2.2**. The displayed temperature must be within 0 to 50.0 °C range.

- 2.5** Allow sufficient time for the pH electrode to stabilize. Press the **SLOPE/STAND II** key. The **SLOPE** indicator will stop flashing and stay on. The instrument will display the second buffer value corresponding to the temperature of the second buffer as set in **2.4**. Refer to **Table 1**. If the reading still drifts, repeat **2.5** until a stable reading is obtained. The microcomputer inside the instrument will calculate and compensate for the pH electrode slope deviation corresponding to the values of the two calibration buffers. The instrument is dual point calibrated and is now ready for measurements.

If **Er 2** is displayed, check to make sure that the correct buffer is used and that the slope of the electrode is not off by more than $\pm 30\%$ from the theoretical slope. Replace the buffer and/or the pH electrode. Press the **CLEAR** key and repeat from **2.1**. Only buffer 4.00, 9.18, or 10.01 may be used to slope the instrument. **Er 2** may appear if the **SLOPE/STAND II** key is pressed before the electrode settles to within $\pm 30\%$ of the buffer value. Allow sufficient time for the electrode to stabilize before taking any action.

pH MEASUREMENTS

The **STAND** and **SLOPE** indicators must be on, indicating that the instrument is dual point calibrated and is now ready for measurements.

1. Measurement with ATC/Temp probe in the pH mode.

1.1 Rinse the pH electrode and ATC probe with distilled water.

Immerse them in the sample to be measured. The ATC annunciator will be on. The **pH** unit , **ATC**, **STAND** and **SLOPE** indicators will also be on .

- 1.2 The display will track the pH value as sensed by the pH electrode and the ATC/Temp probe. Allow sufficient time for the display to stabilize. The instrument will display the pH value of the sample corresponding to its temperature.

If **Er 5** is displayed, the pH value measured is out of the - 2.000 to 16.000 pH range.

2. Measurement with **MAN**ual Temperature Compensation in the **pH** mode.

- 2.1 Connect the pH electrode to the connector of the instrument. Refer to **Figure 2**.
- 2.2 Press the **MODE** key to enter into the **pH** mode. The **pH** , **STAND**, and **SLOPE** indicators will be on, as well as the **MAN**ual indicator.
- 2.3 Rinse the pH electrode with distilled water and immerse it in the sample to be measured.
- 2.4 Use the UP (**Δ**) and DOWN (**∇**) keys to set the temperature of the sample.
- 2.5 Allow sufficient time for the display to stabilize. The instrument will display the pH value of the sample corresponding to its set sample temperature.

If **Er 5** is displayed, the pH value measured is out of the -2.000 to 16.000 pH range.

TEMPERATURE MEASUREMENTS

Model 6250 can be used to measure temperature independently with ATC/Temp probe without using the pH electrode.

- 1.1 If the pH electrode is not connected to the instrument, the pH input must be shorted to the reference input with the protection cap.

1.2 Connect the ATC/Temp probe to the input connector. Refer to **Figure 2**.

1.3 Place the temperature sensor in the media to be measured. The measured temperature will be displayed.

Er 3 will be displayed if the temperature is out of the temperature measurement range -5.0 to 125.0 °C. Once the temperature is brought within range, **Er 3** will disappear and the correct temperature reading will be displayed. It is not necessary to press the **CLEAR** key.

Er 4 will be displayed if the temperature is out of the temperature range 0 to 50.0 °C.

mV MEASUREMENTS

A combination electrode can be used in place of the working electrode and the reference electrode. The **MANual** indicator will be on if the ATC/Temp probe is not connected to the instrument.

1.1 Connect the working electrode to the input BNC connector and the reference electrode to the reference pin connector. Refer to **Figure 2**.

1.2 Press the **MODE** key for the instrument to enter into the **mV** mode and press **RESOL.** key to select optimum resolution.

1.3 Rinse the working and reference electrodes in distilled water and immerse the two electrodes in the sample to be measured.

1.4 Allow sufficient time for the display to stabilize. The instrument will display the mV value of the sample.

If **Er 5** is displayed, the mV value measured is out of the ± 1999.9 mV range. The instrument will display the correct value once the input mV is brought within range. It is not necessary to **CLEAR** the instrument.

1.5 The ATC/Temp probe can be used to measure the sample temperature as required.

ION MEASUREMENTS

The following rules should be observed in order to make accurate determinations of ion concentration.

Rule A. All hardware used to handle ion standards and samples should always be cleaned with de-ionized water.

Rule B. The standard solutions and samples should always be at the same temperature.

Rule C. A magnetic stirrer should be used for all measurements of standards and samples.

Rule D. Study the instruction manual of the ION sensor carefully to make sure that the proper ionic strength adjuster and/or pH adjuster is used.

1.1 Connect the ION sensing electrode to the BNC connector and the reference electrode to the REF pin connector.

1.2 Prepare two standards 1 decade apart. The concentration of the sample should be within the range of the 2 standards. The 2 standards can be of any concentration unit such as ppm, mg/L, or M.

1.3 Rinse the electrode with the diluted standard or deionize water and immerse the electrodes in the diluted standard 1.

1.4 Press the **MODE** key to enter into the **ION** mode. The LCD will display **ION**, and the annunciator **1** (on the higher left corner) will flash. The **conc.** unit indicator will also be on.

1.5 Press the **STAND/STAND I** key and the LCD will display

1.00. The annunciator **1** (on the higher left corner) will be on and the annunciator **2** (on the higher left corner) will flash. The instrument is single point standardized and assumes a slope of +58 mV per decade change in concentration.

Er 5 will be displayed if the input value exceeds 750mV (approximately) or the display exceeds 120.0 conc.

Er 2 will be display if the **STAND II** key is pressed before the **STAND I** key.

1.6 For dual point standardization, remove the electrodes from the diluted standard and rinse with the concentrated standard or de-ionized water. After rinsing, immerse the electrodes in the concentrated standard **2**.

1.7 Press the **STAND II** key, the annunciator **2** will be on. The **STAND II** key can be pressed as many times as required for a stable reading of 10.00 conc. The instrument is dual point standardized and is now ready for measurements. The electrodes should always be rinsed with the sample or de-ionized water before taking measurements.

Er 2 will be displayed if the electrode slope is smaller than 50% of its ideal slope of 58 mV.

Er 5 will be displayed if the input value exceeds +/-750 mV (approximately) or if the display exceeds 120.0 conc.

TEMPERATURE COEFFICIENT OF pH BUFFERS

BUFFERS

TEMP(°C)	4.00	6.86	7.00	9.18	10.01
0	4.003	6.982	7.119	9.460	10.321
5	3.998	6.949	7.086	9.392	10.248
10	3.996	6.921	7.058	9.331	10.181
15	3.996	6.898	7.035	9.276	10.120
20	3.999	6.878	7.015	9.183	10.064
25	4.004	6.683	7.000	9.183	10.014
30	4.011	6.851	6.988	9.143	9.968
35	4.020	6.842	6.979	9.107	9.928
40	4.030	6.836	6.973	9.074	9.891
45	4.042	6.832	6.969	9.044	9.859
50	4.055	6.831	6.968	9.017	9.831

The actual reading of the instrument can differ from the values shown by +/- 1 digit.

TABLE 1

The value in **TABLE 1** is stored in the memory of the microcomputer. Since the buffer values stored are the values of the buffers at 0, 5, 10, 15, 20, 25, 30, 35, 40, 45 and 50 °C, it is recommended to keep the buffers at above or close to room temperature to minimize the error.

RS-232C INTERFACE OPERATION

This section assumes you are familiar with the basics of data communication, RS-232C interface, rudimentary knowledge and a copy of any of the following computer languages: Turbo Basic[®], Quick Basic[®], Turbo PASCAL[®] and Turbo C[®].

This meter can only be operated using the RS-232C 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.

PREPARATION OF THE METER FOR OPERATION

The meter comes equipped with an RS-232C (serial) interface. The meter communicates with a PC computer (100% IBM PC/AT compatible) through a DB-9 interface connector. A standard RS-232C cable can be used for interconnecting two IBM PC/ATs.

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

SOFTWARE PREPARATION

The accompanying disk includes a special software driver to let you easily write a simple program to read data from the meter. By incorporating the driver to your software, you can then use the special commands without worrying about the protocol between the meter and your computer.

For the model 6250, reading "**MAN6250.TXT**" in the accompanying disk will jumpstart you into using the meter with its RS-232C interface. "**MANUAL.TXT**" is the general explanation of the various serial commands available in the driver.

MODEL 6250 PARAMETERS

BAUD RATE:	2400 (fixed)
PARITY:	Software Driver Controlled
DATA BITS:	8
STOP BIT:	1
PROTOCOL:	Software Driver Controlled

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
E-MAIL: jencoi@ix.netcom.com

JENCO ELECTRONICS, LTD.

PO. BOX LINKOU 117
TAIPEI, TAIWAN
TEL: 02 601-6191 FAX: 02 601-7206
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>