

OPERATION MANUAL

THE JENCO MODEL 6171 MICROCOMPUTER BASED BENCH pH METER

JENCO ELECTRONICS, LTD.
MANUFACTURER OF PRECISION INSTRUMENTS

GENERAL INTRODUCTION

The model 6171 is a precise instrument for the measurement of pH, mV, 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 operate with an UL approved AC adaptor or 6 internal type AA batteries, which will allow greater portability. It is recommended to have internal batteries installed, for they provide backup power to the memory of the built-in microcomputer. This will allow the calibration values to be retained after the power is turned off. Re-calibration will not be required when power is turned ON again. The meter can also withstand power line transients through the AC adaptor without altering its internal memory.

There are two large LCDs on the face plate. One reads pH/mV values and the other reads the temperature values. Both values are displayed simultaneously according to the solution being measured. There are also LED indicators that prompt the user through the calibration and measurement sequences. The LED indicators on the LCDs and the LED indicators also clearly indicate the current status of the instrument.

An **AUTOLOCK** feature is provided for pH and mV measurements. This enables the instrument to automatically sense the end point and “lock” the display to indicate the end point value of a measurement. The 6171 can also be used in the non-**AUTOLOCK** mode.

The **AUTOLOCK** and the user prompting features help eliminate human factors in the determination of pH and mV values, thus resulting in precise, repeatable and error free measurements.

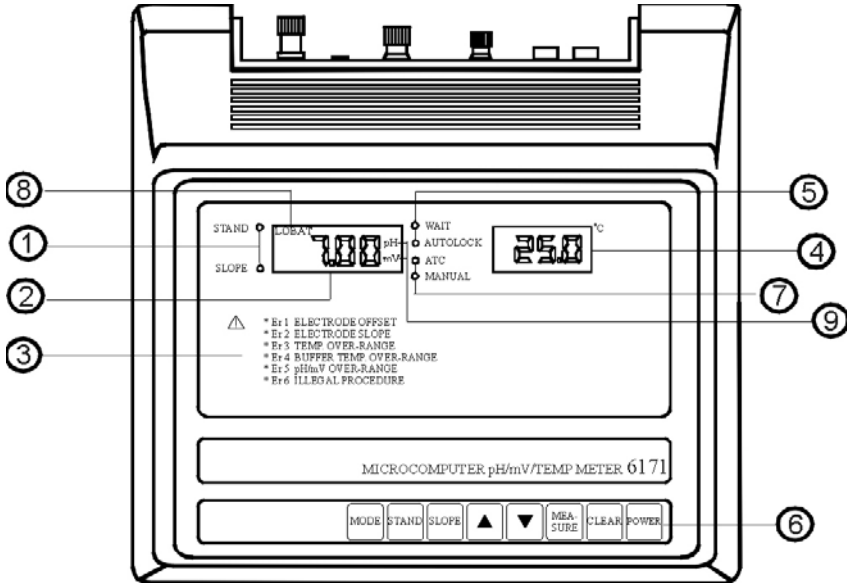
Model 6171 uses pH and ORP electrodes with BNC connectors and interchangeable ATC/Temp probes. The interchangeable temperature sensor, built into the bulb of the pH electrode, ensures close temperature tracking to the pH sensing membrane.

Optional RS-232C and temperature/slope compensated analog output, can track all displayed values and interface the meter with recorders, printers, computers, etc.

Other features such as splash proof touch keys with audio feedback, buffer recognition, electrode slope recognition, automatic and manual temperature compensation, operational error indications, simplicity of operations, etc., make this meter an “USER FRIENDLY” instrument suitable for universal applications.

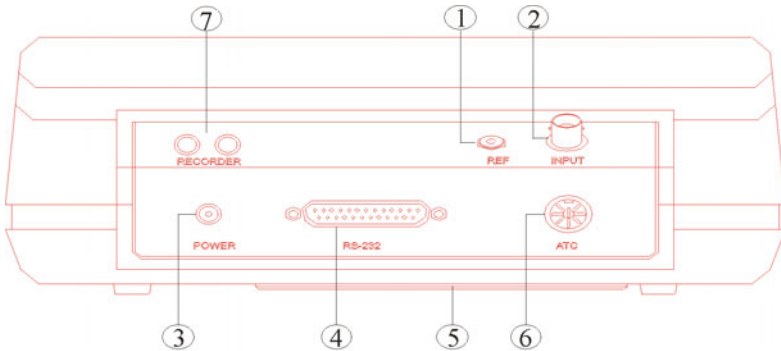
INITIAL INSPECTION

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.



1. CALIBRATION INDICATORS: SLOPE & STAND
2. LCD pH/mV VALUE DISPLAY
3. ERROR CODE
4. LCD TEMPERATURE VALUE DISPLAY
5. UNIT (MODE) INDICATORS
6. ALL EIGHT CONTROL KEYPADS
7. ATC or MANUAL INDICATOR
8. LOW BATTERY INDICATOR
9. PH/mV MODE DISPLAY

FIGURE 1 FRONT VIEW



1. REF INPUT CONNECTOR
2. pH BNC INPUT CONNECTOR
3. AC ADAPTOR INPUT CONNECTOR
4. RS-232C CONNECTOR
5. BATTERY COMPARTMENT
6. ATC INPUT CONNECTOR
7. RECORDER OUTPUT CONNECTOR

Figure 2 rear view

POWER INPUT

This meter can be used with 115V or 230 VAC adaptor, as well as six AA size internal batteries. Check the label on the AC adaptor, supplied with the instrument, to make sure that the AC line voltage is correct. If the wrong AC adaptor is supplied, notify your Jenco Representative immediately. **DO NOT USE THE INSTRUMENT WITH THE WRONG AC LINE. IN THIS CASE, OPERATE WITH THE INTERNAL BATTERIES ONLY.**

BATTERY REPLACEMENT

Follow the procedures below to replace the internal batteries.

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

TURN OFF INSTRUMENT

When the instrument is not in use, press the **POWER** 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 to the internal batteries. The instrument will continue to operate on the internal batteries.

TOUCH KEYS FOR THE MODEL 6171

1. **POWER** key:
The **POWER** key turns the instrument ON and OFF. *The pH 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 **MODE** key changes the display sequentially to display **pH/AUTOLOCK**, **mV/AUTOLOCK**, **pH**, and **mV**. The calibration values will not be affected by changing the display modes.
3. **STAND** and **SLOPE** keys:
The **STAND** and **SLOPE** keys are used for dual point pH calibration of the instrument.

4. **UP** (Δ) and **DOWN** (∇) keys:

The Δ and ∇ keys are used to manually enter temperature values. These keys have no effect on the instrument when operating in the Automatic Temperature Compensation mode.

5. **MEASURE** key:

The **MEASURE** key is used to bring the instrument out of the **AUTOLOCK** condition when operating in the **pH/AUTOLOCK** or **mV/AUTOLOCK** 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 display and the indication LEDs will be on. After approximately 2 seconds, the instrument enters into the **pH/AUTOLOCK** mode. The LED indicator for **AUTOLOCK** will be on and the LED indication for **STAND** will start to flash. This means that the instrument is ready for calibration. The **CLEAR** key is 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: (4.01, 7.00, & 10.01 for model 6171) or (4.01 6.86, & 9.18 for model 6171C).

- Er1 pH electrode offset is greater than ± 1.5 pH range.
Buffer 7.00 (6.86) is not correct or electrode is bad.
- Er2 pH electrode slope is off by more than $\pm 30\%$ of the ideal slope.
Buffer 4.01, 9.18, or 10.01 is not correct.
- Er3 Temperature is out of the -5.0 to 125.0 $^{\circ}\text{C}$ range.
- Er4 Buffer temperature is out of the 0 to 60 $^{\circ}\text{C}$ range.
- Er5 pH value is out of the -2.00 to 16.00 pH range.
mV value is out of the -1999 to $+1999$ mV range.
- Er6 Illegal operation procedures.

OPERATIONAL PROCEDURES

pH CALIBRATION

Connect the AC adaptor to the AC power line. Make sure that 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 **POWER** key. The instrument will be in the state of when it was last turned off. It is not necessary to press the **CLEAR** key.

1. Calibration with ATC/TEMP probe in the pH/AUTOLOCK mode.

1.1 Connect the combination pH electrode to the BNC connector and

ATC/Temp probe to the rear of the instrument. (**Refer to Figure 2**) The ATC LED indicator will be on. Press the **MODE** key for the LCD display to indicate **pH** and for the **AUTOLOCK** LED indicator to be on. (**Refer to Figure 1**)

- 1.2 Rinse the pH electrode and ATC/Temp probe in distilled water and immerse in pH buffer 7.00 (6.86). The instrument will display the buffer temperature.
- 1.3 Press the **STAND** key. The **STAND** LED indicator will be on and **WAIT** LED indicator will flash. At this time, the instrument is hunting for a stable reading. The display will be locked to the buffer value corresponding to the temperature of buffer 7.00 (6.86), as measured in step **1.2 (Refer to Table 1)**. When a stable reading is reached, the **WAIT** LED indicator will stop flashing and stay off. The **SLOPE** LED indicator will start to flash. This means that standardization at buffer 7.00 (6.86) has been completed and the instrument is now ready to be sloped at a second buffer.

If **Er1** 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**. **Er1** may appear if the **STAND** 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 **Er4** is displayed, the buffer temperature is out of the 0 to 60 °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) and rinse them in distilled water. After rinsing, immerse them in buffer 4.01, 9.18, or 10.01.
- 1.5 Press the **SLOPE** key. The **SLOPE** LED indicator will stop flashing and stay on. The **WAIT** LED indicator will start to flash, indicating that the instrument is hunting for a stable reading. The display will be locked to the second buffer value corresponding to the temperature of the second buffer (**Refer to Table 1**). When a stable reading is reached, the **WAIT** LED indicator will stop flashing and stay off. 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 **Er2** 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 30% from the theoretical slope. Replace the buffer and/or the pH electrode. Press the

CLEAR key and repeat from **1.1**. Only buffer 4.01, 9.18, or 10.01 may be used to slope the instrument. **Er2** may appear if the **SLOPE** key is pressed before the electrode and ATC/Temp probe settle to within 30% of the buffer value. Allow sufficient time for the electrode and ATC/Temp probe to stabilize before taking any action.

If **Er4** is displayed, the buffer temperature is out of the 0 to 60°C range. Bring the buffer temperature within range and repeat **1.2**. It is not necessary to press the **CLEAR** key.

If **Er6** is displayed, **CLEAR** the instrument and repeat from **1.2**.

2. Calibration with manual temperature compensation in the pH/AUTOLOCK mode.

- 2.1 Connect the pH electrode to the rear of the instrument (**Refer to Figure 2**). The **MANUAL** LED indicator will be on. Press the **MODE** key for the LCD display to indicate **pH** and for the **AUTOLOCK** LED indicator to be on (**Refer to Figure 1**).
- 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 7.00(6.86) by pressing the Δ and ∇ keys. The displayed temperature must be less than 60 °C.
- 2.3 Press the **STAND** key. The **STAND** LED indicator will be on and the **WAIT** LED indicator will flash. This means that the meter is hunting for a stable reading. The display will be locked to the buffer value corresponding to the temperature of buffer 7.00(6.86) as set in **2.2 (Refer to Table 1)**. When a stable reading is reached, the **WAIT** LED indicator will stop flashing and stay off. The **SLOPE** LED indicator will start to flash, indicating that standardization at buffer 7.00(6.86) is completed and the instrument is ready to be sloped at a second buffer.

If **Er1** is display, check to make sure that the electrode offset is less than ± 1.5 pH and that the correct buffer is used. Replace the buffer and/or the pH electrode. Press the **CLEAR** key and repeat from **2.1**. **Er1** may appear if the **STAND** 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. Remove the pH electrode from buffer 7.00(6.86), rinse with distilled water and immerse in buffer 4.01, 9.18, or 10.01. Set the instrument to display the temperature of the second buffer, as in 2.2. The displayed temperature must not be greater than 60 °C.

- 2.4 Press the **SLOPE** key. The **SLOPE** indicator will stop flashing and stay on. The **WAIT** indicator will start to flash, indicating that the instrument is

hunting for a stable reading. The display will be locked to the value of the second buffer corresponding to the temperature of the second buffer as set in **2.3 (Refer to Table 1)**. When a stable reading is reached, the **WAIT** indicator will stop flashing and stay off. 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 **Er2** 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 30% from the theoretical slope. Replace the buffer and/or the pH electrode. Press the **CLEAR** key and repeat from **2.1**. Only buffer 4.01, 9.18, or 10.01 may be used to slope the instrument. **Er2** may appear if the **SLOPE** key is pressed before the electrode settles to within 30% of the buffer value. Allow sufficient time for the electrode to stabilize before taking any action.

If **Er6** is displayed, **CLEAR** the instrument and repeat from **2.1**.

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

3.1 Connect the pH electrode and ATC/Temp probe to the rear of the instrument (**Refer to Figure 2**). The **ATC** LED indicator will be on. Press the **MODE** key for the LCD to display **pH** and for the **AUTOLOCK** LED indicator to be off (**Refer to Figure 1**).

3.2 Rinse the pH electrode and ATC/Temp probe in distilled water and immerse in pH buffer 7.00(6.86). The instrument will display the buffer temperature.

3.3 Allow sufficient time for the electrode and ATC/Temp probe to stabilize. Press the **STAND** key. The **STAND** LED indicator will be on and the **SLOPE** LED indicator will flash, indicating that standardization at buffer 7.00(6.86) is 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 **3.2 (Refer to Table 1)**. If the reading still drifts, repeat **3.3** until a stable reading is obtained.

If **Er1** 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 **3.1**. **Er1** may appear if the **STAND** 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 **Er4** is displayed, the buffer temperature is out of the 0 to 60°C range. Bring the buffer temperature within range and repeat **3.2**. It is not necessary

to press the **CLEAR** key.

- 3.4 Remove the pH electrode and ATC/Temp probe from buffer 7.00(6.86). Rinse them in distilled water and immerse in buffer 4.01, 9.18, or 10.01. The instrument will display the temperature of the second buffer.
- 3.5 Allow sufficient time for the pH electrode and ATC/Temp probe to stabilize. Press the **SLOPE** key. The **SLOPE** LED indicator 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 **3.4 (Refer to Table 1)**. If the reading still drifts, repeat **3.5** 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 **Er2** 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 30% from the theoretical slope. Replace the buffer and/or the pH electrode. Press the **CLEAR** key and repeat from **3.2**. Only buffers 4.01, 9.18, or 10.01 may be used to slope the instrument. **Er2** may appear if the **SLOPE** key is pressed before the electrode and ATC/Temp probe settle to within 30% of the buffer value. Allow sufficient time for the electrode and ATC/Temp probe to stabilize before taking any action.

If **Er4** is displayed, the buffer temperature is out of the 0 to 60°C range. Bring the buffer temperature within range and repeat **3.5**. It is not necessary to press the **CLEAR** key.

If **Er6** is displayed, CLEAR the instrument and repeat from **3.1**.

4. Calibration with manual temperature compensation in the pH mode.

- 4.1 Connect the pH electrode to the rear of the instrument (**Refer to Figure 2**). The **MANUAL** LED indicator will be on. Press the **MODE** key for the LCD display to indicate **pH** and for the **AUTOLOCK** LED indicator to be off.
- 4.2 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 7.00(6.86) by pressing the Δ and ∇ keys. The displayed temperature must be less than 60°C.
- 4.3 Allow sufficient time for the electrode to stabilize. Press the **STAND** key. The **STAND** LED indicator will be on and the **SLOPE** LED indicator will flash. This means that standardization at buffer 7.00(6.86) is 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 7.00(6.86)

set in **4.2 (Refer to Table 1)**. If the reading still drifts, repeat **4.3** until a stable reading is obtained.

If **Er1** 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 **4.1**. **Er1** may appear if the **STAND** 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.

4.4 Remove the pH electrode from buffer 7.00(6.86) and rinse with distilled water. Immerse them in buffer 4.01, 9.18, or 10.01. Set the instrument to display the temperature of the second buffer, as in **4.2**. The displayed temperature must be less than 60°C .

4.5 Allow sufficient time for the pH electrode to stabilize. Press the **SLOPE** key. The **SLOPE** LED 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 **4.4 (Refer to Table 1)**. If the reading still drifts, repeat **4.5** 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 **Er2** 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 30% from the theoretical slope. Replace the buffer and/or the pH electrode. Press the **CLEAR** key and repeat from **4.1**. Only buffer 4.01, 9.18, or 10.01 may be used to slope the instrument. **Er2** may appear if the **SLOPE** key is pressed before the electrode settles to within 30% of the buffer value. Allow sufficient time for the electrode to stabilize before taking any action.

If **Er6** is displayed, **CLEAR** the instrument and repeat from **4.1**.

pH MEASUREMENTS

The **STAND** and **SLOPE** LED indicators must be on. This means the instrument is dual point calibrated and is ready for measurements.

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

1.1 Connect the pH electrode and ATC/Temp probe to the rear of the instrument (**Refer to Figure 2**). The **ATC** LED indicator will be on.

1.2 Press the **MODE** key for the LCD display to indicate **pH** and for the **AUTOLOCK** LED indicator to be on.

1.3 Rinse the pH electrode and ATC/Temp probe with distilled water and

immerse them in the sample to be measured.

- 1.4 Press the **MEASURE** key. The **WAIT** LED indicator will start flashing. This means the instrument is hunting for a stable reading. The display will track the pH value as sensed by the pH electrode and the ATC/Temp probe. When the display changes less than 0.01 pH within approximately 10 seconds, the **AUTOLOCK** function will be activated. The **WAIT** LED indicator will stop flashing and stay off. The reading is then “locked” and will not respond to further changes from the pH electrode and ATC/Temp probe. The “locked” display is the pH value of the sample at the displayed sample temperature.

If **Er5** is displayed, the pH value measured is out of the -2.00 to +16.00 range.

- 1.5 For samples that are inherently unstable, the instrument will not **AUTOLOCK**. In this case, use the **pH** (non-AUTOLOCK pH) mode for measurements.

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

- 2.1 Connect the pH electrode and the ATC/Temp probe to the rear of the instrument (**Refer to Figure 2**). The **ATC** LED indicator will be on.
- 2.2 Press the **MODE** key for the LCD display to indicate **pH** and for the **AUTOLOCK** LED indicator to be off.
- 2.3 Rinse the pH electrode and ATC/Temp probe with distilled water and immerse them in the sample to be measured.
- 2.4 Allow sufficient time for the display to stabilize. The instrument will display the pH value of the sample at the displayed sample temperature.

If **Er5** is displayed, the pH value measured is out of the -2.00 to +16.00 range.

3. Measurement with manual temperature compensation in the pH/AUTOLOCK mode.

- 3.1 Connect the pH electrode to the rear of the instrument (**Refer to Figure 2**). The **MANUAL** LED indicator will be on.
- 3.2 Press the **MODE** key for the LCD display to indicate **pH** and for the **AUTOLOCK** LED indicator to be on.
- 3.3 Rinse the pH electrode with distilled water and immerse it in the sample to be measured. Set the instrument to the temperature of the sample as in **2.2** of **pH CALIBRATION** section.
- 3.4 Press the **MEASURE** key. The **WAIT** LED indicator will start to flash. This means that the instrument is hunting for a stable reading. The display will

track the pH value as sensed by the pH electrode. When the display changes less than 0.01 pH within approximately 10 seconds, the **AUTOLOCK** function will be activated. The **WAIT** LED indicator will stop flashing and stay off. The reading is then “locked” and will not respond to further changes from the pH electrode. The “locked” display is the pH value of the sample at the set sample temperature.

If **Er5** is displayed, the pH value measured is out of the –2.00 to +16.00 range.

3.5 For samples that are inherently unstable, the instrument will not **AUTOLOCK**. In this case, Use the **pH** (non-AUTOLOCK pH) mode for measurements.

4. Measurement with manual temperature compensation in the pH mode.

4.1 Connect the pH electrode to the top of the instrument (**Refer to Figure 1**). The **MANUAL** LED indicator will be on.

4.2 Press the **MODE** key for the LCD to display **pH** and for the **AUTOLOCK** LED indicator to be off.

4.3 Rinse the pH electrode with distilled water and immerse it in the sample to be measured.

4.4 Set the instrument to the temperature of the sample by pressing \triangle and ∇ keys.

4.5 Allow sufficient time for the display to stabilize. The instrument will display the pH value of the sample at the set sample temperature.

If **Er5** is displayed, the pH value measured is out of the –2.00 to + 16.00 range.

TEMPERATURE MEASUREMENTS

The model 6171 can be used to measure temperature independently with the ATC/Temp probe without using the pH electrode.

1. Place the ATC/Temp probe in the media to be measured. The measured temperature is displayed.

2. **Er3** will be displayed if the temperature is out of the temperature measurement range of –5.0 to 125.0°C. Once the temperature is brought within range, **Er3** will disappear and the correct temperature reading will be displayed. It is not necessary to press the **CLEAR** key.

mV MEASUREMENTS

1. Measurement in the mV /AUTOLOCK mode.

- 1.1 Connect an optional combination ORP electrode to the instrument in the BNC connector (**Refer to Figure 2**).
- 1.2 Press the **MODE** key for the LCD to display mV and for the **AUTOLOCK** LED indicator to be on.
- 1.3 Rinse the electrode with distilled water and immerse it in the sample to be measured.
- 1.4 Press the **MEASURE** key. The **WAIT** LED indicator will start to flash. This means the instrument is hunting for a stable reading. The display will track the mV value as sensed by the electrode. When the display changes less than 1mV within approximately 10 seconds, the **AUTOLOCK** function will be activated. The **WAIT** LED indicator will stop flashing and stay off. The reading is then “locked “ and will not respond to further changes from the electrode. The “locked” display is the mV value of the sample.

If **Er5** is displayed, the mV value measured is out of the ± 1999 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.
- 1.6 For samples that are inherently unstable, the instrument will not **AUTOLOCK**. In this case, use the **mV** (non-AUTOLOCK mV) mode for measurements.

2. Measurement in the mV mode.

- 2.1 Connect an optional combination ORP electrode to the instrument in the BNC connector (**Refer to Figure 2**).
- 2.2 Press the **MODE** key for the LCD display to indicate **mV** and for the **AUTOLOCK** LED indicator to be off.
- 2.3 Rinse the electrode with distilled water and immerse it in the sample to be measured.
- 2.4 Allow sufficient time for the fore the display to stabilize. The instrument will display the mV value of the sample.

If **Er5** is displayed, the mV value measured is out of the ± 1999 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.

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

ANALOG VOLTAGE OUTPUT

The analog voltage output can be used to interface with other instruments such as recorder, printer, computer, 4 to 20 mA converter, etc.

STANDARD OUTPUT

The standard output voltage is not temperature and slope compensated for pH measurements. It tracks the input voltage as sensed by the pH or ORP electrode. This output will not always track the displayed values.

1. pH mode output voltage: 1 mV/mV, no absolute value
2. mV mode output voltage: 1 mV/mV, 0 mV = 0 mV

OPTIONAL OUTPUT-Option R

The optional analog output voltage is temperature and slope compensated for pH measurements. It tracks the displayed values of the instrument. The resolution is 2 mV (i.e. The output changes in steps of 2 mV).

1. pH mode output voltage: 1 mV/0.01 pH, pH 7.00 = 0 mV
2. mV mode output voltage: 1 mV/mV, 0 mV = 0 mV

Check the type of analog output supplied with the instrument before proceeding.

The following rules must be observed in order to avoid reading inaccuracies or possible damages to the instrument.

1. If the sample solution is grounded, the equipment connected to the analog output must be “floating” from earth ground (i.e. The lead wire connected to the negative analog output, black terminal, must not be touching earth ground through the interfacing equipment). (Refer to Figure 2)
2. The input impedance of the interface device must be greater than 1 K Ω .
3. Make sure that the AC line voltage is never accidentally connected to the analog output.

RS-232C INTERFACE OPERATION

Before operating with the RS-232C interface, you must get out of the AUTOLOCK mode.

This section assumes you are familiar with the basics of data communication, the 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 drive 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 compatibles) through a DB-25 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 the 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 6171, reading “**MAN6171.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 6171 RS-232C PARAMETERS

BAUD RATE	4800 (fixed)
PARITY	Software Driver Controlled
DATA BITS	8
STOP BITS	1
PROTOCOL	Software Driver Controlled

pH BUFFERS

The temperature coefficient of pH calibration buffers 4.01, 7.00 and 10.01 are stored inside the memory of the microcomputer. The buffers used to calibrate the instrument

must exhibit the same temperature characteristics as the stored values. The buffer temperature values are listed in **Table 1**.

**TEMPERATURE COEFFICIENT OF THE pH BUFFERS
BUFFERS**

°C	4.01	7.00	10.01
0	4.00	7.11	10.32
5	4.00	7.08	10.25
10	4.00	7.06	10.18
15	4.00	7.03	10.12
20	4.00	7.01	10.06
25	4.01	7.00	10.01
30	4.02	6.98	9.97
35	4.02	6.98	9.93
40	4.03	6.97	9.89
45	4.04	6.97	9.86
50	4.06	6.97	9.83
55	4.07	6.97	9.80
60	4.10	6.98	9.78

The actual reading of the instrument can differ from the values shown by ± 1 digit.

Table 1

The internal memory of the instrument stores the temperature values of the buffer at 0.5°C intervals to continuously update the buffer values with changing temperature.

SPECIFICATIONS FOR MODEL 6171: pH/mV/TEMP

	RANGE	ACCURACY	RESOLUTION
pH	-2.00 to 16.00 pH	$\pm 0.1\%$, ± 1 digit	0.01 pH
mV	-1999 to +1999 mV	$\pm 0.1\%$, ± 1 digit	1.0 mV
TEMP	-0.5 to 125.0°C	$\pm 0.5^\circ\text{C}$	0.1°C

pH TEMP. COMPENSATION

AUTOMANual -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 60 °C
pH ELECTRODE OFFSET RECOGNITION	±90 mV at pH 7.00 or 6.86
pH ELECTRODE SLOPE RECOGNITION	±30% at pH 4.01, 9.18, or 10.01
INPUT IMPEDANCE	>10 ¹² Ω
ATC PROBE:	THERMISTOR (10K Ω AT 25 °C)
COMMUNICATION	RS-232C Output
ANALOG OUTPUT RANGE:	
-Standard Output	Same with the Input Voltage
-Optional Output (special order)	pH: -900 to +900 mV (pH 7.00 = 0 mV) mV: -1023 to +1023 mV
END POINT SENSING & HOLD	Yes
POWER BACKUP	Memory Backup
AUDIO FEEDBACK	All Touch Keys
DISPLAY: pH/mV: Temp.	12.7 mm HIGH LCD
AMBIENT TEMP. RANGE	0 to 50 °C
POWER: Batteries / Adaptor	six AA Size batteries: 9V AC adaptor
BATTERY LIFE (Alkaline)	~50 Hours
DIMENSIONS (W×D×H)	250mm×240mm×100mm
WEIGHT	1070gm (Batteries Included)

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.

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