TRANS INSTRUMENTS

Professional Benchtop pH meter BP3001

Operation Manual

INTRODUCTION

Your purchase of this professional bench-top pH meter marks a step forward for you into the field of precision measurement. Although this meter is a complex and delicate instrument; its usability will allow many years of use if proper operating techniques are observed and practiced.

Please read the following instructions carefully and always keep this manual within easy reach.

1. FEATURES:

- Multiple display of pH, temperature simultaneously
- Automatic buffer recognition with built in ISO and NIST standard
- Manual setting of customize buffer standard
- 5 points calibration
- Hold or freeze display function
- 99 memory with real time clock recording
- Maximum and minimum data review
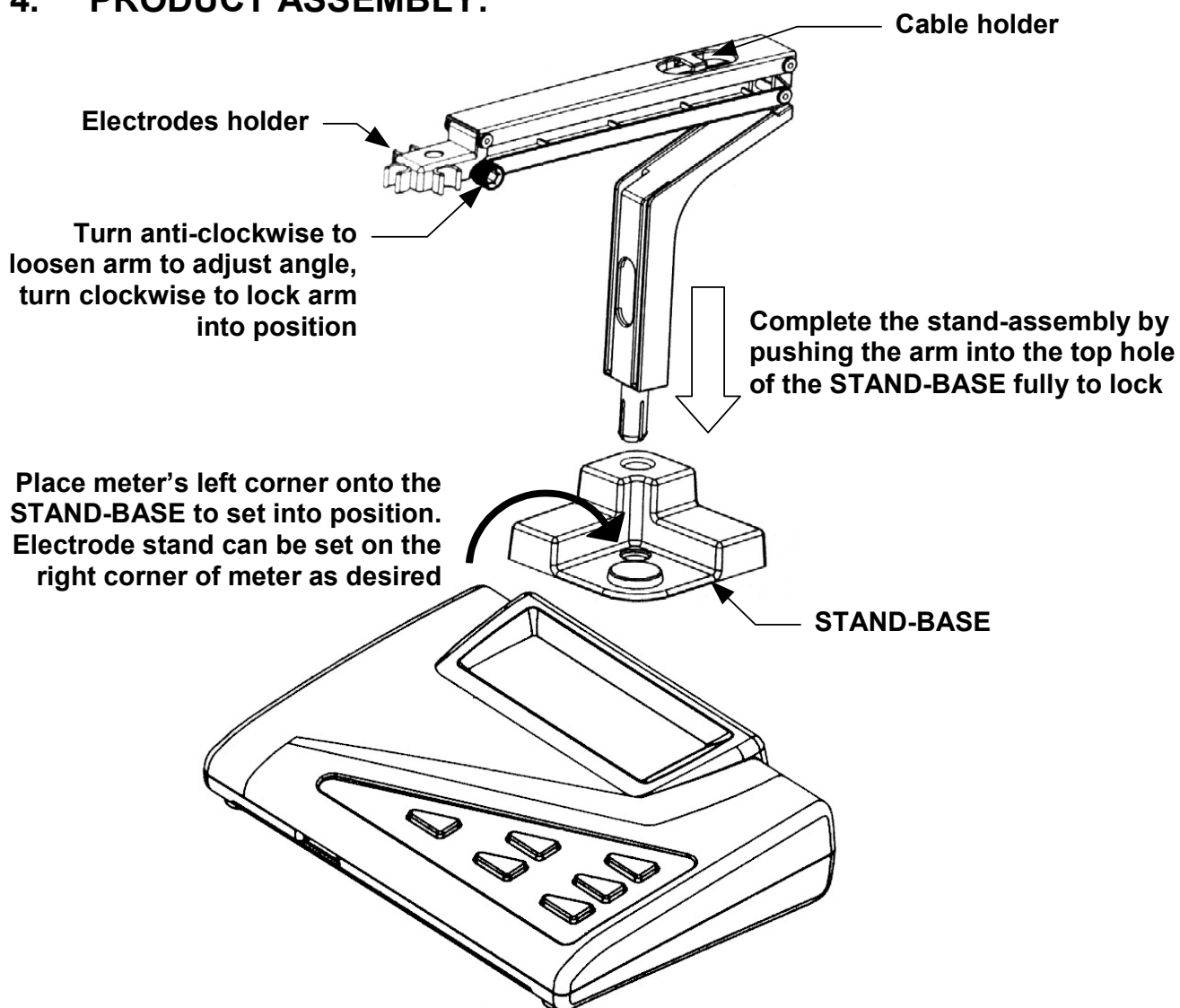- USB / RS232 online data logging to PC

2. CONTENT:

Carefully unpack the box. It should contain the following items:

a. Main unit
b. Combination pH electrode with built-in temperature sensor
c. Electrode stand
d. AC – DC adaptor (Non-universal, for local power point use only)
e. USB PC communication kit
f. Operations manual

3. SPECIFICATION:

Range	0 to 14 pH	±1999mV	0 to 90ºC
Resolution	0.01pH	0.1mV ~199.9 1mV ~1999	0.1ºC
Accuracy	±0.02pH	±0.2mV ~199.9 ±2mV ~1999	±0.5ºC
Calibration	5 point selectable		
Operating voltage	9 VDC, min.100mA		
Operating temperature	5 to 40ºC		
Storage temperature	-20 to 60ºC		
Operating humidity	Up to 95% RH		
Meter size	217 x 168 x 58mm		
Package size			
Package weight	2.1kg		

4. PRODUCT ASSEMBLY:

Cable holder

Electrodes holder

Turn anti-clockwise to loosen arm to adjust angle, turn clockwise to lock arm into position

Complete the stand-assembly by pushing the arm into the top hole of the STAND-BASE fully to lock

Place meter's left corner onto the STAND-BASE to set into position. Electrode stand can be set on the right corner of meter as desired

STAND-BASE

5.   ELECTRODE & SENSORS

The pH electrode is one of the important sensing elements in the pH measuring system.   Understanding and maintaining the electrode in good conditions will ensure consistent and accurate measurement all the time.

> ### PRECAUTION ON USE !
> ✘ Do not touch or scratch the pH glass sensor. It is fragile and delicate.
> ✘ Do not clean sensor with alcohol.
> ✘ Never use distilled water for storage.
> ✓ Store the electrode in the storage solution.
> ✓ Always rinse the electrode with distilled water before and after each test.

5.1   The supplied pH electrode is a plastic body combination sealed general-purpose electrode with build in temperature sensor.

5.2   There are specialized electrodes for different purpose and for measuring different liquid. This general-purpose electrode should only be used to measure city water. It is not made for measuring ultra-pure water, high viscosity liquid, cream, oil or solvent based liquid. Specialized electrode can be purchased separately for your specific needs.
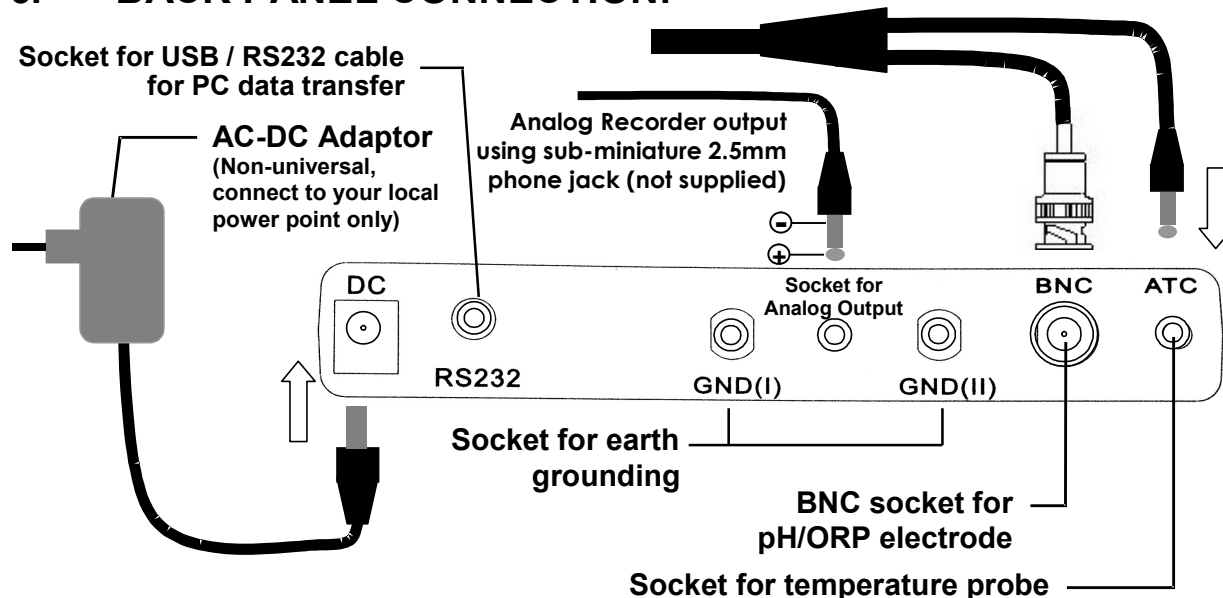
5.3   The pH electrode is an electro-chemistry sensor that contains special chemicals and a pH sensitive glass bulb. The glass bulb is half of the measuring element and must be kept wet to enhance speed of measurement. If the sensor is dried out, it will take a longer time to get hydrated. The other measuring element is the reference element, which contain concentrated chemical with a liquid bridge of porous fiber, allowing controlled contact with the measuring liquid.   In order to keep both sensors in ideal condition; the electrode is constantly soaked in a specially formulated liquid concentrate.
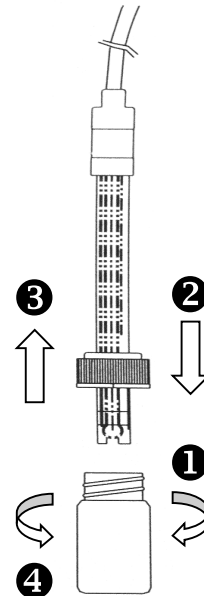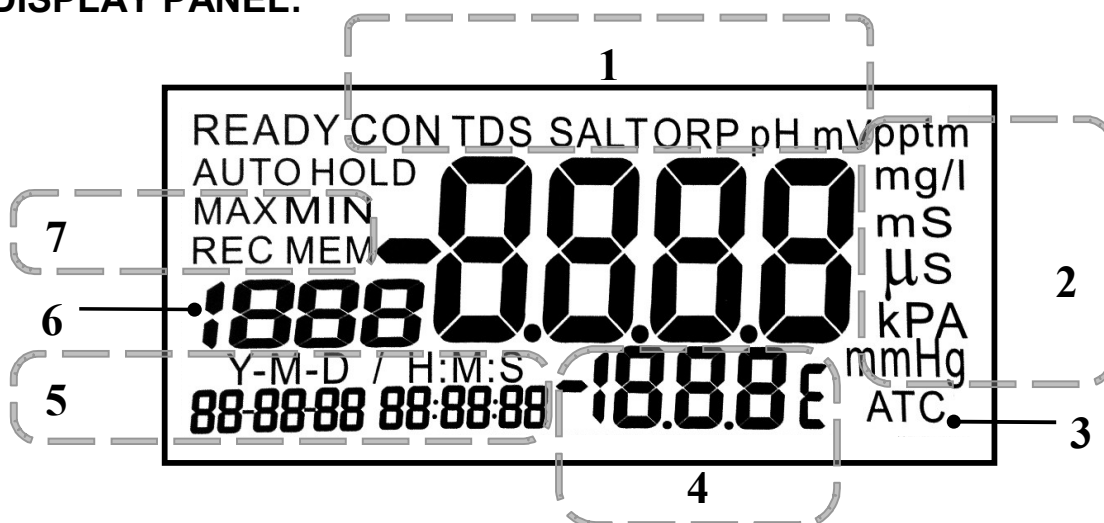
5.4   Before using the electrode, ❶ unscrew the soaker bottle then ❷ remove the cap. Rinse the sensor area with distilled water several times before proceeding with testing.

5.5   After using the electrode, first put back ❸ the cap then ❹ screw the bottle into place tightly to prevent leakage.

6. BACK PANEL CONNECTION:

Socket for USB / RS232 cable for PC data transfer

AC-DC Adaptor (Non-universal, connect to your local power point only)

Analog Recorder output using sub-miniature 2.5mm phone jack (not supplied)

DC

RS232

Socket for Analog Output

GND(I)   GND(II)

BNC   ATC

⊖
⊕

Socket for earth grounding

BNC socket for pH/ORP electrode

Socket for temperature probe

7. DISPLAY PANEL:

READY CON TDS SALT ORP pH mV ppt m
AUTO HOLD
MAX MIN
REC MEM
1888 -8.8.8.8
Y-M-D / H:M:S
88-88-88 88:88:88   -18.8.8 ℃

mg/l
mS
µs
kPA
mmHg
ATC.

1 – Measurement functions indicator
2 – Units of measurement
3 – Indicates reading with automatic temperature compensation
4 – Sub-display for Temperature display or program number in **SETUP** mode or buffer standard in **CALIBRATION** mode.
5 – Real time clock in "**Year-Month-Date / Hour : Minute : Second**"
6 – Memory data counter and **CALIBRATION** mode indicator
7 – Memory recall / review indicator:
   MEM – Flash momentarily while data is being saved
   MAX – Maximum reading of all saved data displayed
   MIN – Minimum reading of all saved data displayed
   REC – Flashing while recall mode is initiated
HOLD – Display put on hold
READY – When the **READY** feature is enabled, during measurement it will flash, indicating measurement in progress. When stopped, indicates reading has stabilized.

8. KEY PAD PANEL

Get familiarized with the key buttons will help you to operate the meter with ease.

ON-OFF & SETUP KEY
1. Press to switch **ON** or **OFF** the meter
2. Press and hold down to enter **SETUP** mode

CALIBRATION & EXIT KEY
1. Press to enter **CALIBRATION** mode
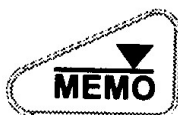2. During **SETUP** or **RECALL** mode, press to EXIT

HOLD KEY & RECALL KEY
1. Press to freeze or put display on hold. Press again to release.
2. Press and hold down to enter **RECALL** mode
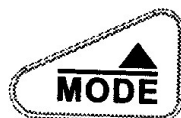
MODE KEY & MOVE-UP/SELECT KEY
1. Press to switch display mode between pH and mV
2. During setting, press to move digit up or next selection

MEMORY SAVE KEY & MOVE-DOWN / SELECT KEY
1. Press to save current reading into memory
2. During setting, press to move digit down or previous selection

CONFIRM KEY, MAXIMUM / MINIMUM DISPLAY KEY & TEMPERATURE SET KEY
1. During **CALIBRATION** or **SETUP** setting, press to confirm setting.
2. While in **RECALL** mode, press to display maximum and again for minimum reading of all saved data.
3. When making measurement without temperature mode, press and hold down to enter temperature adjustment mode.

9. SETTING UP THE UNIT:

9.1 Before you begin using the unit, it is important to define your measuring requirements. These will allow the unit to display accurately on the condition of sample that is being measured.

9.2 After the unit is switched ON, press and hold down the ⌧(SET⏻) key until display shows tr.

9.3 Press ⌧(MODE▲) to go to next parameter and ⌧(MEMO▼) for previous parameter. Below are the description of each parameter setting:

(Anytime during setup, press ⌧(CAL ESC) to cancel or return to measuring mode)

tr (P1.0) DATA TRANSMISSION TO PERSONAL COMPUTER

This setting allows you to download saved memory data to PC via the RS232 connection.

1. Download a free software from the internet at the below link:

http://www.eltima.com/download/rs232-data-logger

2. **Connect** the USB cable to the back of the meter and PC USB socket. Optional RS232 interface connector can be used for PC.
3. Install and **RUN** the application on the PC.
4. Under **Available ports**, select the **com port** meter is connected to.
5. Click ⌊··⌋ to select **file location** and type file **name** then click **save.**
6. Set Baud-rate to **9600**, Data-bits to **8**, Parity to **non**, Stop-bits to **1**, Flow control to **non** and Click [**Start logging**]
7. Press ⌧(MN/MX↵) on the meter and display will show out (P1.1) flashing, PC will indicate transmission in progress.
8. When transmission is completed, display will return to tr P1.0.
9. On the PC, click [**Stop logging**] and a text file will be created.
10. Locate the directory and open the file in text format. Data is display with time and date for analysis.
11. Press ⌧(MODE▲) to go to next parameter.

CLr (P2.0) CLEAR MEMORY

This setting will clear all the saved memory in the unit.

1. Press ⌧(MN/MX↵) and display will show no (P2.1) flashing.
2. Press ⌧(MODE▲) once to select between YES or no. If you select YES and press ⌧(MN/MX↵) all memory will be cleared. Otherwise select no then press ⌧(MN/MX↵), display will return to CLr (P2.0).
3. Press ⌧(MODE▲) to go to next parameter.

ELE (P3.0) REVIEW OF ELECTRODE STATUS

This setting allows you to review the last calibration information about the electrode conditions.

1. There are 5 calibration points for review in the follow order:

	SAVED DATA	NIST Buffer range	ISO/ Custom Buffer range
P3.1	% of Calibration slope	0.00 to 4.01	0.00 to 4.50
P3.2	% of Calibration slope	4.02 to 6.86	4.51 to 7.00
P3.3	% of Calibration slope	6.87 to 9.18	7.01 to 9.50
P3.4	% of Calibration slope	9.19 to 14.00	9.51 to 14.00
P3.5	Calibration offset value in mili-volt (mV)		

2. Press [MN/MX] and repeat to display *P3.1* to *P3.4* in slope percentage (%) and *P3.5* in offset value. Value for *P3.1* & *P3.2* will be identical if one Cal. point is within both ranges and same for *P3.3* & *P3.4*

3. A good electrode should have a value of above 75% and below 115%. Otherwise, the electrode should be replaced.

4. At P3.5, display will show the calibrated offset value in mV. A good electrode should have a value not greater than ±60mV. Otherwise, the electrode should be replaced.

5. Press [MN/MX] to return to *ELE* (*P3.0*)

6. Press [MODE] to go to next parameter.

buF (P4.0) BUFFER CALIBRATION STANDARD

This setting allows you to select ISO, NIST or customized buffer standard. Factory preset is ISO standard.

ISO (*iSo*) buffer standards are pH1.68, 7.00, 4.01, 10.01, 12.45 and **NIST** (*niSt*) buffer standards are pH1.68, 4.01, 6.86, 9.18 and 12.45, which are preset in this meter, and will be automatically recognized during calibration.

Select customize (*CUSt*) if you have other standards other than Nist buffer solutions. This will allow you to set each calibration point to the standard buffer solution available, which are about to calibrate.

1. Press [MN/MX] and display will show *CUSt* (*P4.1*) flashing.
2. Press [MODE] once to select *ISO*, *niSt* or *CUSt*. Press [MN/MX] and display will return to *bUF* (*P4.0*).
3. Press [MODE] to go to next parameter.

rdY (P6.0) STABILITY INDICATOR

This setting allows you to switch ON or OFF the stabilized reading indicator. Whenever the **READY** sign appear on the top left corner of the display, it indicates that a stable reading has reached. This will be helpful to eliminate guesswork. In some case, especially where the reading is very slow in response, switch OFF the indicator for independent user's judgment. Factory preset is ON.

1. Press [MN/MX] and display will show YES (P6.**1**) with flashing.
2. Press [MODE] to select between YES or no
3. Set to no and press [MN/MX] to disable endpoint indicator, display will return to rdY (P6.0)
4. Press [MODE] to go to next parameter.

$Unit$ (P7.0) UNIT OF MEASUREMENT

This setting allows you to set the unit of measurement for temperature. Factory preset is in °C.

1. Press [MN/MX] and display will show $Unit$ (P7.**1**) with C flashing.
2. Press [MODE] to change between F or C.
3. Press [MN/MX] to confirm setting, display will return to $Unit$ (P7.0).
4. Press [MODE] to go to next parameter.

rtc (P8.0) REAL TIME CLOCK

This setting allow you to change the date in **Y**ear-**M**onth-**D**ate and time in **H**our:**M**inute:**S**econd on the unit.

1. Press [MN/MX] and display will show rtc (P8.**1**) with 2 digit flashing below **Y**-year.
2. Press [MODE] or [MEMO] to change the value of **Y**ear.
3. Press [MN/MX] to confirm, display will show rtc (P8.**2**) with the next 2-digit flashing below **M**-month.
4. Repeat step 2 to 3 to change each setting in the following sequence of **D**ay(P8.**3**), **H**our(P8.**4**), **M**inute(P8.**5**) and **S**econd(P8.**6**).
5. After confirming the last setting, display will return to rtc (P8.0)
6. Press [MODE] to go to next parameter.

$r5t$ ($P9.0$) **MASTER RESET**

This setting allows you to reset the unit to the original factory's default.

Original factory default: bUF ($P4.0$) $= i5o$ $rd9$ ($P6.0$) $= 9E5$

1. Press ⌧(MN/MX) and display will show no ($P9.1$) flashing.

2. Press ⌧(MODE) to select between $9E5$ or no. If you select $9E5$ and press ⌧(MN/MX) , all setting will be cleared and reset to original factory default. Otherwise select **no** then press ⌧(MN/MX) and display will return to $r5t$ **($P9.0$)**.

3. Press ⌧(MODE) to return to beginning.

9.4   After completing setup, press ⌧(CAL/ESC) to exit **SETUP**.

10.   CALIBRATION:

> ** Calibration should be performed as frequently as possible to ensure accurate measurement, depending on the frequency of tests performed. Additional calibration solution should be purchased for future needs.*

10.1   Prepare standard solutions ***of at least two (2) calibration points***. If measurements are to be made in the acidic range, select 2 points between pH0 to 7. If measurements are made in the alkaline range, then select between pH7 to 14. If full range is required, calibrate at least 3 to 5 calibration points between pH0 to 14.

10.2   Buffer standard must be set during **SETUP** in page 7, bUF **($P4.0$)**.

10.3   Standard solutions are in 3 groups of standards – ISO, Nist and custom standards.

ISO buffer standards are pH7.00, 4.01 and 10.01

NIST buffer standards are pH1.68, 4.01, 6.86, 9.18 and 12.45
Custom standards can be defined by manually set the buffer standard.

10.4   Do keep in mind that buffer standards are specified at 25°C. Calibration value should set to the exact value as the buffer solution value correlate to the current calibration temperature.

Calibration with ISO Standard

10.5 Make sure the unit is properly installed and electrode connected.

10.6 Press ⟨CAL/ESC⟩ and display will show *CAL* flashing on the left, indicating it is in calibration mode.

10.7 This meter has an internal setting of automatic buffer recognition on the ISO Standard. **Always begin with "Offset" calibration first**.

10.8 Rinse the pH electrodes in distilled water then dip in the buffer solution. First Offset buffer (pH7.00) then subsequently slope buffer.

> *Always rinses the electrode with distilled water before and after each test. This is to prevent solution carry over or cross contamination. Standard solutions must maintain highest purity; otherwise the meter's accuracy could be compromised.*

10.9 Main display will show the current measured value and the bottom sub-display will show the buffer value. Value will vary according to temperature listed below table:

Temperature (°C)	ISO standard buffer solution				
	Slope 1.68	Slope 4.01	Offset 7.00	Slope 10.01	Slope 12.45
0	1.67	4.00	7.11	10.32	13.43
5	1.67	4.00	7.08	10.25	13.21
10	1.67	4.00	7.06	10.18	13.00
15	1.67	4.00	7.03	10.12	12.81
20	1.68	4.00	7.01	10.06	12.63
25	**1.68**	**4.01**	**7.00**	**10.01**	**12.45**
30	1.69	4.02	6.98	9.97	12.29
35	1.69	4.02	6.98	9.93	12.13
40	1.70	4.03	6.97	9.89	11.99
45	1.70	4.04	6.97	9.86	11.84
50	1.71	4.06	6.97	9.83	11.70

10.10 If the sub-display does not automatically recognize a buffer, it means the electrode could be defective or the buffer solution is wrong. Calibration cannot proceed until they are rectified.

10.11 When the **READY** sign appear on the top left corner, it means you are ready to confirm the setting. Wait another 10 seconds, if the reading is not stable, **READY** sign will disappear. Wait again till it appears.

10.12 Press ⟨MN/MX⟩ to confirm and display will flash and reading will revert to raw data, while sub-display alternate between buffer standard.

10.13 Repeat step 10.8 to 10.12 subsequently up to 4 Slope calibrations.

10.14 After confirming the final calibration point, press ⟨CAL/ESC⟩ to save data and exit calibration mode and return to normal reading.

Calibration with Nist Standard (if you have NIST buffer solution)

10.15 Make sure the unit is properly installed and electrode connected.

10.16 Press ⬚ᴄᴀʟ/ᴇsᴄ and display will show *CAL* flashing on the left, indicating it is in calibration mode.

10.17 This meter has an internal setting of automatic buffer recognition on the Nist Standard. ***Always begin with "Offset" calibration first***.

10.18 Rinse the pH electrodes in distilled water then dip in the buffer solution. First Offset buffer (pH6.86) then subsequently slope buffer.

> *Always rinses the electrode with distilled water before and after each test. This is to prevent solution carry over or cross contamination. Standard solutions must maintain highest purity; otherwise the meter's accuracy could be compromised.*

10.19 Main display will show the current measured value and the bottom sub-display will show the buffer value. Value will vary according to temperature listed below table:

Temperature (°C)	NIST standard buffer solution				
	Slope 1.68	Slope 4.01	Offset 6.86	Slope 9.18	Slope 12.45
0	1.67	4.01	6.98	9.47	13.43
5	1.67	4.00	6.95	9.38	13.21
10	1.67	4.00	6.92	9.32	13.00
15	1.67	4.00	6.90	9.27	12.81
20	1.68	4.00	6.88	9.22	12.63
25	**1.68**	**4.01**	**6.86**	**9.18**	**12.45**
30	1.69	4.01	6.85	9.14	12.29
35	1.69	4.02	6.84	9.10	12.13
40	1.70	4.03	6.84	9.07	11.99
45	1.70	4.04	6.83	9.04	11.84
50	1.71	4.06	6.83	9.01	11.70

10.20 If the sub-display does not automatically recognize a buffer, it means the electrode could be defective or the buffer solution is wrong. Calibration cannot proceed until they are rectified.

10.21 When the **READY** sign appears on the top left corner, it means you are ready to confirm the setting. Wait another 10 seconds, if the reading is not stable, **READY** sign will disappear. Wait again till it appears.

10.22 Press ⬚ᴍɴ/ᴍx to confirm and display will flash and reading will revert to raw data, while sub-display alternate between buffer standard.

10.23 Repeat step 10.18 to 10.22 subsequently up to 4 Slope calibrations.

10.24 After confirming the final calibration point, press ⬚ᴄᴀʟ/ᴇsᴄ to save data and exit calibration mode and return to normal reading.

Calibration with Custom Standard

10.25 Make sure the unit is properly installed and electrode connected.

10.26 Press [CAL/ESC] and display will show *CAL* flashing on the left, indicating it is in calibration mode to make an Offset point calibration.

10.27 Rinse the pH electrodes in distilled water then into the buffer solution for Offset calibration or the slope buffer on continuity.

10.28 Main display will show the current measured value and the bottom sub-display will show *2.00* or the previous value on continuity.

10.29 Press [HLD/REC] to select the value nearest to the calibration solution. The preset custom standards are *2.00*, *4.50*, *7.00*, *9.50* and *12.50*.

10.30 After selecting the nearest value, press [MODE▲] or [MEMO▼] to adjust to the exact value as the buffer solution at the current temperature being used.

10.31 Press [MN/MX] to confirm and display will flash then revert to raw data.

10.32 Now you are ready to make Slope point calibration. Repeat step 10.27 to 10.31 in sequence. You can calibrate up to 4 slope points.

10.33 *At least 2 calibration points (offset & slope) must be established in one session of calibration. Otherwise, erroneous reading will result.*

10.34 Only upon completing the entire session of calibration, press [CAL/ESC] to exit calibration mode and to begin measurement.

11.   MAKING PH MEASUREMENT:

pH measurement with ATC (Automatic Temperature Compensation on sensor error)

11.1   This meter comes with an electrode with built in temperature sensor. Plug in the BNC and mini-phone connector as in section 6 of page4. The ATC sign will appear on the display.

11.2   Remove the electrode bottle carefully as in 5.4 of page3. Rinse probe in distilled water before each test. Shake the electrode with a snap motion, the way you would to a mercury thermometer and dip it into the test solution, stir to remove any bubbles.

11.3   Once a reading is stabilized and the **READY** sign appear. You may record the measurement.

Note on Measurements and Analysis:
Each type of liquid has its own pH value varies at different temperature. ATC measurement only compensates for the pH sensor's error, it does not compensate for the pH variation due to temperature fluctuation in the liquid. Therefore, each test should be made at the same temperature if possible or recorded with temperature reading for a comprehensive analysis.

pH measurement without ATC (Manual temperature compensation on sensor error)

11.4   If an alternative specialized electrode is used without the temperature sensor, then the ATC jack should not be connected. Manual setting of the temperature should be made as follow:

11.5   Press and *hold down* [MN/MX] until CAL appears in a flashing mode.

11.6   Press [MODE] and [MEMO] to change to the temperature of test liquid.

11.7   Press [MN/MX] to confirm and display will return to measuring mode.

11.8   Proceed to perform tests as 11.1 to 11.3. Whenever a temperature sensor is used, measurement will resume ATC. When it is removed, the manually set temperature will resume until you reset it.

12.   MAKING REDOX(ORP) MEASUREMENT:

12.1   Disconnect and remove the pH electrode and temperature probe. Connect with the Redox/ORP electrode. Temperature has no effect on ORP readings and therefore, not required during measurement.

12.2   Rinse the sensor in distilled water then in the test liquid. Stir to remove bubbles and wait for a stabilized reading.

12.3   When the **READY** sign appears, a stable reading has established.

12.4   Depending on the liquid that is measured, some volatile liquid may take as long as 20 minutes or even longer time to be stabilized. Therefore, even the **READY** sign appears; the endpoint reading should be determined by individual experience in such case.

13.   DATA MEMORY:

13.1   This meter can save up to 99 data with real time clock with either pH or ORP measurements.

13.2   After a reading has been acquired, press [MEMO] to save reading into memory. Display will flash and memory counter shows 01.

RECALL MEMORY:

13.3   To review the saved data, press and hold down [HLD/REC] to enter **RECALL** mode.

13.4   Press [MODE] or [MEMO] to review each data.

13.5   Press [MN/MX] to review minimum reading over all saved data, and again to review maximum over saved data and again to return to review mode in a cyclical sequence.

13.6   After reviewing, press [CAL/ESC] to exit reviewing mode.

14. ONLINE DATA LOGGING TO PC:

14.1 This unit can be linked to any computer via USB or RS232 connection port to perform real time online data logging on the computer.

14.2 Data will be collected at defined intervals and a graph will be plotted.

14.3 Connect the RS232 mini phone jack connector to the back of the meter and the USB to the COM1 or 2….8 computer socket. (optional RS232 connector can be purchased and used)

14.4 Insert the PC connect CD-ROM to begin software installation.

14.5 Run the setup program.

14.6 After loading completed, run the program.

14.7 Read the instructions under help for detail setting.

15. TROUBLESHOOTING:

Problem	Cause & Remedy
Cannot switch on	1. Check A/C adaptor connection
Unstable reading or slow response	1. Ground loop in solution – make measurement in a cup or container. 2. Electrode is clogged. 3. Electrode could be expired. 4. Electromagnetic interference - move to another location to perform test.
Reading does not change	1. Broken pH glass sensor with micro-crack. 2. **HOLD** function is activated. Press ⬡ HLD REC to release.
Wrong date & time	Backup battery has expired. Contact your dealer to replace new ones.

16. ERROR CODE:

Code	Cause & Remedy
E02	Value is out of the lower measuring range
E03	Value is out of the upper measuring range
E04	Original data error – return for repair
E12	Factory calibration error – Perform **Master Reset** page 9 ⌐5ᖷ
E13	Slope or Offset is out of range – Wrong pH buffer/standard use or defective electrode. – Perform **Master Reset** page 9 ⌐5ᖷ if problem persist.
E31	Measuring circuit failure – Perform **Master Reset** page 9 ⌐5ᖷ
E32	IC memory failure – return for repair

CALIBRATION CERTIFICATE

Product: Professional Bench-top pH meter BP3001
Measuring range: 0 to 14 pH
Calibration point(s):   7.00, 4.01, 10.01
Test point(s):   7.00, 4.01, 10.01
Accuracy achieved: ±0.02 (Complete system, meter + probe)

CL Teh

Trans Instruments (S) Pte. Ltd. certified that the above products underwent stringent calibration in accordance with Trans Instruments product manufacturing standards and work procedures and the result of inspection or testing for calibration meets the product specifications above. The standard solutions use for the calibration procedure was tested by instrument which is traceable to the US National Institute for Standards & Technology standard, under ambient conditions.

This certificate validates the product at the point of production. A complete pH system will require regular calibration from time to time. A traceable pH buffer solution should be used for continual re-calibration.

WARRANTY:

Trans Instruments (Singapore) Pte. Ltd., warranties this product for a period of 12 months for main unit and 3 months for probe or sensors from date of purchase; against all defects in material and workmanship. This warranty does not apply to the abuse or misuse of the instrument. If repairs or adjustments are required, please return the defective product freight prepaid. Instrument within warranty will be repaired at no charge.

Make sure that the product is properly packed and insured against possible damage or loss in shipment. Purchase invoice **MUST** be accompanied in returned product or else warranty is considered void.

Please obtain authorization from Trans Instruments (Singapore) Pte Ltd. Directly or through your local sales representatives prior to returning the product. Trans Instruments staff can be contacted at the following email address or through our web-page contacts:

sales@transinstruments.com

TRANS INSTRUMENTS

(Singapore) Pte Ltd
email: sales@transinstruments.com
Website: www.transinstrumnets.com
ISO9001 Certified Firm