

Professional Benchtop Conductivity meter BC3020

Operation Manual

INTRODUCTION

Your purchase of this professional benchtop Conductivity 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:

- 5 points calibration at 1 point on each range
- Automatic Temperature Compensation
- User adjustment for temperature coefficient
- Hold or freeze display function
- 99 memory with real time clock recording
- Maximum and minimum data review
- RS232 online data logging to PC

2. CONTENT:

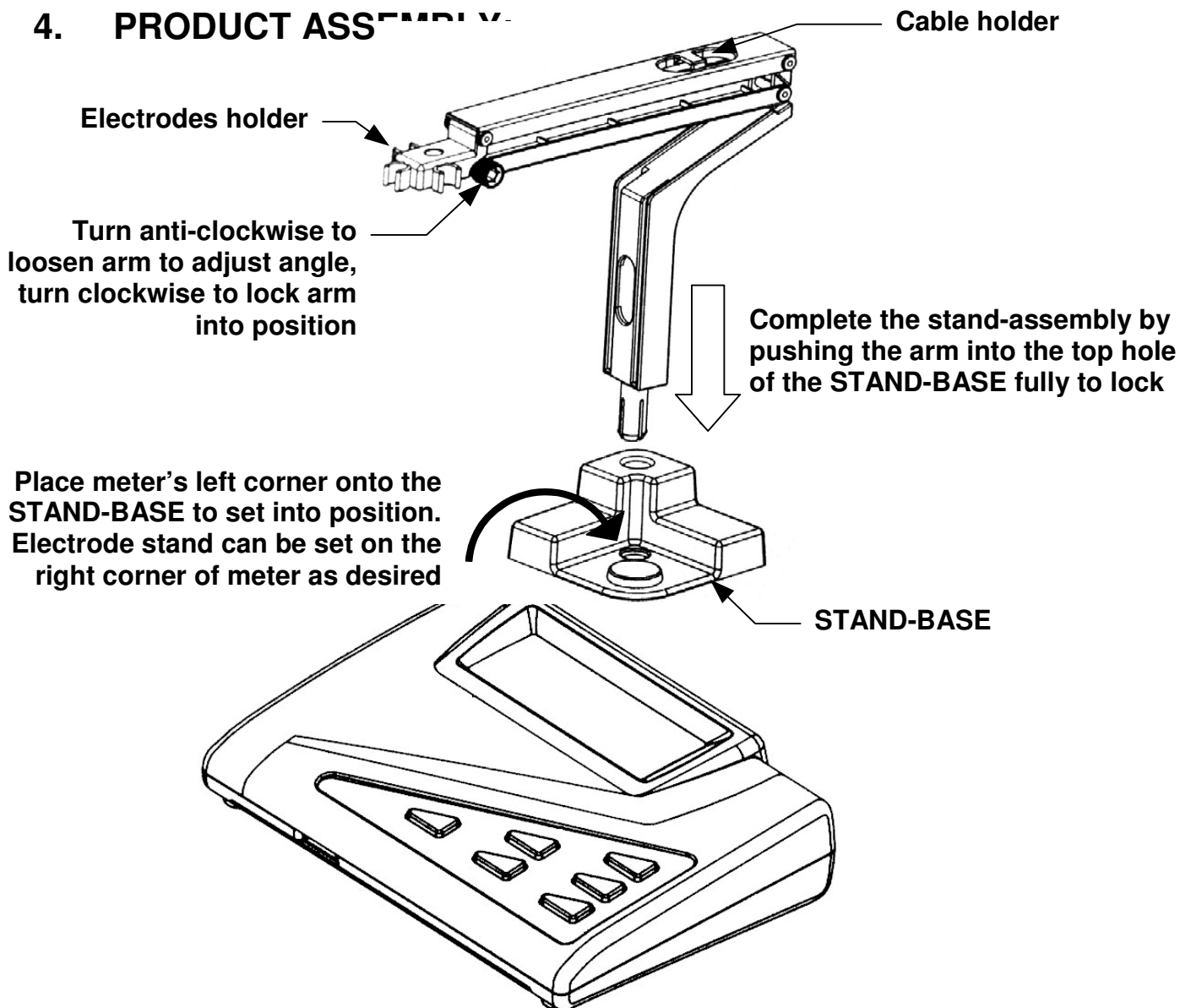
Carefully unpack the box, it should contain the following items:

- a. Main unit
- b. Combination Conductivity Probe with built-in temperature sensor
- c. Electrode stand
- d. AC – DC adaptor (Non-universal, for local power point use only)
- e. RS232 PC communication kit
- f. Operations manual

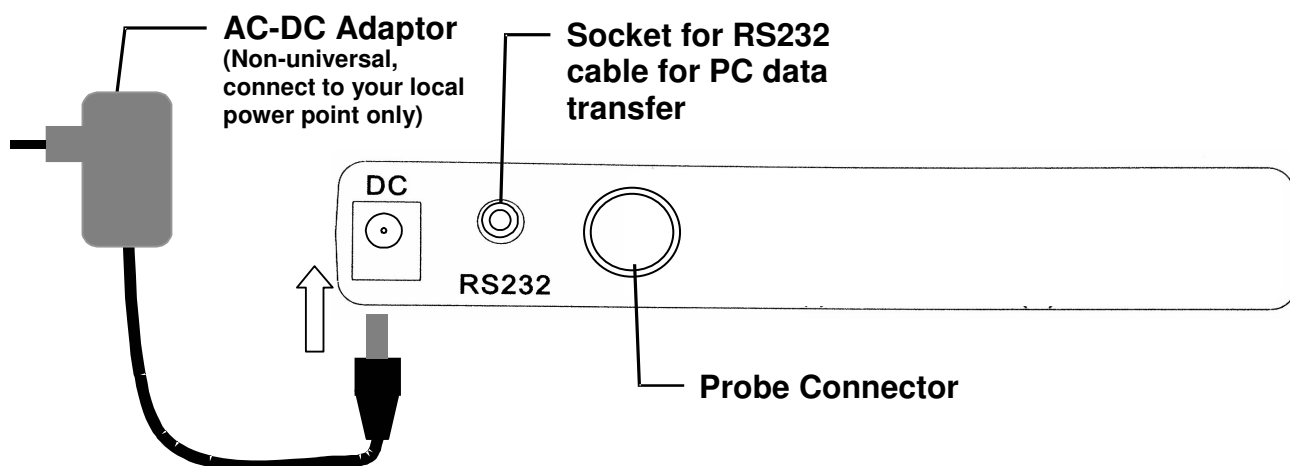
3. SPECIFICATION:

Auto Range	0~19.99 μ S	~199.9 μ S	~ 1999 μ S	~19.99mS	~199.9mS
Resolution	0.01 μ S	0.1 μ S	1 μ S	0.01mS	0.1mS
Accuracy	\pm 1% F.S. +1digit				
Calibration	5 point with 1 point on each range				
TDS factor	Adjustable 0.3 to 1.00				
ATC	Automatic 0 to 80°C				
Memory	99 data with real time clock				
Calibration	5 point at 1 point on each range				
Operating voltage	9 to 12VDC, min. 650mA				
Operating temperature	5 to 40°C				
Storage temperature	-20 to 60°C				
Operating humidity	Up to 95% RH				
Meter size	217 x 168 x 58mm				
Package weight	2.1kg				

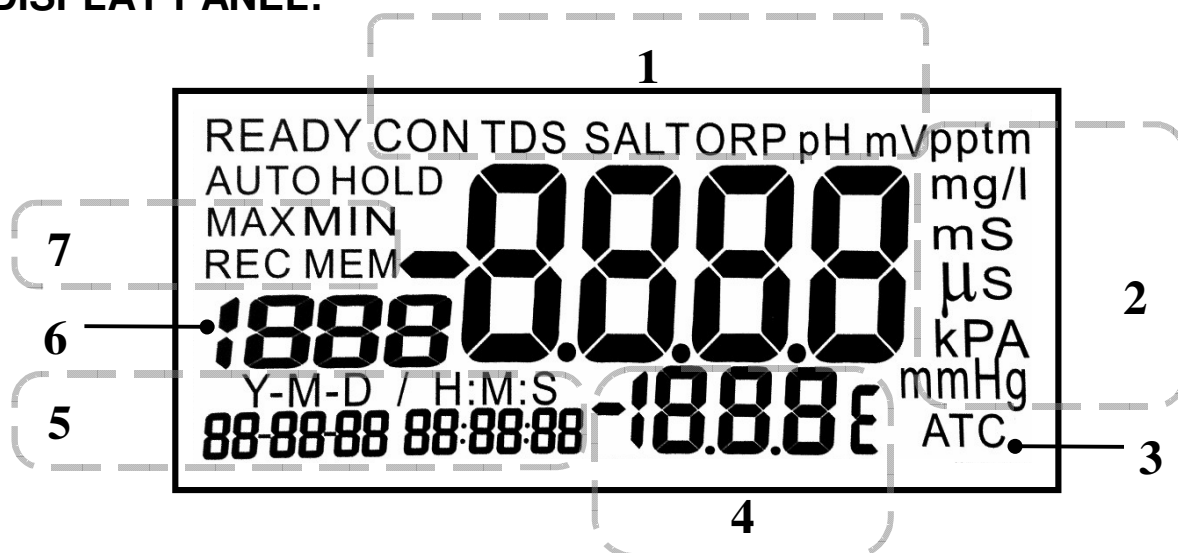
4. PRODUCT ASSEMBLY:



5. BACK PANEL CONNECTION:



6. DISPLAY PANEL:



- 1 – Measurement functions indicator
 - 2 – Units of measurement
 - 3 – Indicates automatic temperature compensation (**ATC**) enabled
 - 4 – Sub-display for Temperature display or program number in **SETUP** mode or standard value 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 or reach its endpoint.

7. KEY PAD PANEL

Get familiarised 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** mode or **RECALL** mode, press to EXIT



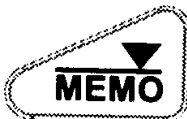
HOLD KEY ● RECALL KEY

1. Press to freeze or put display on hold. Press again to release.
2. Press and hold down to enter **RECALL** mode



MOVE-UP ● SELECT KEY

1. During setting, press to move digit up or next selection
2. Press and hold-down to scroll for a digit value setting.



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.
3. Press and hold-down to scroll for digit value setting.



RANGE SELECTION KEY ● CONFIRM KEY ● MAXIMUM / MINIMUM DISPLAY KEY

1. Press to switch measuring ranges $rA1, 2, 3, 4, 5$ and $Auto$ in a cyclical mode.
2. During **CALIBRATION** or **SETUP** setting, press to confirm setting.
3. While in **RECALL** mode, press to display maximum reading of all saved data and again to display minimum reading of all saved data.

8. SETTING UP THE UNIT:






- 8.1 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.
- 8.2 After the unit is switched ON, press and hold down the  key until display shows E_r .
- 8.3 Press  to go to next parameter and  or previous parameter. Below are the description of each parameter setting:
(Anytime during setup, press  to cancel or return to previous setting)

E_r (P 1.0) DATA TRANSMISSION TO PERSONAL COMPUTER

This setting allow 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 RS232 cable to the back of the meter and PC RS232 socket. Optional USB interface connector can be used.
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 Baudrate to **9600**, Databits to **8**, Parity to **non**, Stopbits to **1**, Flowcontrol to **non** and Click 
7. Press  on the meter and display will show $\square U E (P 1.1)$ flashing, PC will indicate transmission in progress.
8. When transmission is completed, display will return to $E_r P 1.0$.
9. On the PC, click  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  to go to next parameter.

CLR (P2.0) CLEAR MEMORY

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



1. Press  and display will show **no (P2.1)** flashing.
2. Press  once to select between **YES** or **no**. If you select **YES** and press  all memory will be cleared. Otherwise select **no** then press , display will return to **CLR (P2.0)**.
3. Press  to go to next parameter.

CAL (P3.0) REVIEW OF CALIBRATION STATUS

This setting allow you to review the last calibration information.




1. There are 5 calibration points on each range for review as follow:

Program Code	Range	Default value
P3.1	0 ~ 19.99 μ S	14.13 μ S
P3.2	~ 199.9 μ S	141.3 μ S
P3.3	~ 1999 μ S	1413 μ S
P3.4	~ 19.99mS	14.13mS
P3.5	~ 199.9Ms	141.3mS

2. If no calibration was made on the range, default value is displayed.
3. Press  and display will show the calibrated value for **P3.1**. Repeat for the next value, in the above table order.
4. At the last instance, to return to **CAL (P3.0)**
5. Press  to go to next parameter.

CELL (P4.0) REVIEW OF PROBE CELL CONSTANT

This setting let user review the registered cell constant calculated from the last calibration on each range. In this way, user can review the deviation of the cell constant against the original probe cell constant, thereby determine if you should replace the probe.

1. Press  and display will show the value on **(P4.1)** of range 1.
2. If no calibration was made on the range, **1.000** will be displayed.
3. Press  to display the next value on **(P4.2)** of range 2.
4. Repeat for next range 3, 4 and 5.
5. At the last instance, press  to go to next parameter.




COEF (P5.0) TEMPERATURE COMPENSATION SETTING

This setting allow you to set the automatic temperature compensation to manual temperature coefficient adjustment and adjust temperature while using manual compensation.

Auto (P5.1) ATC SETTING




This setting allow you set the automatic temperature compensation to manual. Factory default setting for ATC is ON, but if manual setting is desired, it must be switched off.

When the ATC is set to off, temperature has to be set manually under (P5.3)

1. Press  and display will show **Auto (P5.1)** flashing.
2. Press  to change between **OFF** ("off") or **Auto** ("on").
3. Press  to confirm setting.





2.1 (P5.2) TEMPERATURE COEFFICIENT

Temperature coefficient is the ratio of conductivity change per degree celsius in a solution. Since each solution has varying temperature coefficient, adjusting the value would enhance precision of temperature compensation thus giving a more precise reading. Temperature coefficient is expressed in percentage per degree celsius. In general, 2.1% / °C is used as default if this value is not available.

1. Display will show **2.1 (P5.2)** flashing.
2. Press  or  to change the value.
3. Press  to confirm setting.





25.0 (P5.3) MANUAL TEMPERATURE COMPENSATION ADJUST

When automatic temperature compensation is switched off and set to manual compensation, the temperature setting is default at 25°C. This setting allow you to adjust the temperature to the known temperature of the liquid about to be measured. Otherwise, reading will not be compensated and higher deviation will result.

1. Display will show **25.0** flashing.
2. Press  or  to change or hold-down to scroll for a temperature value.
3. Press  to confirm setting, display will return **COEF (P5.0)**
4. Press  to go to next parameter.





rdy (P6.0) ENDPOINT INDICATOR

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

1. Press  and display will show **YE5 (P6.1)** flashing.
2. Press  to select between **YE5** or **no**
3. Press  to confirm and display will return to **rdy (P6.0)**
4. Press  to go to next parameter.






Unit (P7.0) UNIT OF MEASUREMENT

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

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

rte (P8.0) REAL TIME CLOCK

This setting allow you to change the date in **Year-Month-Date** and time in **Hour:Minute:Second** on the unit.

1. Press  and display will show **rte (P8.1)** with 2 digit flashing below **Y**-year.
2. Press  or  to change the value of **Year**.
3. Press  to confirm, display will show **rte (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 **Day(P8.3)**, **Hour(P8.4)**, **Minute(P8.5)** and **Second(P8.6)**.
5. After confirming the last setting, display will return to **rte (P8.0)**
6. Press  to go to next parameter.






r5t (P9.0) MASTER RESET


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

Original factory default: CELL (P4.0)= 1.000 rdy (P6.0)= YES

COEF (P5.1)= Atc (P5.2)= 2.1

(P5.3)= 25.0 Unit (P7.1)= C

1. Press  and display will show no (P9.1) flashing.
2. Press  to select between YES or no. If you select YES and press , all setting will be cleared and reset to original factory default. Otherwise select no then press  and display will return to r5t (P9.0).
3. Press  to return to beginning.

8.4 After completing setup, press  to exit **SETUP**.

9. CALIBRATION:

9.1 This meter is factory calibrated and re-calibration is not required. But if higher accuracy is required on a specific range or if readings are in doubt, recalibration should be performed.

9.2 You can calibrate one point on each of the 5 ranges as below:






Range	Cell constant K= 1.0	Recommended Calibration Solution
Range 1	0.00 ~ 19.99 μ S	
Range 2	20.0 ~ 199.9 μ S	74 μ S
Range 3	200 ~ 1999 μ S	1413 μ S
Range 4	2.00 ~ 19.99 mS	12.88mS
Range 5	20.0 ~ 199.9 mS	

9.3 Do not use solutions value within 10% of the top or bottom value of the stated range, as it will limit the adjustment window and cause error. Choose solution values that are at the middle of the range.

9.4 Prepare each calibration solution in 2 container, one for rinsing and the other for calibration. It is important to prevent liquid carry-over from the previous liquid or rinsing water, as they will affect accuracy.

9.5 Fill container with at least 4cm or 1 1/2 inch height with the standard solution.


9.6 Rinse the probe with distilled water; then dip into the first container for rinsing, then into the second container for calibration.

- 9.7 With the unit switched on, press the  button to enter calibration mode.
- 9.8 Press  or  to adjust, hold-down to scroll the calibration value of the **sub-display** to exactly match the calibration solution value. Example: 1413 μ S.
- 9.9 When the **READY** sign appear on the left of the display, press  to confirm the calibration. Display will return to normal measuring mode.
- 9.10 If you have other solutions at different range, repeat 9.5 to 9.9
- 9.11 Anytime during calibration, press  to exit and return to normal measuring mode.

CALIBRATION ERROR:

- 9.12 Calibration point setting is adjustable within 20% of the detected value. If calibration point is unable to be set, then the probe could be fouled and cleaning is necessary. Otherwise, it could be damaged or faulty.

10. MAKING MEASUREMENT:

- 10.1 Switch on the unit. Note on the bottom right side of display, ATC should appear. Otherwise, it may have been set to off. Follow instructions under **SETUP** on page 7 of *RUŁ □ (P5. I)* to turn it on.
- 10.2 Rinse the probe with distilled-water then dip into the test liquid and stir and tap on the probe to remove bubbles. *Tiny bubble in the sensor cell can affect measurement and gives erroneous reading.*
- 10.3 Keep still and wait a while for temperature compensation to take place.
- 10.4 When the **Ready** sign appear on the left side of display, it indicates a stabilized endpoint reading has been reach. You can now take the measurement.
- 10.5 Press the  button to freeze the display as desired. **HOLD** will appear on the display. Press again to release it for another measurement.
- 10.6 Always rinse probe with distilled water before and after each test.

FIXED RANGE MEASUREMENT:

10.7 If measurement is required only within a specific range and to enhance display resolution, press the  button to switch between the range in a cyclical sequence as follows:

Display Code	Display resolution	Range
rA1	0.01 μ S	0.01 ~ 19.99 μ S
rA2	0.1 μ S	0.1 ~ 199.9 μ S
rA3	1 μ S	1 ~ 1999 μ S
rA4	0.01 mS	0.01 ~ 19.99 mS
rA5	0.1 mS	0.1 ~ 199.9 mS
AUTO	Auto switching	Full range

If measurement is below the set Range, E02 will appear on the display.


If measurement is above the set Range, E03 will appear on the display.

This means you have to set range to the next higher or lower setting.


11. DATA MEMORY:

SAVE / STORE MEMORY:


11.1 This meter can save up to 99 data with real time clock.

11.2 After a reading has been acquired, press  to save reading into memory. Display will flash and **memory counter** shows 01. Subsequent saved memory will be 02. 03. 04. . . and so on.

RECALL MEMORY:

11.3 To review the saved data, press and hold down  to enter **RECALL** mode. **REC** will flash and displayed on the right side.

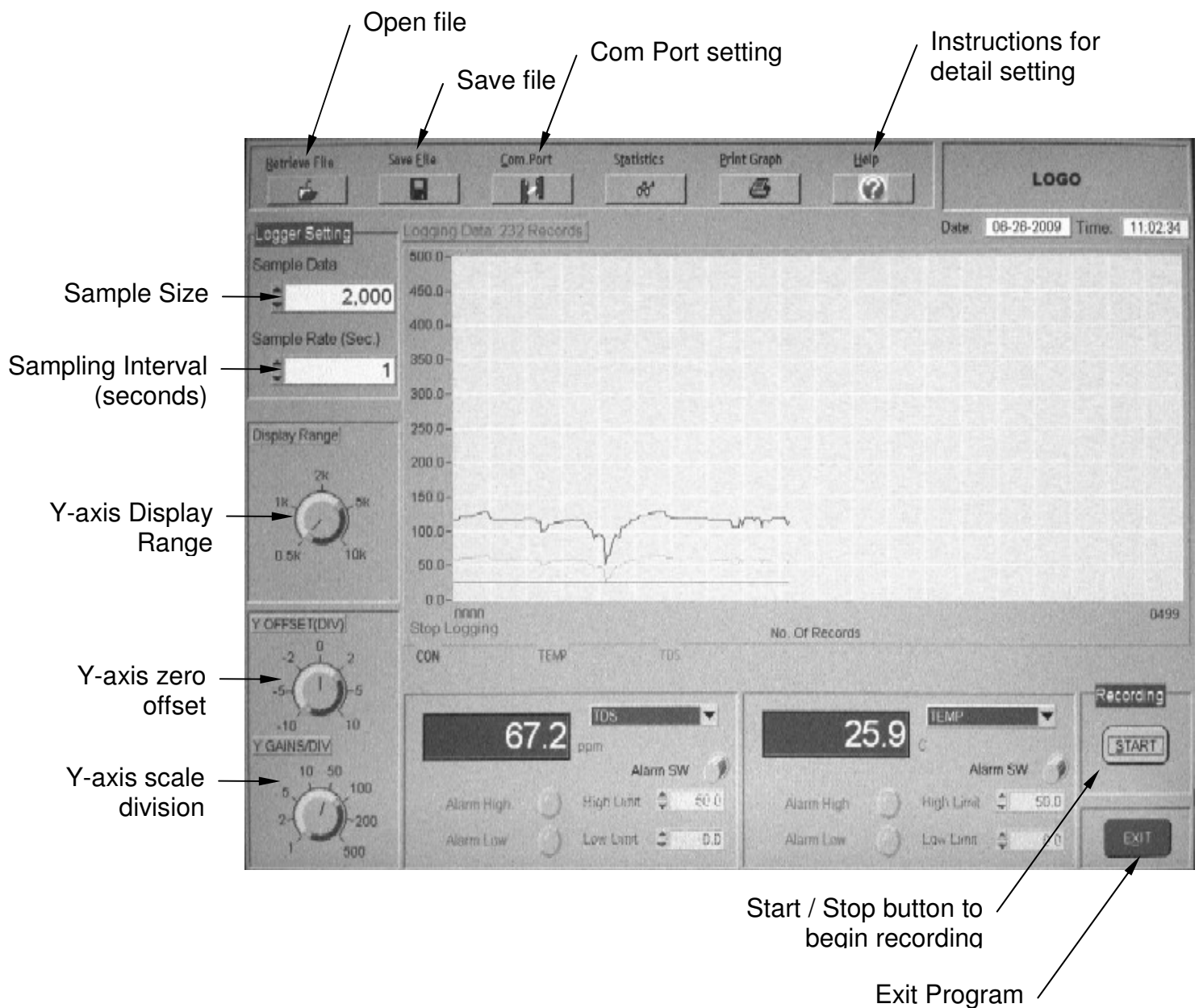
11.4 Press  or  to review each data.

11.5 Press  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.

11.6 After reviewing, press  to exit recall mode.

12. ONLINE DATA LOGGING TO PC:

- 12.1 This unit can be linked to any computer via the RS232 connection port to perform real time online data logging on a computer.
- 12.2 Data will be collected at defined intervals and a graph will be plotted.
- 12.3 Connect the RS232 mini phone jack connector to the back of the meter and the RS232 jack to the COM1 or 2....8 computer socket. (optional USB connector can be purchased and used)
- 12.4 Insert the PC connect CD-ROM to begin software installation.
- 12.5 Run the setup program.
- 12.6 After loading completed, run the program.
- 12.7 Read the instructions under help for detail setting.



13. MAINTENANCE:

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

13.2 If residue liquid is dried up on the cell surface, it may affect reading.

13.3 Perform the following options of cleaning:

- a. Soak sensor cell in distilled water to dissolve residue.
- b. Rinse the sensor cell in warm diluted detergent.
- c. Rinse the sensor cell in alcohol liquid.

Rinse thoroughly with distilled water and perform a calibration after each cleaning. Then re-test.


PRECAUTION

The sensor is a thin layer of platinised platinum and is very delicate. Once the surface is damaged, it will change the cell constant of the sensor and cause inaccuracy in reading.

- ✗ **Do not touch cell sensor**
- ✗ **Never rub or polish the sensor cell**
- ✗ **Never scrub the sensor cell**

- ✓ **Always rinse the cell sensor with distilled water before and after each test.**

14. TROUBLESHOOTING:

Problem	Cause & Remedy
Meter cannot switch on	1. Check A/C adaptor connection
Unstable reading or slow response	<ol style="list-style-type: none"> 1. Ground loop in solution – make measurement in a cup or container. 2. Probe could be damaged. 3. Strong electromagnetic interference – move to another location to perform test.
Reading does not change	1. HOLD function is activated. Press  to release.
Wrong date & time	Backup battery has expired. Contact your dealer to replace new ones.

15. ERROR CODE:

Code	Cause & Remedy
E02	Value is out of the lower measuring range – Set range to higher range. (page 11)
E03	Value is out of the upper measuring range – Set range to lower range (page 11)
E04	<ol style="list-style-type: none"> 1. Original data error – return for repair 2. Probe connection error – Check connection 3. Probe faulty – Swop with a good probe to confirm
E16	Factory calibration error – Unplug power for 10 seconds then restart meter. If cannot recover, return for repair
E17	Cell constant of probe is out of range – Sensor cell damaged or worn-off, change new probe
E31	Measuring circuit failure – Unplug power for 10 seconds then restart meter. If cannot recover, return for repair
E32	IC memory failure – return for repair

WARRANTY:

Trans Instruments (Singapore) Pte. Ltd., warrants this product for a period of 12 months and 3 months on probes and electrode 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

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