Instruction Manual

CyberScan CON 1500

Bench Conductivity/ TDS/ Resistivity Meter

EUTECH INSTRUMENTS

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68X292335
Rev 1 01/04

CE

ISO 9001 CERTIFIED

PREFACE

Thank you for selecting the Eutech Instruments CyberScan CON 1500 bench meter.

The instruction manual serves to explain the use of the CyberScan CON 1500 bench meter as a step-by-step operational guide to help you familiarise with the meter's features and functions. It is structured sequentially with illustration of diagrams that explains the various functions and setup menus available.

This manual is written to cover as many anticipated applications and uses of the CyberScan CON 1500 bench meter as possible. If there are doubts in the use of the meter, please do not hesitate to contact the nearest Eutech Instruments' Authorised Distributors or call us at (65) 6778-6876 for Eutech Instruments' Customer Service Dept. for assistance.

Kindly remember to complete the warranty card and mail it back to your Authorised Distributors or Eutech Instruments Pte Ltd.

Eutech Instruments reserve the rights to change, make improvement and modify specifications without prior notice and cannot accept any responsibility for damage or malfunction to the instrument caused by improper use.

TABLE OF CONTENTS

1. INTRODUCTION

Thank you for selecting the Eutech Instruments CyberScan CON 1500 bench-top meter. This instruction manual describes the operation of the meter. The state-of-art meter that you have purchased is easy to operate and will guide you through the various functions by displaying easy to understand prompts.

This instruction manual is designed to provide all the information necessary to guide you through the process of measuring Conductivity, Resistivity and Total Dissolved Solids with a series of prompts on the screen.

You will find this symbol appearing in this manual; it indicates useful tips that ease your meter operation.

The CyberScan CON 1500 provides microprocessor precision in a compact bench top design that is easy to use. This meter allows you:

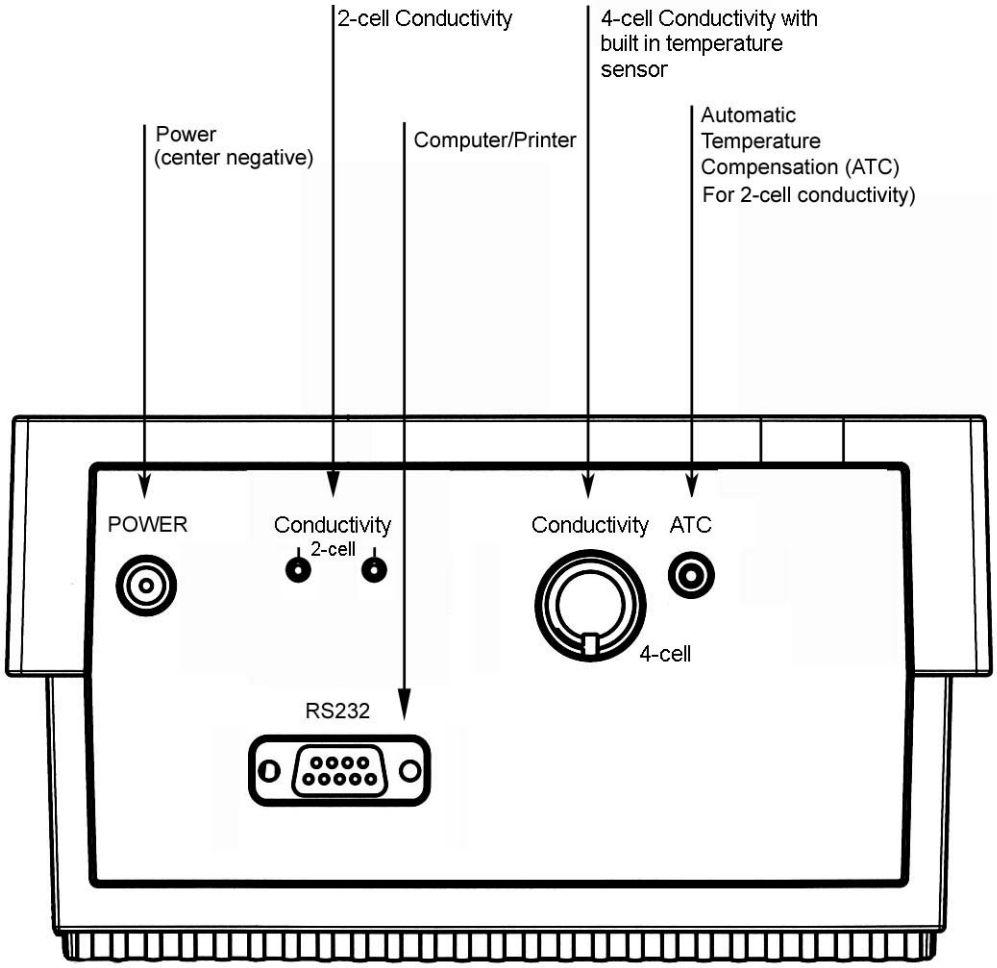
- Measure Conductivity, Resistivity and Total Dissolved Solids (TDS).
- Select cell constants, temperature coefficients, normalised temperature, TDS factor and temperature units.
- Replatinise your conductivity probe

It all adds up to rapid, completely automatic, intuitive operation.

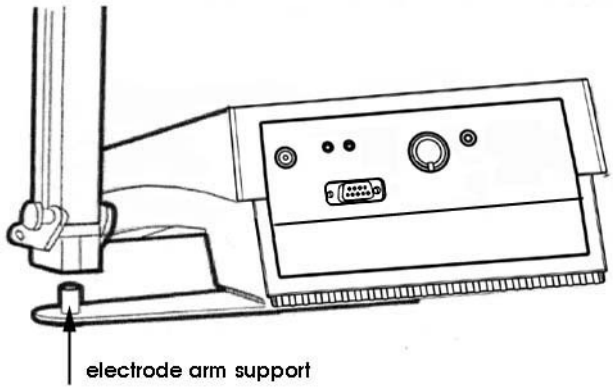
2. GETTING STARTED

2.1. Connectors

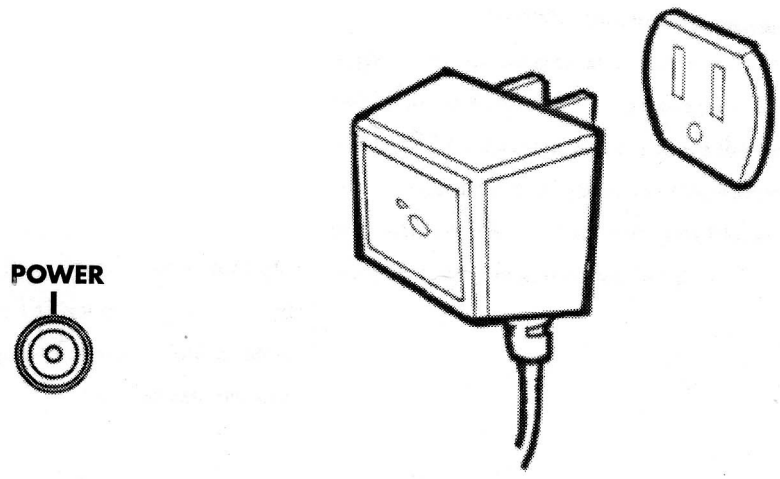
1. Review the layout and arrangement of the rear connector panel.



2. Connect the electrode arm to the base plate.



3. Connect the power adapter's output power jack to the meter's rear panel DC input power socket and plug in the adapter to a power source.



3. USING THE METER

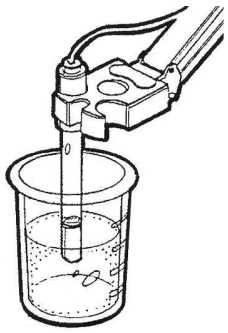
3.1. Conductivity Probes

This meter allows you to use either the 2-cell or 4-cell conductivity probes.

DO NOT connect both probes together.

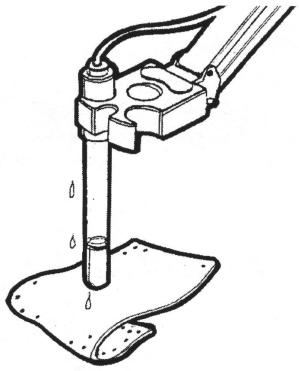
Remove the protective cover from the end of the probe. Prior to use, soak the probe in distilled or deionised water for 10 minutes. You may either:-

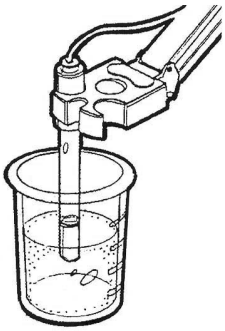
1. Connect the 2-cell probe by plugging its pin connectors into the dual pin sockets located at the rear panel of the meter.
2. Connect the 4-cell probe by plugging its DIN connector into the DIN socket at the rear panel of the meter.
3. Connect the ATC probe by plugging the 1/8” mini-phone jack into the ATC socket located at the rear panel of the meter.



The Eutech Instruments 4-cell probe has a built-in temperature sensor and therefore a separate ATC probe is not required.

1. Rinse the conductivity probe sensing elements with distilled or deionised water between samples.



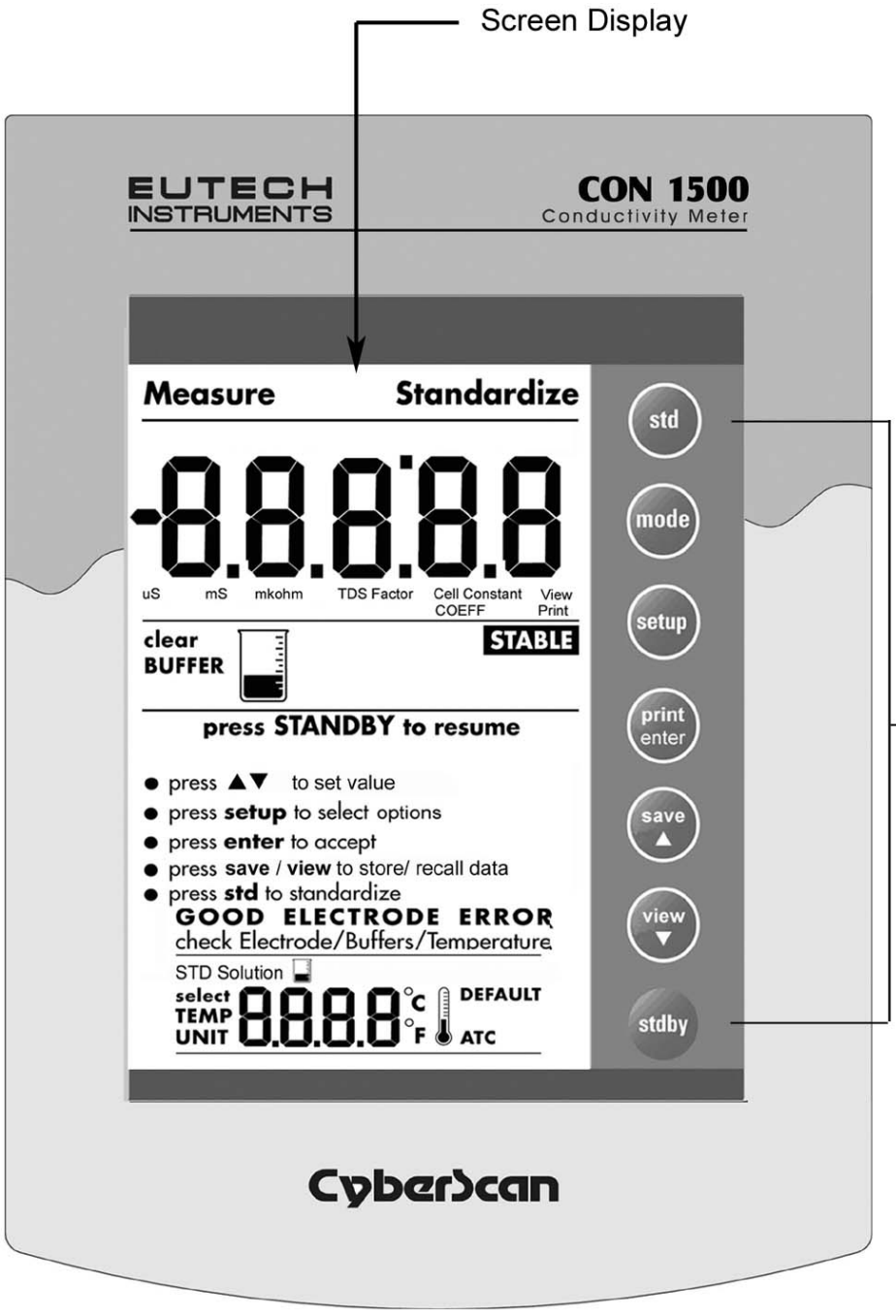


2. For long term storage, the probes can be stored dry or in distilled water.

Note that the cell constant may change slightly due to storage or use, and it must be re-evaluated with the use of standard conductivity solution (standardisation) prior to use.

3.2. Display/ Keys

Overview of the meter screen display and function key layout.



Press **std** key to initiate standardisation. Or press **std** key at the 'Standardize' mode allows you to exit and return to measurement mode without accepting the calibration.

Press **mode** to select uS, kohm or TDS.

Press **setup** key to access setup for configuration of meter setting.

Press **print** key to print stored data from memory or current reading to a PC or printer (depending on meter setup).

Press **enter** key to confirm selection or change being made.

Press ▲ key to increment value or scroll up selection.

Press ▼ key to decrement value or scroll down selection.

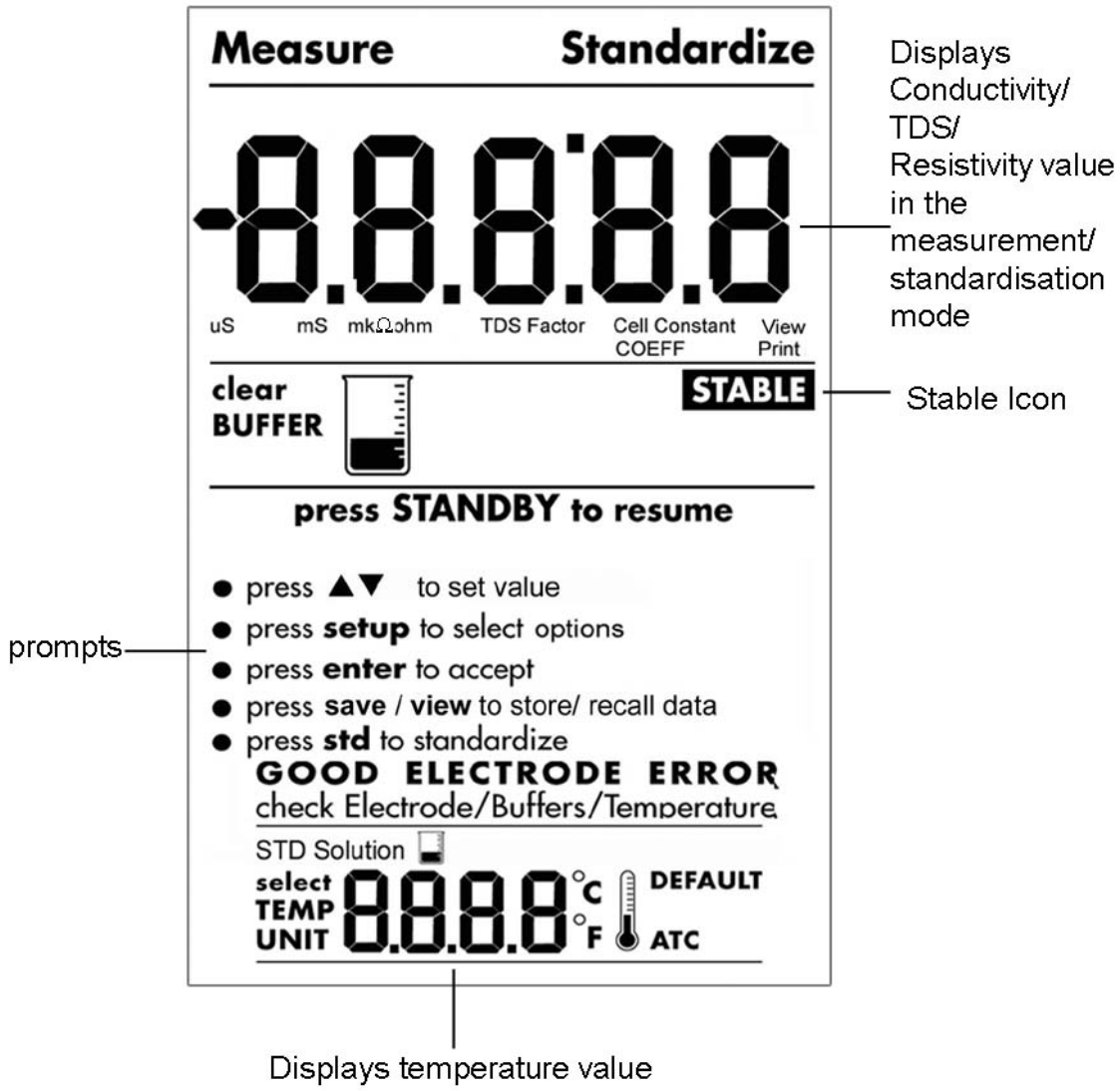
Press **save** key to store displayed data into memory

Press **view** key to recall and select memory location of stored data

Press **stdby** key to start up or put the meter in standby mode.

3.3. Screen Display

Familiarise yourself with the layout of the digital screen display.



4. CONDUCTIVITY OPERATION

4.1. Using Setup

The **setup** button brings you to the setup mode of the various parameters. Press **setup** while in measurement to access to the setup mode. The **▲/save** or **▼/view** keys allow you to scroll through the setup pages available. While in the **setup mode** you may:

Press the **std** key at any time to return to the measurement mode screen. Note new change will not be effected as no confirmation is done.

Press the **enter** key to accept a change or selection of desired option in the displayed parameter. The meter will then return to the next setup

Press the **▲/save** or **▼/view** keys to scroll through (increment and decrement setup pages respectively) the remaining selection options available.

4.2. Overview of Setup Pages in CyberScan CON 1500

Each mode selection (conductivity, resistivity or total dissolved solids) has similar setup pages except for TDS mode which includes *Setup P6.0 for setting TDS factor*. Refer to *Overview of Setup Pages* shown below.

Mode	Setup Pages Accessible
uS	P1.0 to P15.0 except P6.0
kohm	P1.0 to P15.0 except P6.0
TDS	P1.0 to P 15.0

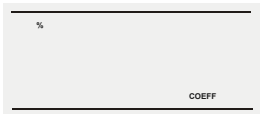
☞

If you do not wish to make a selection or change the option, pressing **std** key at any point of time allows you to exit the setup page/mode and return to the measurement mode.

Overview of Setup Pages in CyberScan CON 1500

P 1.0: View calibration data
- View the last calibrated buffer value depending on the display mode selected.

P 2.0: Set the cell constant
- Adjust and select cell constant to be 1.00, 10.00 or 0.10.

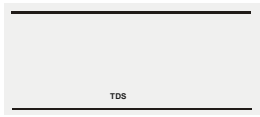


P 3.0: Set the Temperature Coefficient
- Select temperature coefficient value in the range of 0.000 to 10.000%.

P 4.0: Select the Normalised temperature
- Set the normalised temperature in the range of 15.0 to 30.0°C.

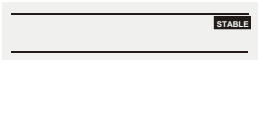
P 5.0: Set single- or multi-point calibration
- Select **ON** to activate single-point calibration, **OFF** for multi-point calibration.

P 5.0: Select the Auto or Manual cal options. (Only applicable for Conductivity mode)
- Set Auto calibration or Manual calibration for uS



P 6.0: Set TDS Factor
- Set the TDS Factor from a range of 0.40 to 1.00.

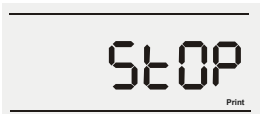
P 7.0: Set Temperature Unit
-Set the temperature unit to be °C or °F.



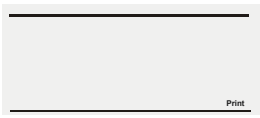
P 8.0: Set the stability indicator
- Select **ON** to activate the stability indicator, **OFF** to de-activate.

P 8.0: Set the Baud Rate
- Set baud rate as 4800, 9600, 19200 or 38400 bps.

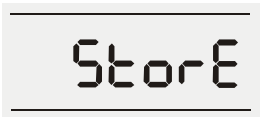
P 9.0: Set the Parity Bit
- Set parity bit as none(0), odd(1) or even(2).



P 10.0: Set the Stop Bit
- Set stop bit as one(1) or two (2).



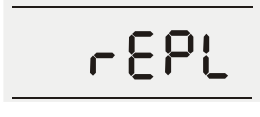
P 11.0: Select the Print Data Option
- Select to print current or stored data.



P 13.0: Clear the memory
- Select to clear stored memory.

P 14.0: Clear the user calibration

- Select to clear respective user calibration in the current mode.



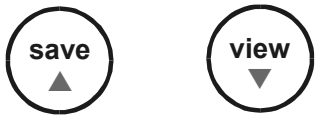
P 15.0: Replatinisation process setting
- Select **YES** to replatinise probe, **NO** to exit. Default replatinisation duration is 5.00 minutes.

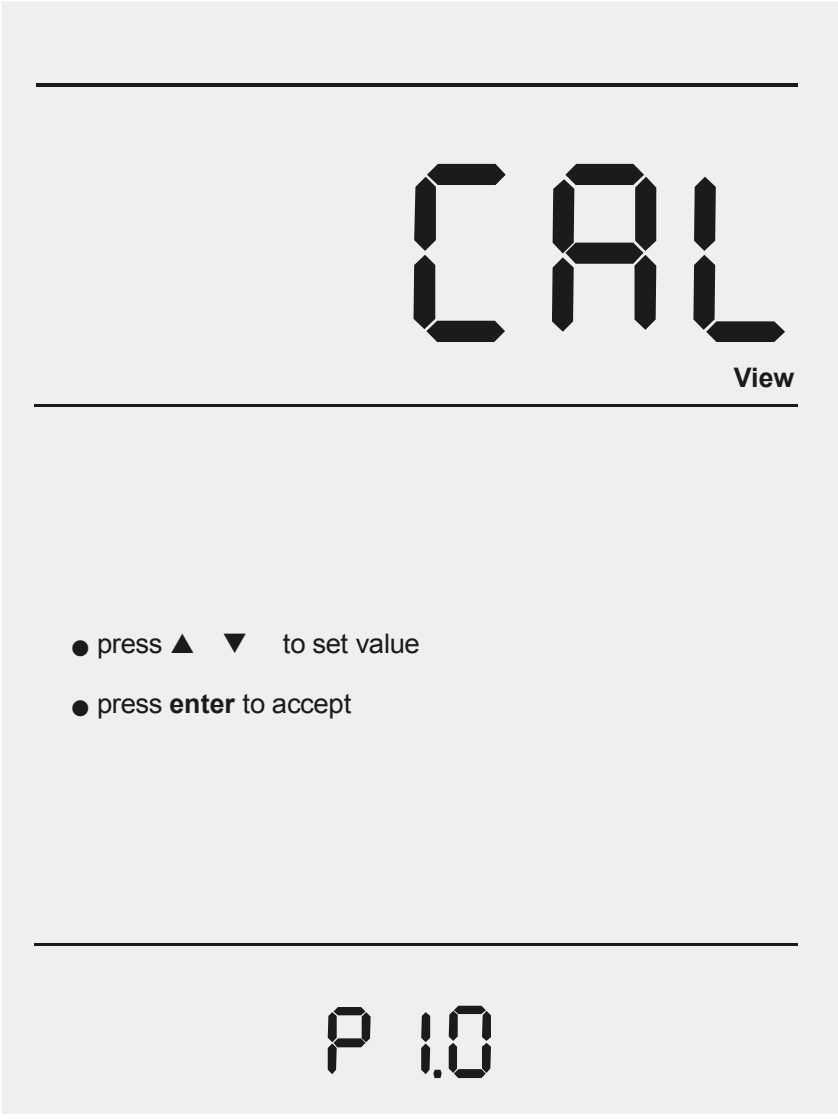
4.2.1 Setup Page 1.0: View the Cal data

This setup page allows you to view the calibrated buffer value depending on the display mode (Conductivity/ Resistivity/ TDS) selected, the electrode type (2-Cell/ 4-Cell), respective calibrated electrode cell constant/s and the calibrated buffer value.

1. Access the *View the Cal Data* setup page by pressing **setup** during any measurement mode screen.

2. Use the **▲/save** or **▼/view** keys to scroll until the screen displays as shown.



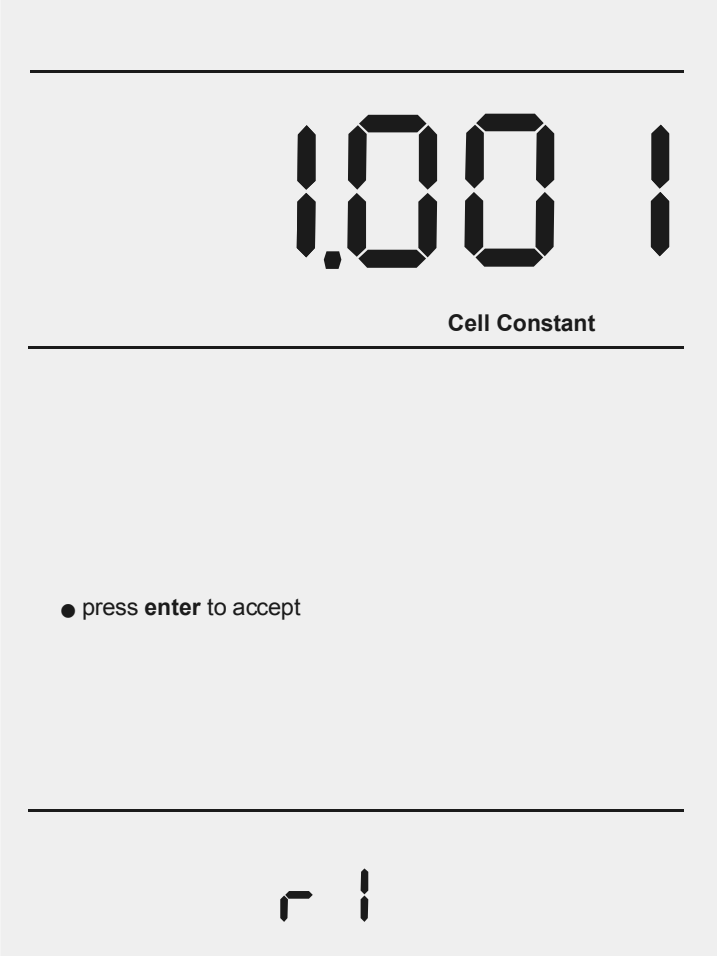


3. Press **enter** repeatedly to view all previous calibration data, starting from the first range till fourth range.

   The meter will display the calibration value of that particular range provided calibration is performed. If any of the range is not being calibrated the upper display shows "---".

   Range 1 has the lower display showing "r 1", range 2 will display "r 2" and the following ranges respectively.

   The meter displays the effective cell constants through the respective ranges and also the calibrated value. The cell constant is adjusted according to your calibration options. This will serve as an indicator to the probe's efficiency.



Cell constants of electrode will degrade with time and usage. You can use this feature to prompt you the need for a new probe prior to total failure. Recommended value as an indicator for a replacement of probe is either 0.60 or 1.40 (±40% of 1.000).

4. When you have scrolled through all the cell constants, you will automatically come to the screen shown below. This screen displays the meter's calibrated value.

5. Press **enter** key to go to the next setup page P2.0. Press **std** key if you wish to return to measurement mode.

6. Continue to access other setup pages using **▲/save** or **▼/view** keys OR press **std** key to exit from the setup mode and return to measurement mode.

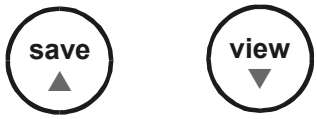
If you enter the setup mode from Conductivity measurement mode, calibration data will be in µS or mS. Similarly, if you enter the setup mode from TDS measurement mode, calibration data will be in ppm or ppt.

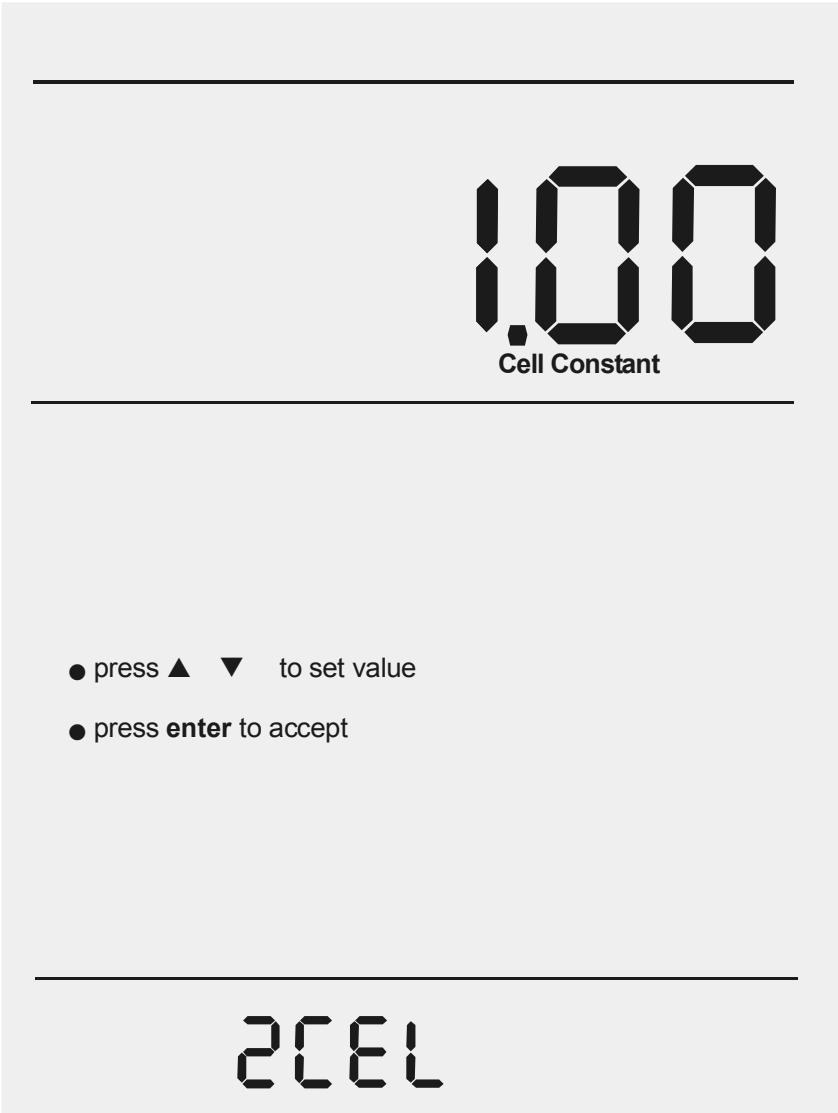
4.2.2 Setup Page 2.0: Set cell constant

This setup page allows you to set the cell constant value as 0.1, 1.0 or 10.0.

1. Access the *Set cell constant* setup page by pressing **setup** during any measurement mode screen.

2. Use the **▲/save** or **▼/view** keys to scroll until the screen displays as shown.





3. The cell constant can be selected as 0.1, 1.0 and 10.0 using the **▲/save** or **▼/view** keys to scroll through.

4. Press **enter** key to confirm selection OR press **std** to exit from this setup page.

5. Continue to access other setup pages using **▲/save** or **▼/view** keys OR press **std** key to exit from the setup mode and return to measurement mode.

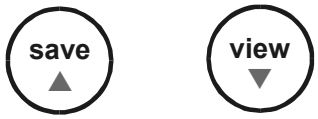
Lower Display shows '2CEL' when a 2-cell conductivity probe is connected. '4CEL' if a 4-cell conductivity probe is connected.

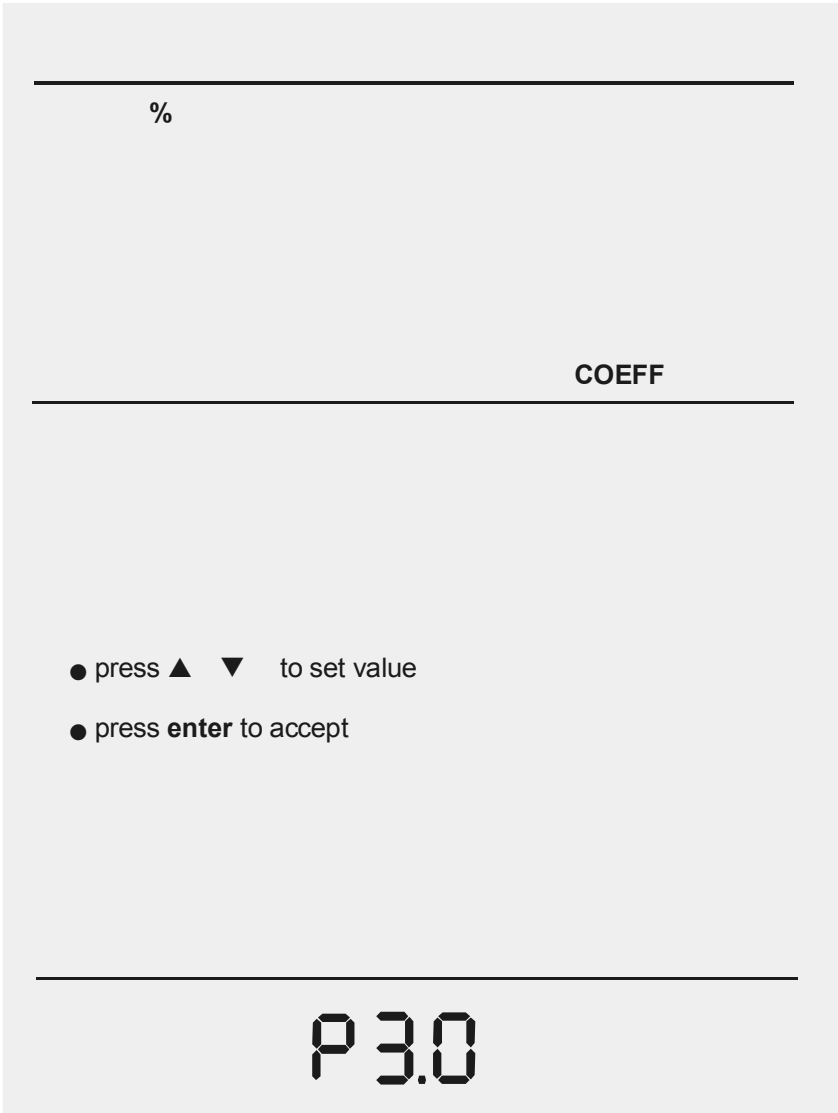
4.2.3 Setup Page 3.0: Set Temperature Coefficient

This setup page allows you to set the temperature coefficient in the range of 0.000 to 10.000%.

1. Access the *Set Temperature Coefficient* setup page by pressing **setup** during any measurement mode screen.

2. Use the **▲/save** or **▼/view** keys to scroll until the screen displays as shown.





3. Press **enter** to view the current temperature coefficient value.

4. The temperature coefficient value can be adjusted in the range of 0.000 to 10.000% using the **▲/save** or **▼/view** keys.

5. Press **enter** key to confirm selection OR press **std** to exit from this page.

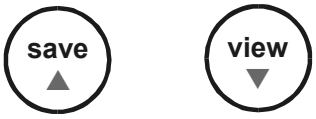
6. Continue to access other setup pages using **▲/save** or **▼/view** keys OR press **std** key to exit from the setup and return to measurement mode.

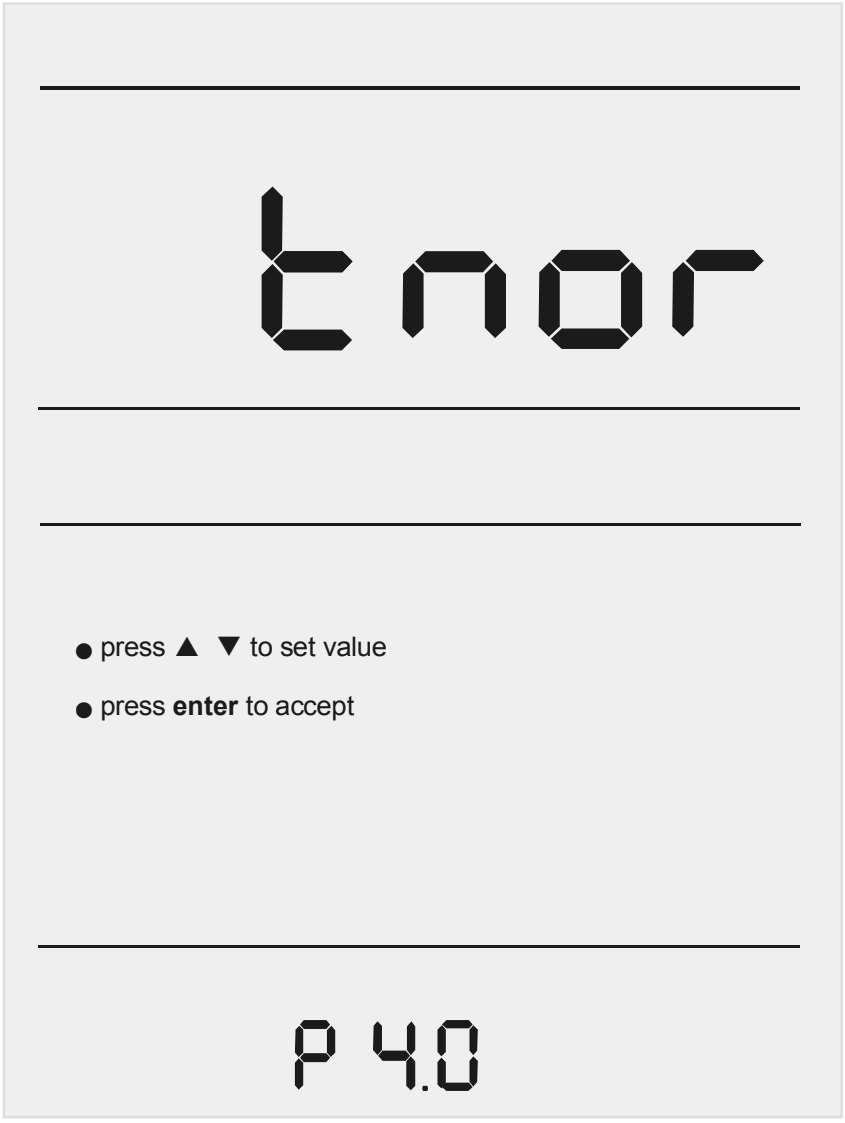
4.2.4 Setup Page 4.0: Set the Normalisation Temperature

This setup page allows you to set the Normalisation temperature value in the range of 15.0 to 30.0°C.

1. Access the *Set the Normalisation Temperature* setup page by pressing **setup** during any measurement mode screen.

2. Use the **▲/save** or **▼/view** keys to scroll until the screen displays as shown.





3. Press **enter** key to view the current normalisation temperature value.

4. Press the **▲/save** or **▼/view** keys to adjust the normalisation temperature value in the range of 15.0 to 30.0°C.

5. Press **enter** key to confirm the value set OR press **std** to exit from this page.

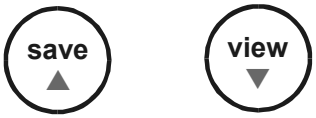
6. Continue to access other setup pages using **▲/save** or **▼/view** keys OR press **std** key to exit from the setup and return to measurement mode.

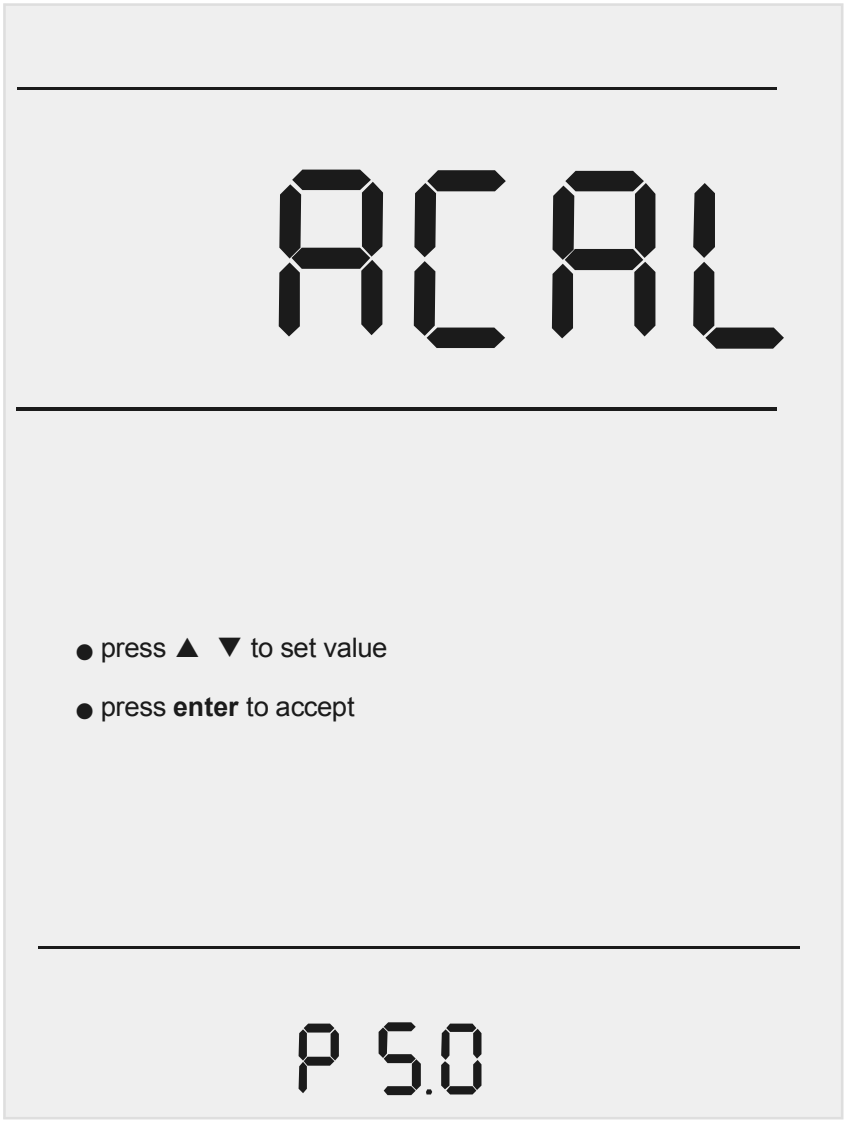
4.2.5 Setup Page 5.0: Set the Auto Calibration mode (ACAL for Conductivity mode only)

This setup page allows you to select an auto calibration or a manual calibration. This option is only applicable during conductivity mode of measurement.

1. Access the *Set the Auto Calibration Mode (ACAL)* setup page by pressing **setup** during conductivity measurement mode screen.

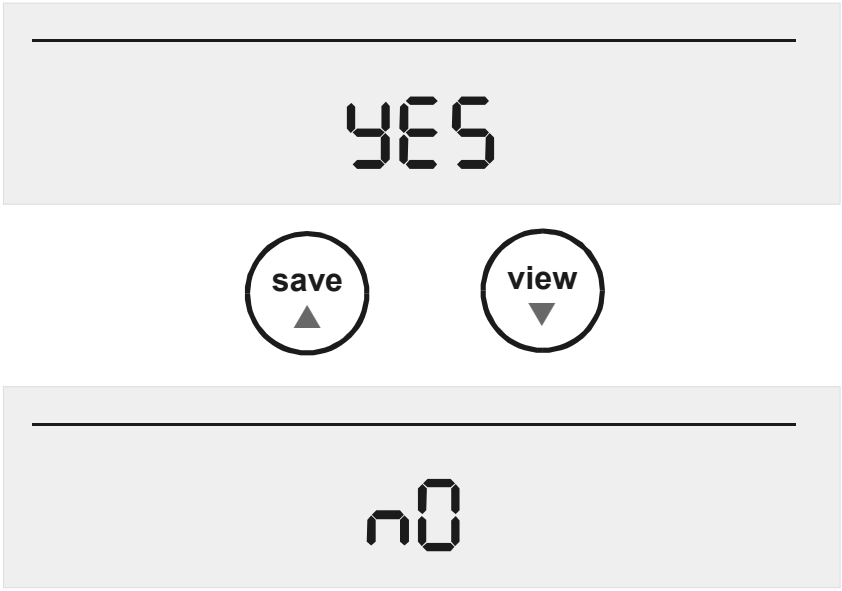
2. Use the **▲/save** or **▼/view** keys to scroll until the screen displays as shown.





3. Press the **enter** key to go into the *Set the Auto Calibration Mode (ACAL)* setup.

4. Use the **▲/save** or **▼/view** keys to select the options of **YES** (Auto) or **NO** (Manual) so as to configure the Calibration Mode to Auto Calibration or Manual Calibration mode.



5. Press **enter** key to confirm selection OR press **std** to exit from this page.

6. Continue to access other setup pages using ▲/save or ▼/view keys OR press **std** key to exit from the setup and return to measurement mode.

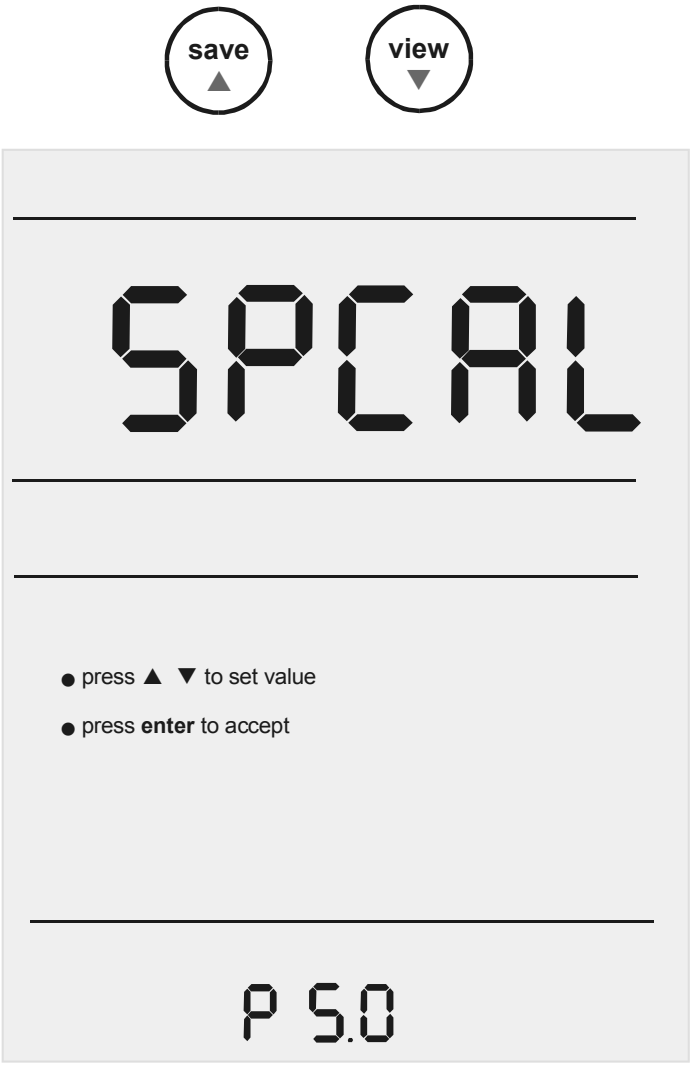
4.2.6 Setup Page 5.0: Set the Single/Multi Point Calibration mode (SPCAL for all modes)

This setup page allows you to select a single-point or a multi-point calibration. This option is applicable during all modes of measurement (Conductivity, Resistivity and Total Dissolved Solids).

1. Access the *Set the Single/Multi Point Calibration Mode (SPCAL)* setup page by pressing **setup** during measurement mode screen.

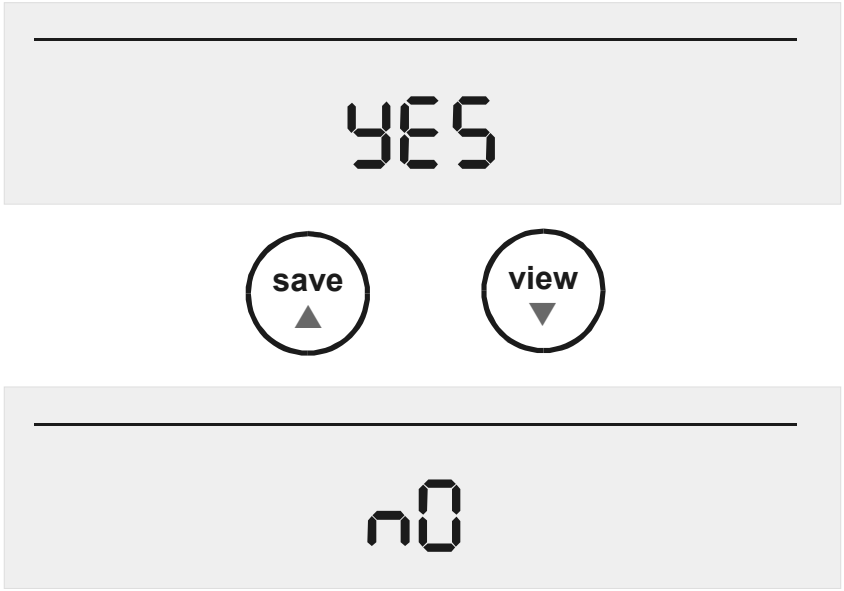
2. Use the **▲/save** or **▼/view** keys to scroll until the screen displays the page as shown below.

This page will be displayed only if setup is entered from Resistivity or TDS measurement mode. However, when setup is entered from the conductivity measurement mode, this page is not accessible. You need to enter the *Set the Auto Calibration Mode (ACAL)* setup page first and then press the **enter** key to directly access the *Set the Single/Multi Point Calibration Mode (SPCAL)* setup page as in step 3 .



3. Press the **enter** key to go into the *Set the Single/Multi Point Calibration Mode (SPCAL)* setup page.

4. Use the **▲/save** or **▼/view** keys to select the options of **YES** (single-point) or **NO** (multi-point) so as to configure the Calibration Mode to Single-point Calibration or Multi-point Calibration mode.



5. Press the **enter** key to confirm selection OR press **std** to exit from this page.

6. Continue to access other setup pages using **▲/save** or **▼/view** keys OR press **std** key to exit from the setup and return to measurement mode.

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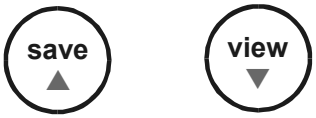
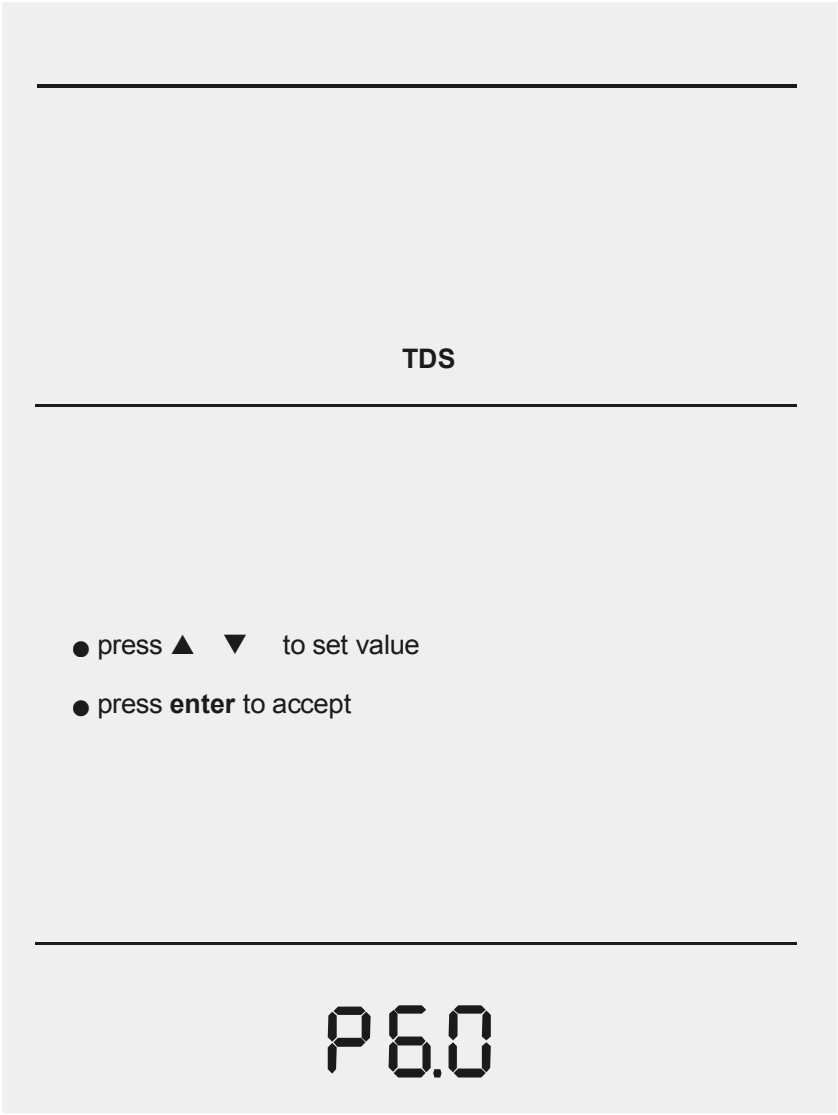
4.2.7 Setup Page 6.0: Set the TDS Factor. (Only applicable in TDS mode)

This setup page allows you to set the TDS Factor in the range of 0.40 to 1.00. This option is only applicable during Total Dissolved Solids mode of measurement.

1. Access the *Set the TDS Factor* setup page by pressing **setup** during TDS measurement mode screen.

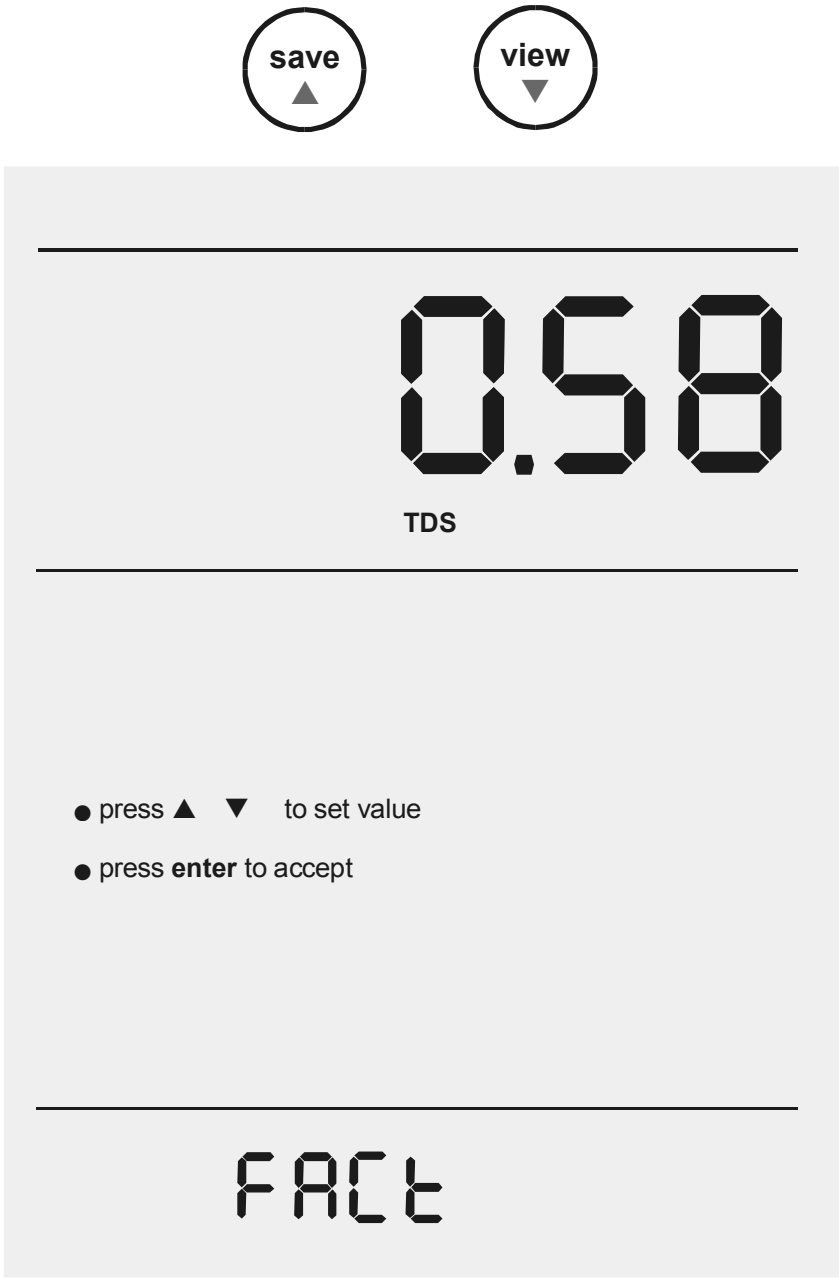
2. Use the **▲/save** or **▼/view** keys to scroll until the screen displays as shown.





3. Press the **enter** key to go into the *Set the TDS Factor* setup and view the current TDS Factor.

4. The TDS Factor of 0.40 to 1.00 can be set using the **▲/save** or **▼/view** keys.



5. Press the **enter** key to confirm selection OR press **std** to exit from this page.

6. Continue to access other setup pages using **▲/save** or **▼/view** keys OR press **std** key to exit from the setup and return to measurement mode.

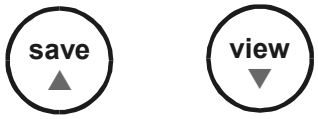
4.2.8 Setup Page 7.0: Set the Temperature Unit.

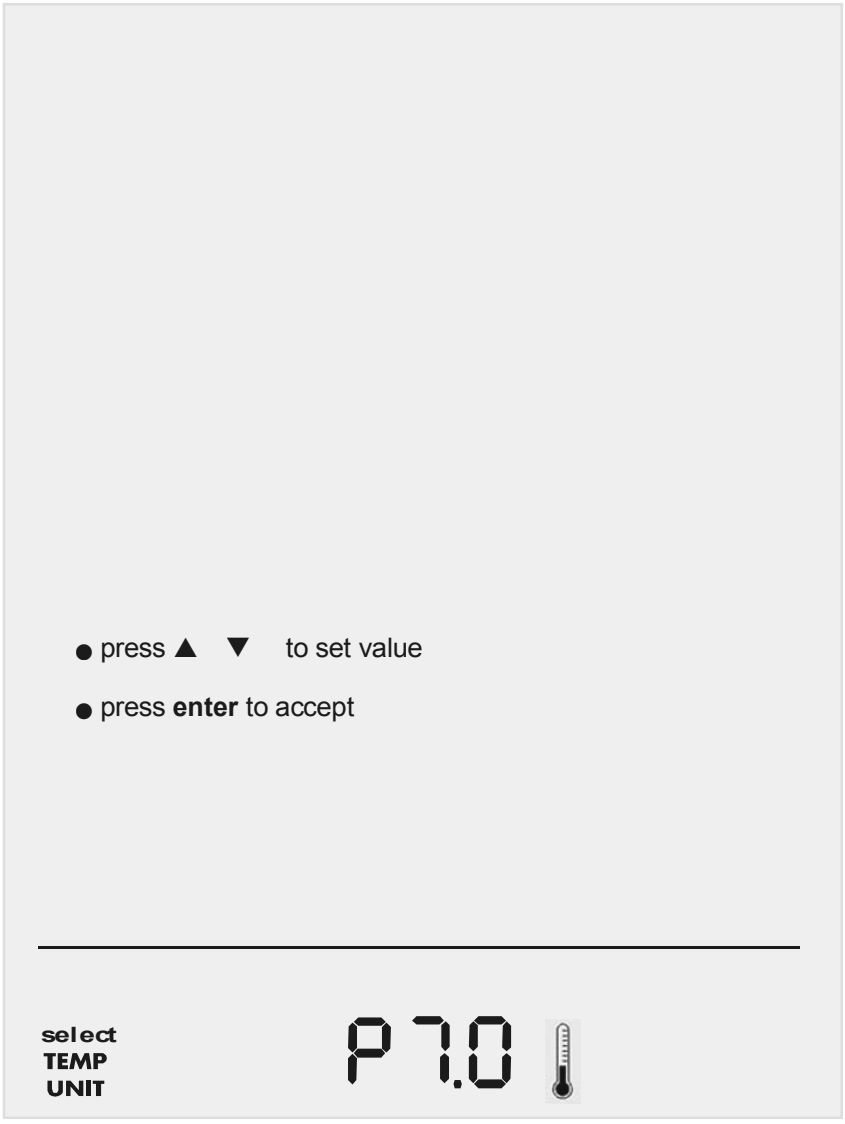
This setup page allows you to select unit of measure for Temperature either in °C or °F.

To Select Temperature Unit

1. Access the *Set the Temperature Unit* menu during any measurement mode screen by pressing the **setup** key.

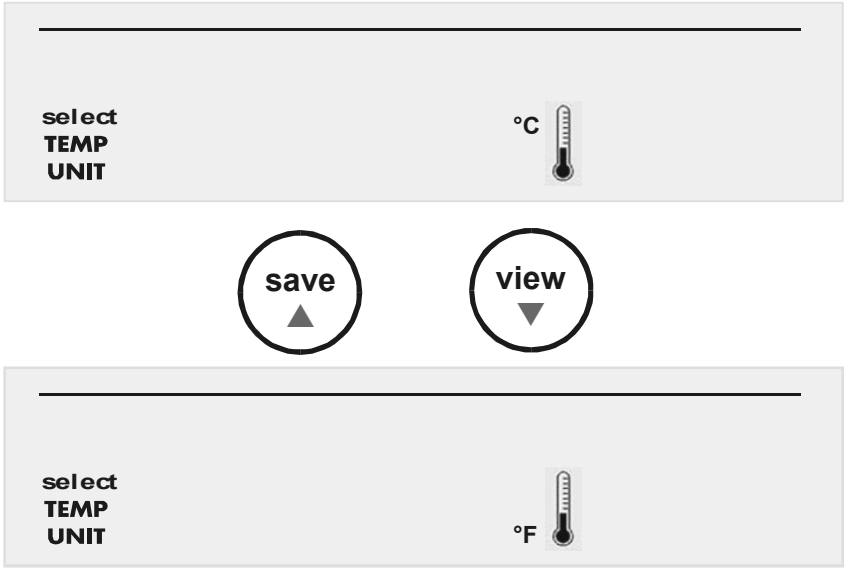
2. Use the **▲/save** or **▼/view** keys to scroll until the screen displays as shown.





3. Press the **enter** key to go into the *Set the Temperature Unit* setup page and view the current temperature unit.

4. Use the **▲/save** or **▼/view** key to choose either °C or °F.



5. Press the **enter** key to confirm selection OR press **std** to exit from this page.

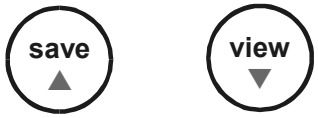
6. Continue to access other setup pages using **▲/save** or **▼/view** keys OR press **std** key to exit from the setup and return to measurement mode.

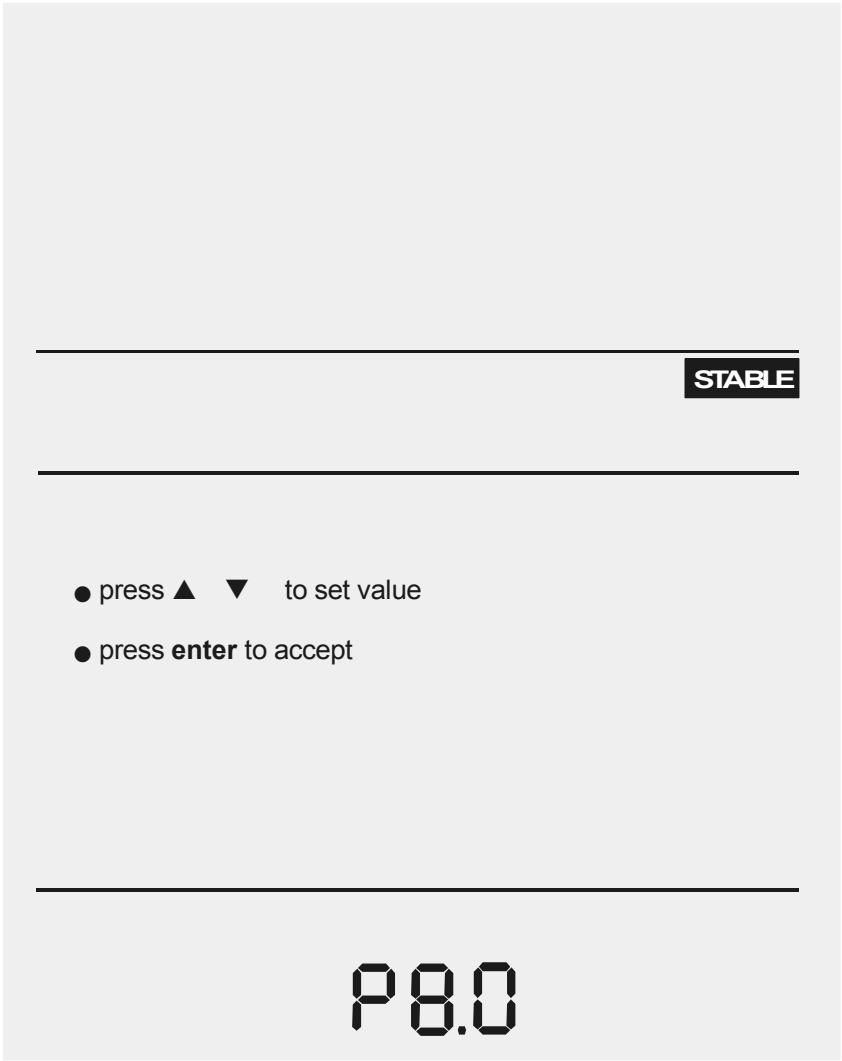
4.2.9 Setup Page 8.0: Set the Stability Indicator

This setup page allows you to activate/ de-activate the stability indicator. Once activated, the **STABLE** icon appears on the display when reading stabilises.

1. Access the *Set the Stability Indicator* setup page during any measurement mode screen by pressing the **setup** key.

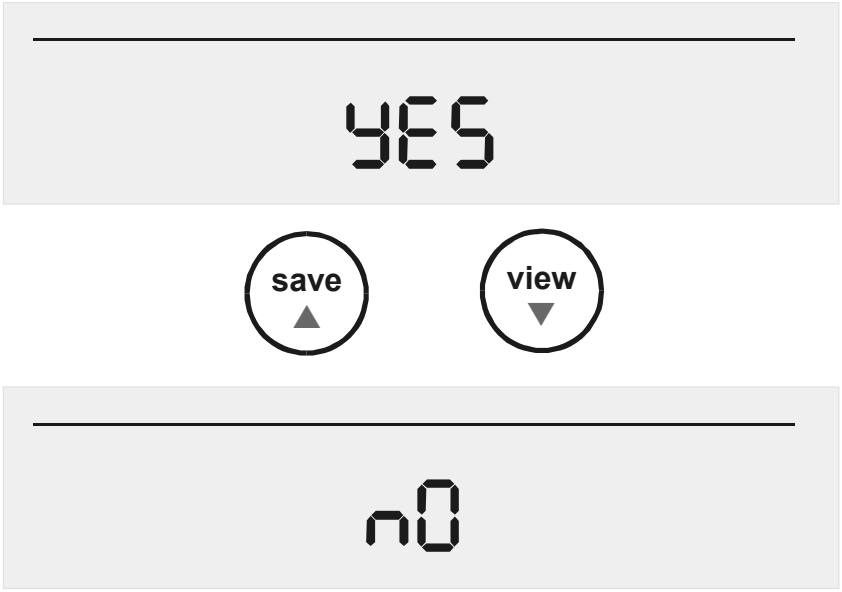
2. Use the **▲/save** or **▼/view** keys to scroll until the screen displays as shown.





3. Press the **enter** key to go into the *Set the Stability Indicator* setup.

4. Use the **▲/save** or **▼/view** keys to toggle between the options of **YES (enable stability indicator)** and **NO (disable stability indicator).**



5. Press the **enter** key to confirm selection OR press **std** to exit from this page.

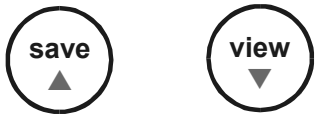
6. Continue to access other setup pages using **▲/save** or **▼/view** keys OR press **std** key to exit from the setup and return to measurement mode.

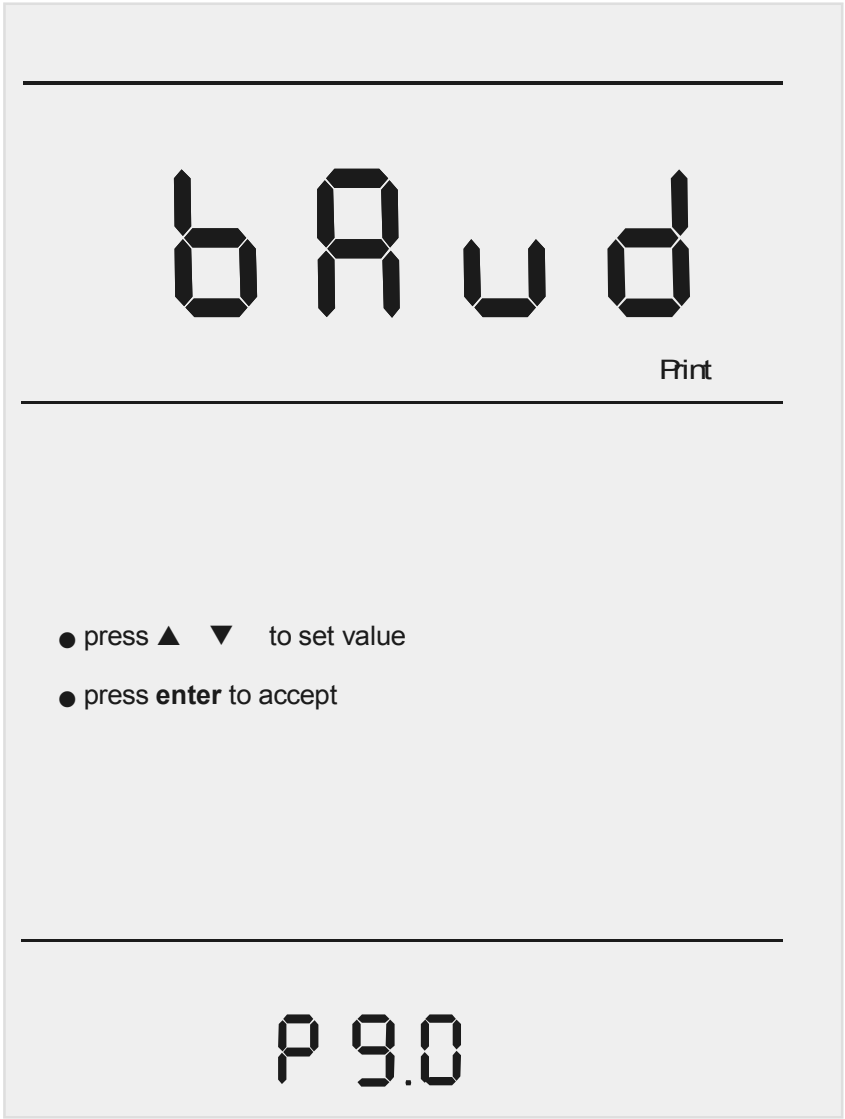
4.2.10 Setup Page 9.0: Set the Baud Rate

This setup page allows you to set the baud rate (bits per second) of the communication protocol interface.

1. Access the *Set the Baud Rate* setup page during any measurement mode screen by pressing the **setup** key.

2. Use the **▲/save** or **▼/view** keys to scroll until the screen displays as shown.





3. Press the **enter** key to go into the *Set the baud rate* page and view the current baud rate value.

4. The baud rate can be set as 4800, 9600, 19200 or 38400 bps using the **▲/save** or **▼/view** keys.

5. Press the **enter** key to confirm selection OR press **std** to exit from this page.

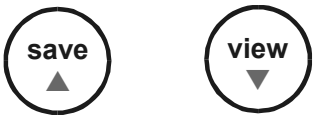
6. Continue to access other setup pages using **▲/save** or **▼/view** keys OR press **std** key to exit from the setup and return to measurement mode.

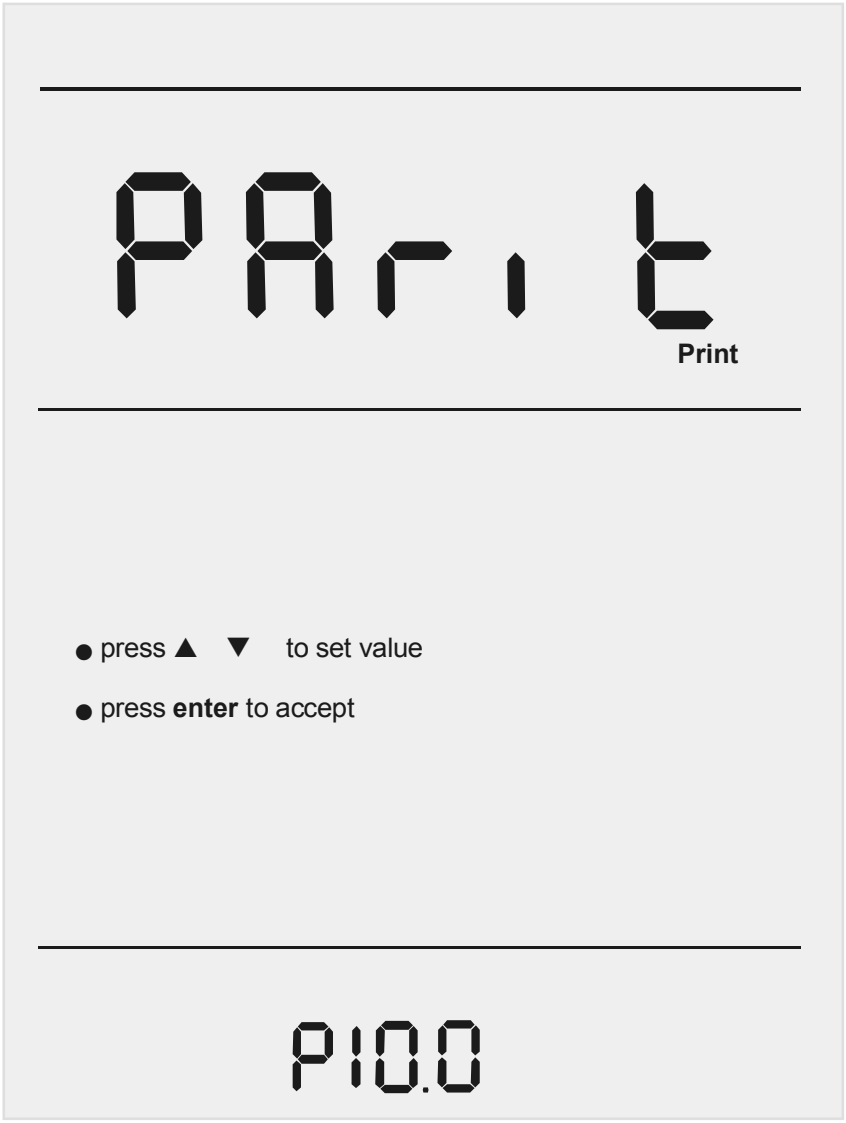
4.2.11 Setup Page 10.0: Set the Parity Bit

This setup page allows you to set the parity bit of the communication protocol interface.

1. Access the *Set Parity Bit* setup page from any measurement mode screen by pressing the **setup** key.

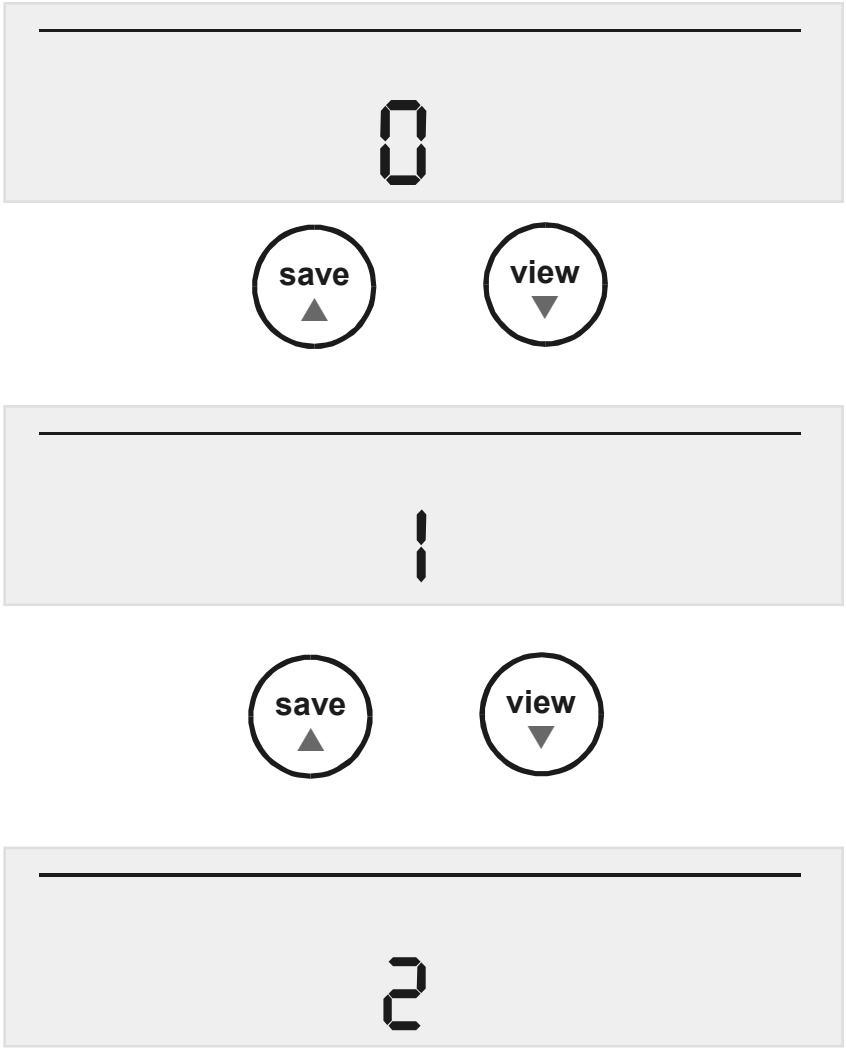
2. Use the ▲**/save** or ▼**/view** keys to scroll until the screen display as shown.





3. Press the **enter** key to go into the *Set Parity Bit* setup page.

4. Use the **▲/save** or **▼/view** keys to toggle between 0 (none), 1 (odd) or 2 (even).



5. Press the **enter** key to confirm selection OR press **std** to exit from this page.

6. Continue to access other setup pages using **▲/save** or **▼/view** keys OR press **std** key to exit from the setup and return to measurement mode.

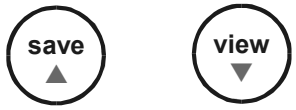
4.2.12 Setup Page 11.0: Set the Stop Bit

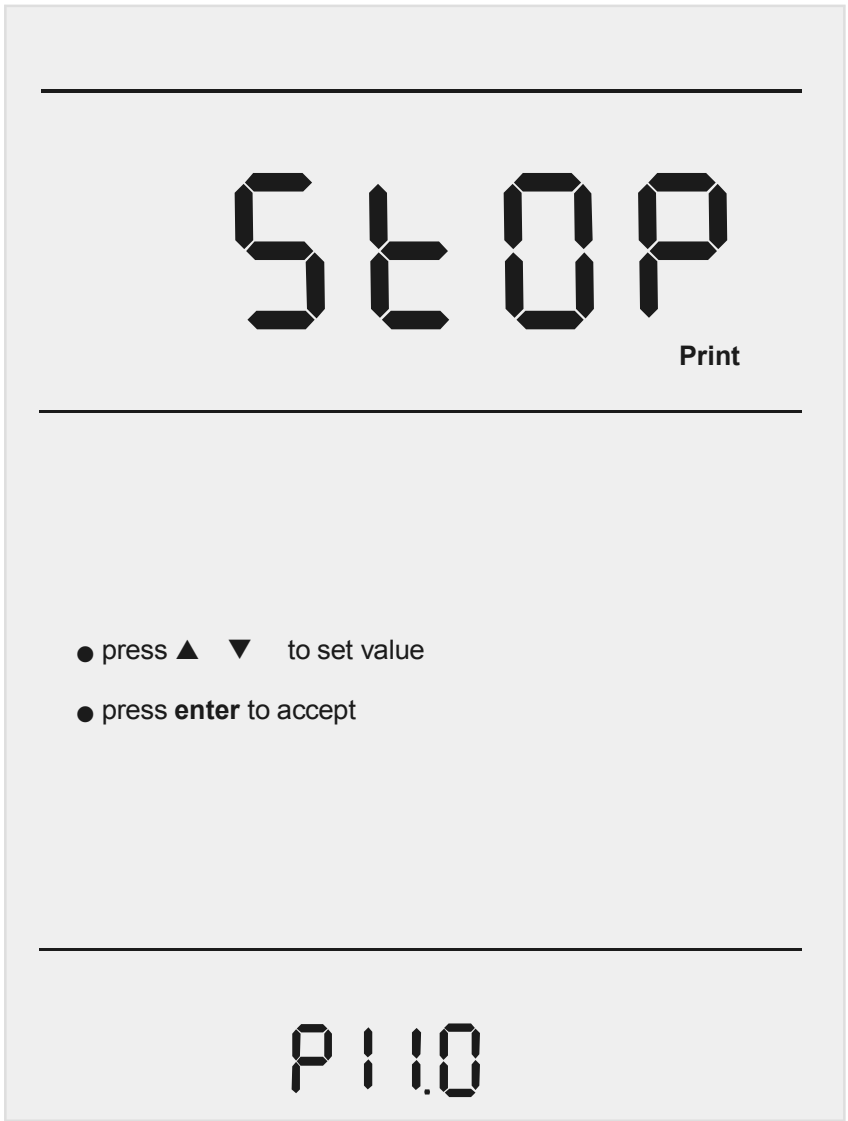
This setup page allows you to set the stop bit of the communication protocol interface.

To Set Stop Bit

1. Access the *Set Stop Bit* setup page from any measurement mode screen by pressing the **setup** key.

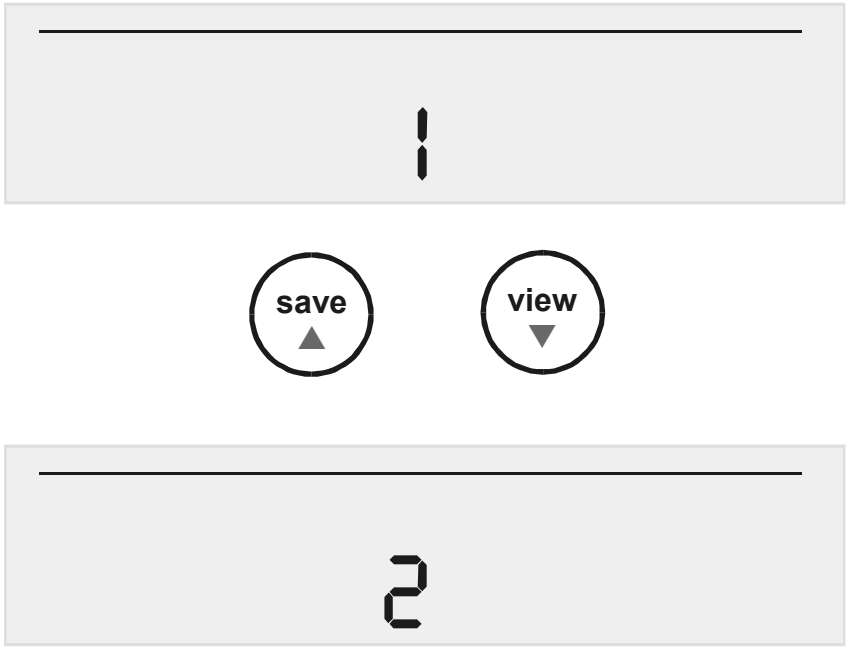
2. Use the ▲**/save** or ▼**/view** keys to scroll until the screen display as shown.





3. Press the **enter** key to go into the *Set Stop Bit* setup page.

4. Use the **▲/save** or **▼/view** keys to toggle between 1 or 2.



5. Press **enter** key to confirm selection OR press **std** to exit from this page.

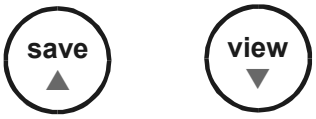
6. Continue to access other setup pages using **▲/save** or **▼/view** keys OR press **std** key to exit from the setup and return to measurement mode.

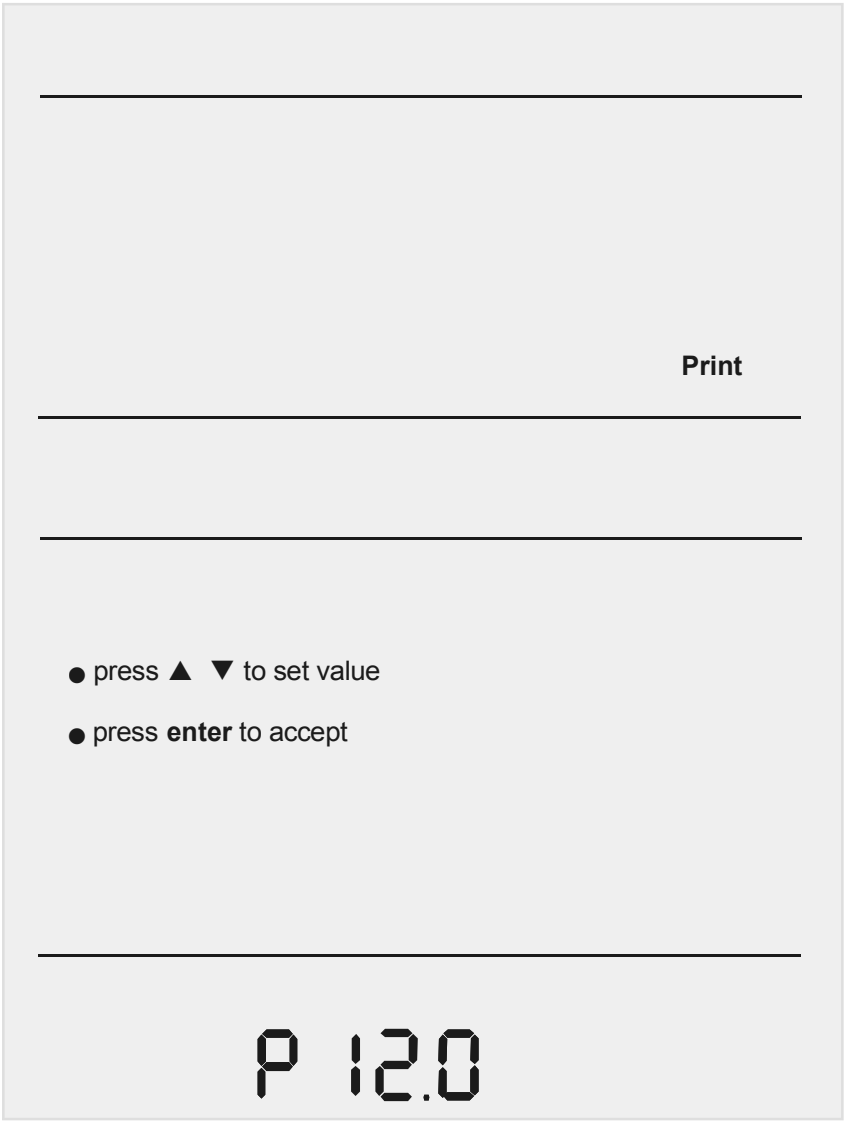
4.2.13 Setup Page 12.0: Select the Print option

This setup page allows you to print current displayed data or data stored in the meter's memory to a computer or printer via its RS232 interface port. Note all the communication protocol for both the meter and computer/printer must match before successful printing can be performed.

1. Access the *Select Print Data* setup page from any measurement mode screen by pressing the **setup** key.

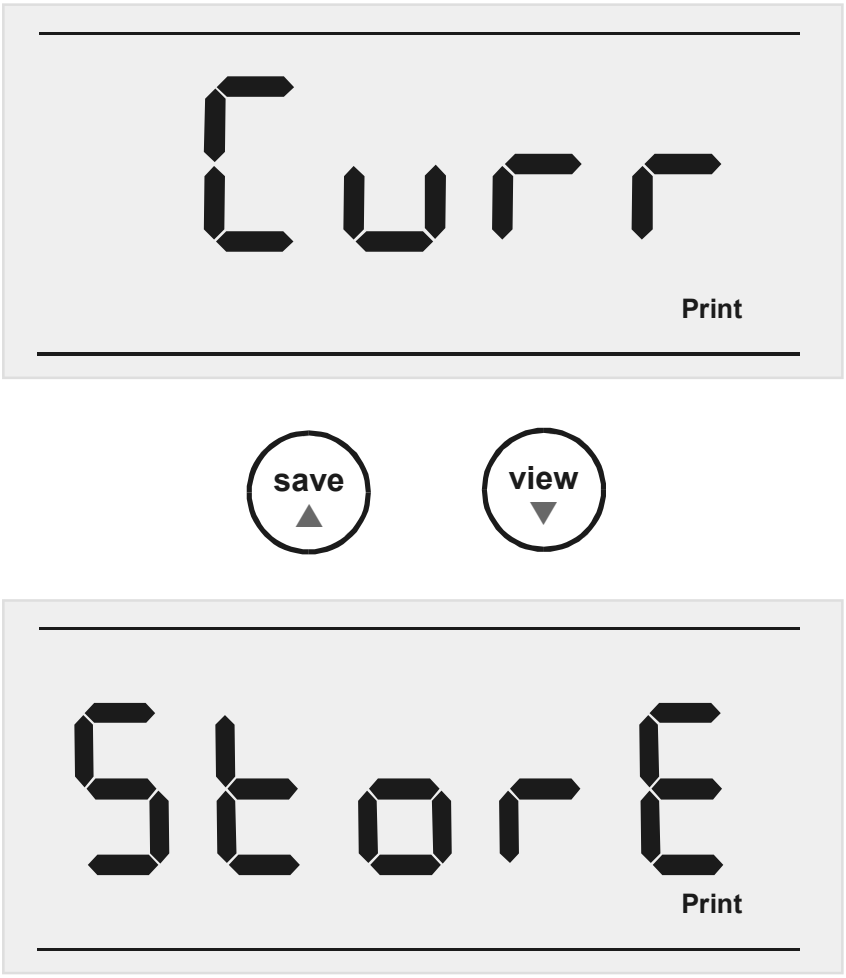
2. Use the ▲**/save** or ▼**/view** keys to scroll until the screen display as shown.





3. Press the **enter** key to go into the *Select Print Data* setup page.

4. Use the **▲/save** or **▼/view** keys to toggle between Current or Memory data print out selection.



5. Press the **enter** key to confirm selection OR press **std** to exit from this page.

6. Continue to access other setup pages using **▲/save** or **▼/view** keys OR press **std** key to exit from the setup and return to measurement mode.

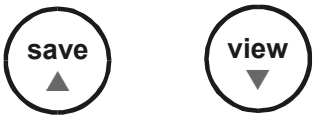
4.2.14 Setup Page 13.0: Clear Stored Data

This setup page allows you to clear all stored data sets (from previous measurements) in the meter's memory for new data to be stored. Note old data sets will be overwritten by any new data sets in the event when the stored locations have exceeded.

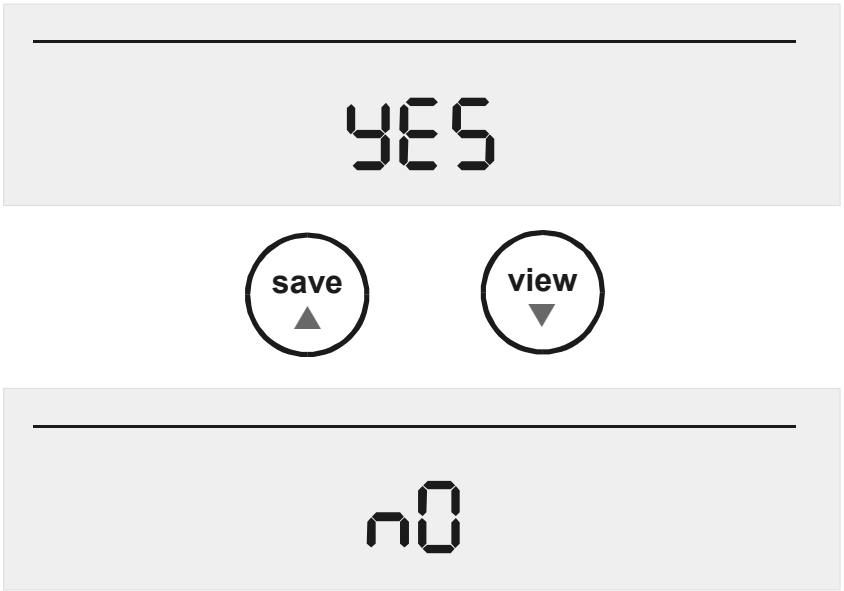
To Clear Stored Data

1. Access the Clear Stored Data menu from any measurement mode screen by pressing the **setup** key.

2. Use the **▲/save** or **▼/view** keys to scroll until the screen displays as shown.



3. Press the **enter** key and use the **▲/save** or **▼/view** keys to toggle between **NO** or **YES**. Select **YES** to clear all stored data sets or **NO** if no change is to be made.



4. Press the **enter** key to confirm selection OR press **std** to exit from this page.

5. Continue to access other setup pages using **▲/save** or **▼/view** keys OR press **std** key to exit from the setup and return to Measure mode.

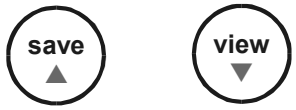
Note:
When you press the enter key to confirm the clearing of memory, "clear" will blink. Wait till it stops blinking before proceeding with the next button press.

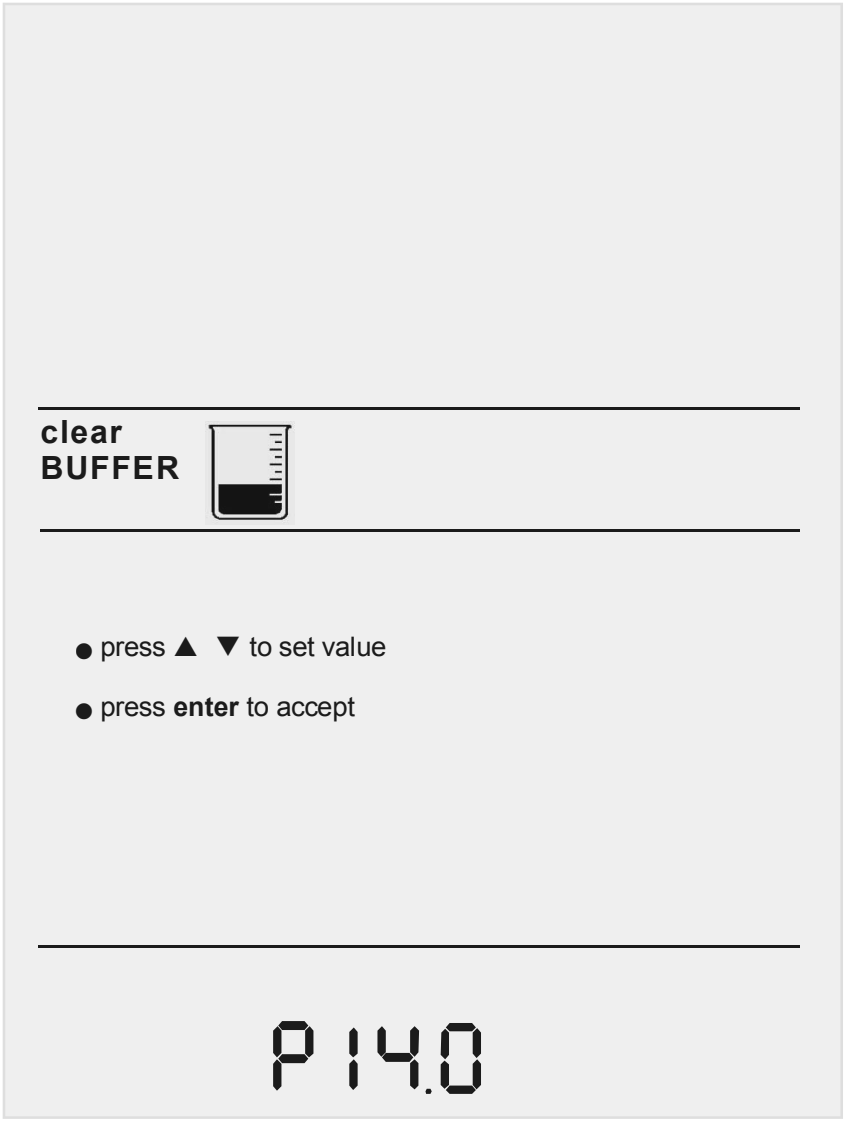
4.2.15 Setup Page 14.0: Clear User calibration

This setup page allows you to clear the user calibrated values. This option clears respective user calibration depends on the mode you are in. (e.g.: If you access the setup menu from conductivity measurement mode, then this option only clears the conductivity user calibration)

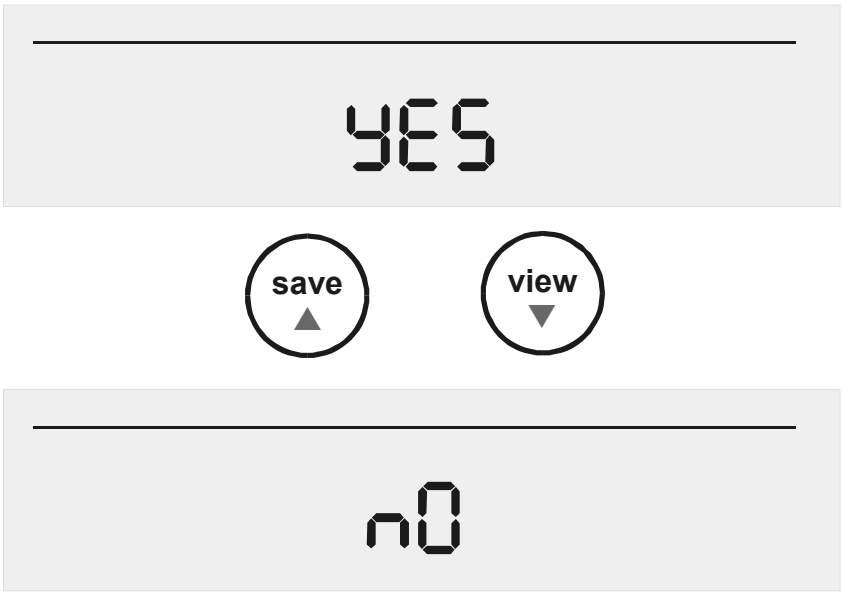
1. Access the *Clear User Calibration* menu from measurement mode screen by pressing the **setup** key.

2. Use the **▲/save** or **▼/view** keys to scroll until the screen displays the clear BUFFER icon along with the previously buffer values being standardised.





3. Press the **enter** key to make the selection and use the **▲/save** or **▼/view** keys to toggle between NO or YES. Select **YES** to clear all the existing buffer values or **NO** if no change is to be made.



4. Press the **enter** key to confirm selection OR press **std** to exit from this page.

5. Continue to access other setup pages using **▲/save** or **▼/view** keys OR press **std** key to exit from the setup and return to measurement mode.

Depends on the measurement mode you are in, this setup page clears only the particular mode calibrated value.

Suppose you access the setup pages from TDS measure mode and you choose to clear the standardised buffer then the meter only resets the TDS standardisation. Conductivity/ Resistivity standardisation if any will remain unchanged.

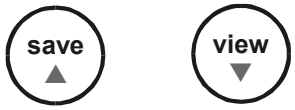
When accessing the cell constant, temperature coefficient, TDS factor, temperature unit selection and stable ON/OFF setup pages, meter will display the last selected choice.

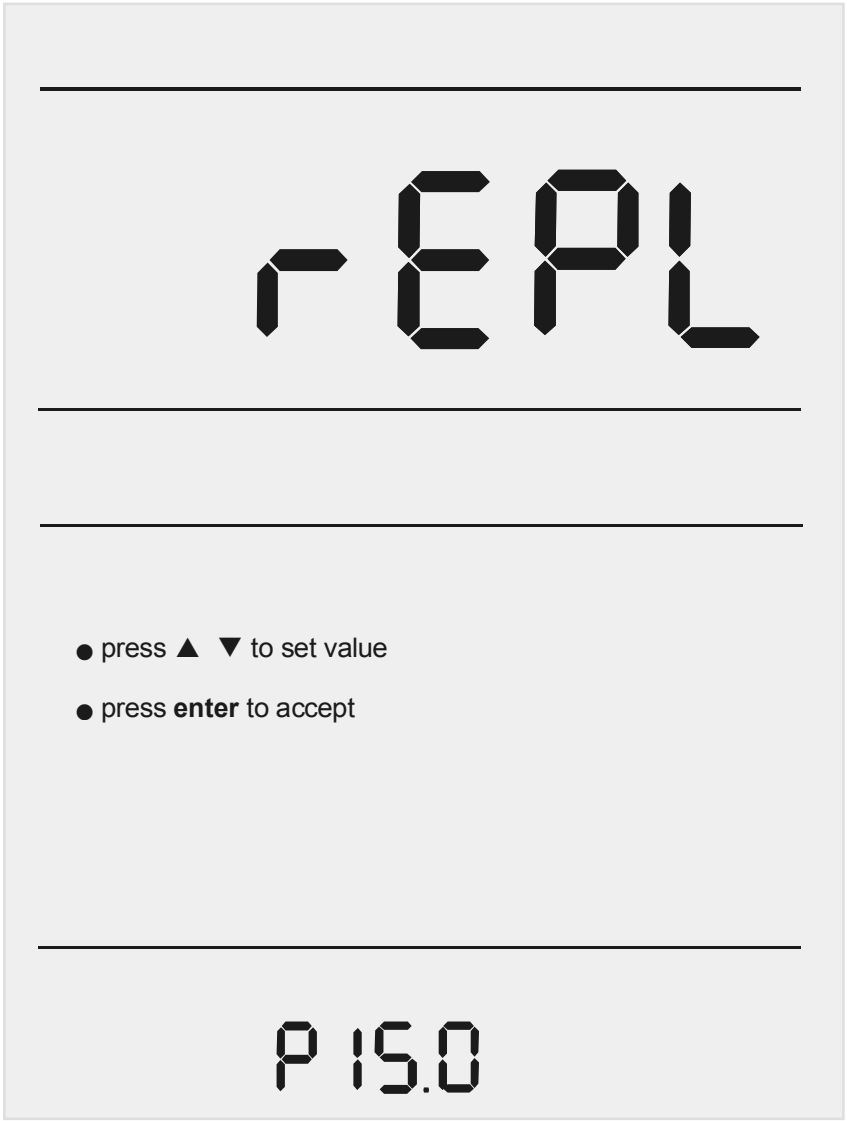
4.2.16 Setup Page 15.0: Replatinisation Process

This setup page allows you to replatinise the probe and is only applicable for 2-cell probes.

Replatinisation is the process of replacing the platinum on the surfaces of the 2-cell conductivity probes that may flake or wear off over time. The platinum on the surface of the probe is used to increase the measuring surface area, resulting in decreased population error. Should the cell constant of your conductivity probe change by more than 50% from its typical value, it may be necessary to replatinise the probe. Replatinisation is a relatively quick procedure to perform, typically taking no more than 5 minutes. Although replatinisation is not a long process, the replatinisation solution is costly.

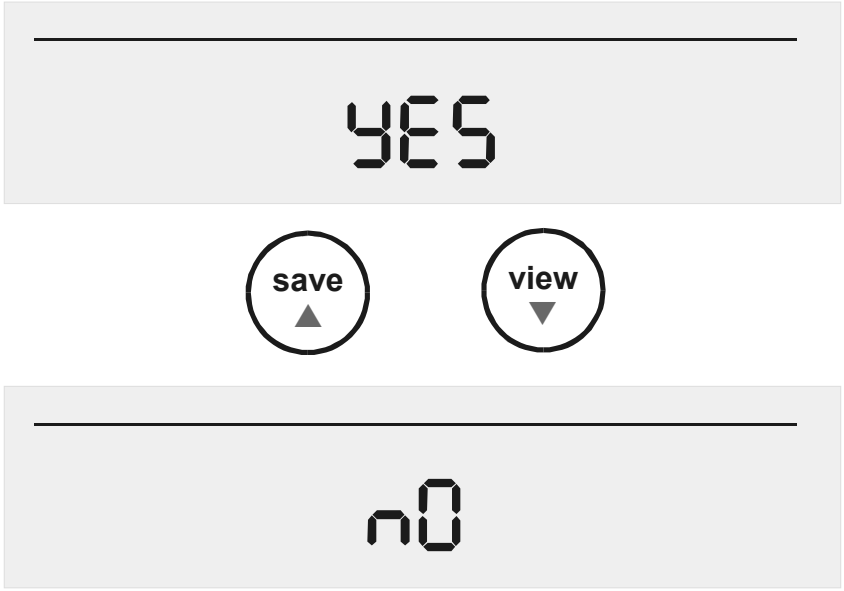
1. Immerse the probe into a suitable replatinising solution.
2. Access the *Replatinisation Process* setup page from any measurement mode screen by pressing the **setup** key.
3. Use the **▲/save** or **▼/view** keys to scroll until the screen displays the as shown below.





4. Use the **▲/save** or **▼/view** keys to scroll through the options of **YES** and **NO** for the selection of replatinisation**.**

5. Press the **enter** key to confirm selection OR press **std** to exit from this page.



6. Continue to access other setup pages using **▲/save** or **▼/view** keys OR press **std** key to exit from the setup and return to measurement mode.

Replatinisation Timer

1. Select **YES** to start replatinisation process. “5:00 minutes” will appear on the main display.

2. Press the **enter** key to initiate replatinisation. The timer will countdown from 5.00 minutes on the main display. Upon completion, the meter will return to the measurement mode screen.

3. Repeat step 2 if a longer replatinisation is required. A new cell constant must now be established for the probe. Refer to the *Select the cell constant* setup pages.

4. Press **stdby** to exit from the replatinisation mode. Meter will be in standby mode after exit. Press **stdby** again should you wish to enter measurement mode.

5. STANDARDISATION

Conductivity probes are generally identified as having a characteristic cell constant, 0.1, 1.0 or 10.0 which reflects their physical geometry and their range of application. However, these are typically nominal cell constants. The actual cell may vary somewhat from the nominal values, and therefore the actual cell constant must be calculated using a solution with a known conductivity value. The standardisation process of the CyberScan CON 1500 meter permits you to obtain the exact cell constant of your electrode. Standardise the electrode daily for best results.

Prior to standardising, use the setup menu from measurement screen to set the desired units, nominal cell constant which best matches the electrode you are using, temperature coefficient desired (See Theory section, page 60), temperature units and normalised temperature and also depending on whether you want to perform a single-point or multi-point calibration.

Range	Conductivity	TDS	Resistivity
R1	0 to 200.0 uS	0 to 200.0 ppm	0 to 20.00 KΩ
R2	200.0 uS to 2.000 mS	200.0 ppm to 2000 ppm	20.00 KΩ to 200.0 KΩ
R3	2.000 mS to 20.00 mS	2000 ppm to 20000 ppm	200.0 KΩ to 2.000 M Ω
R4	20.00 mS to 500.0 mS	20000 ppm to 99999 ppm	2.000 MΩ to 100.0 MΩ

Suppose user set single-point calibration option in the setup page, calibrated Cal Factor will be applied to the whole range (0.000 to 500.0mS).

But if a multi-point calibration option (calibration for different ranges as indicated in the table shown above) is chosen, calibration factors are applied only to their respective ranges.

5.1. Conductivity standardisation (Manual)

1. Immerse the electrode into the sample solution. Stir moderately.

Make sure that the meter is in the measurement mode. If you are using the 2-cell electrode, and separate temperature probe is NOT available, the meter will take 25°C as the default temperature. The default temperature value can also be adjusted if required.

STABLE icon will only appear provided that it has been set to the 'On' mode in setup. See *Setup Page 8.0: Set the Stability Indicator.*

---

2. Press **std** to enter the standardise screen. Both the upper and lower displays will show the measured value. The STD Solution icon will appear along with the measured value in the lower display.

3. Wait for reading to stabilise.

4. Press **▲/save** or **▼/view** keys to adjust the value to which you wish to calibrate.

5. After adjusting to the std solution value (which will be displayed at the upper display), press **enter** to initiate the standardisation and on successful completion, meter returns to measurement mode

   OR

   Press **std** to exit from the standardisation page.

Adjustable standardisation window provided is ±40% of current reading.

If the standardisation is successful, then meter displays buffer icon in the middle part of the display in the measurement mode.

There are separate standardisation provided for Conductivity, Resistivity and TDS.

5.2. Conductivity standardisation (Auto)

Refer to *Section 4.2.5: Set the Auto Calibration Mode (ACAL)* on Page 19 to enable the automatic calibration of conductivity feature in this meter.

Standard buffer values: 84.0 uS/ 1.413 mS/ 12.88 mS/ 111.8 mS

1. Immerse the electrode into the standard solution you wish to calibrate.

2. Press the **std** key. The lower display will show the standard buffer value closest to the measured value as shown in the next page.

3. Press **enter** to initiate the standardisation and on successful completion meter returns to measurement mode

   OR

   Press **std** to exit from the standardisation page.

Standardisation window provided is ±40% of current reading. If the standard value set is not within the window then meter displays "Electrode Error" message after initiate the standardisation.

*Press **enter** to return to measurement mode. In this case meter will not accept the standardisation,*

If the standardisation is successful, then meter displays buffer icon in the middle part of the display in the measurement mode.


Standardize
1.433
mS
STABLE
press enter to accept
STD Solution
1.413
std
mode
setup
print
enter
save
view
stdby

5.3. Resistivity Standardisation (Manual)

1. Immerse the electrode into the sample solution. Stir moderately.

Make sure that the meter is in the measurement mode. If you are using the 2-cell electrode, and separate temperature probe is NOT available, the meter will take 25°C as the default temperature. The default temperature value can also be adjusted if required.

STABLE icon will only appear provided that it has been set to the 'On' mode in setup. See *Setup Page 8.0: Set the Stability Indicator.*

2. Press **std** to enter the standardise screen. Both the upper and lower displays will show the measured value. The STD Solution icon will appear along with the measured value in the lower display.

3. Wait for reading to stabilise.

4. Press **▲/save** or **▼/view** keys to adjust the value to which you wish to calibrate.

5. After adjusting to the std solution value (which will be displayed at the upper display), press **enter** to initiate the standardisation and on successful completion, meter returns to measurement mode

   OR

   Press **std** to exit from the standardisation page.

Adjustable standardisation window provided is ±40% of current reading.

If the standardisation is successful, then meter displays buffer icon in the middle part of the display in the measurement mode.

There are separate standardisation provided for Conductivity, Resistivity and TDS.

5.4. TDS Standardisation (Manual)

1. Immerse the electrode into the sample solution. Stir moderately.

Make sure that the meter is in the measurement mode. If you are using the 2-cell electrode, and separate temperature probe is NOT available, the meter will take 25°C as the default temperature. The default temperature value can also be adjusted if required.

STABLE icon will only appear provided that it has been set to the 'On' mode in setup. See *Setup Page 8.0: Set the Stability Indicator.*

---

2. Press **std** to enter the standardise screen. Both the upper and lower displays will show the measured value. The STD Solution icon will appear along with the measured value in the lower display.

3. Wait for reading to stabilise.

4. Press **▲/save** or **▼/view** keys to adjust the value to which you wish to calibrate.

5. After adjusting to the std solution value (which will be displayed at the upper display), press **enter** to initiate the standardisation and on successful completion, meter returns to measurement mode

   OR

   Press **std** to exit from the standardisation page.

Adjustable standardisation window provided is ±40% of current reading.

If the standardisation is successful, then meter displays buffer icon in the middle part of the display in the measurement mode.

There are separate standardisation provided for Conductivity, Resistivity and TDS.

---

6. TEMPERATURE CALIBRATION

If the temperature probe is not connected, the meter will display 25.0°C default icon on the secondary display. If the temperature probe is connected, then meter will sense the actual temperature and display the ATC icon.

From any measurement mode (Conductivity/ Resistivity / Total Dissolved Solids):-

1. Access the temperature calibration setup page by pressing the **std** key and then the **mode** key.

Depending on which temperature probe is connected (4-cell/ 2-cell temperature probe), user can adjust the temperature value using the **▲/save** or **▼/view** keys. [Window: ± 5°C (9°F)]

If no probe is connected, user can adjust the default temperature value.

2. Press **▲/save** or **▼/view** keys to adjust the temperature.

3. Press **enter** to confirm the reading and return to measurement mode

   OR

4. Press **std** key to exit from this setup page.

Note:

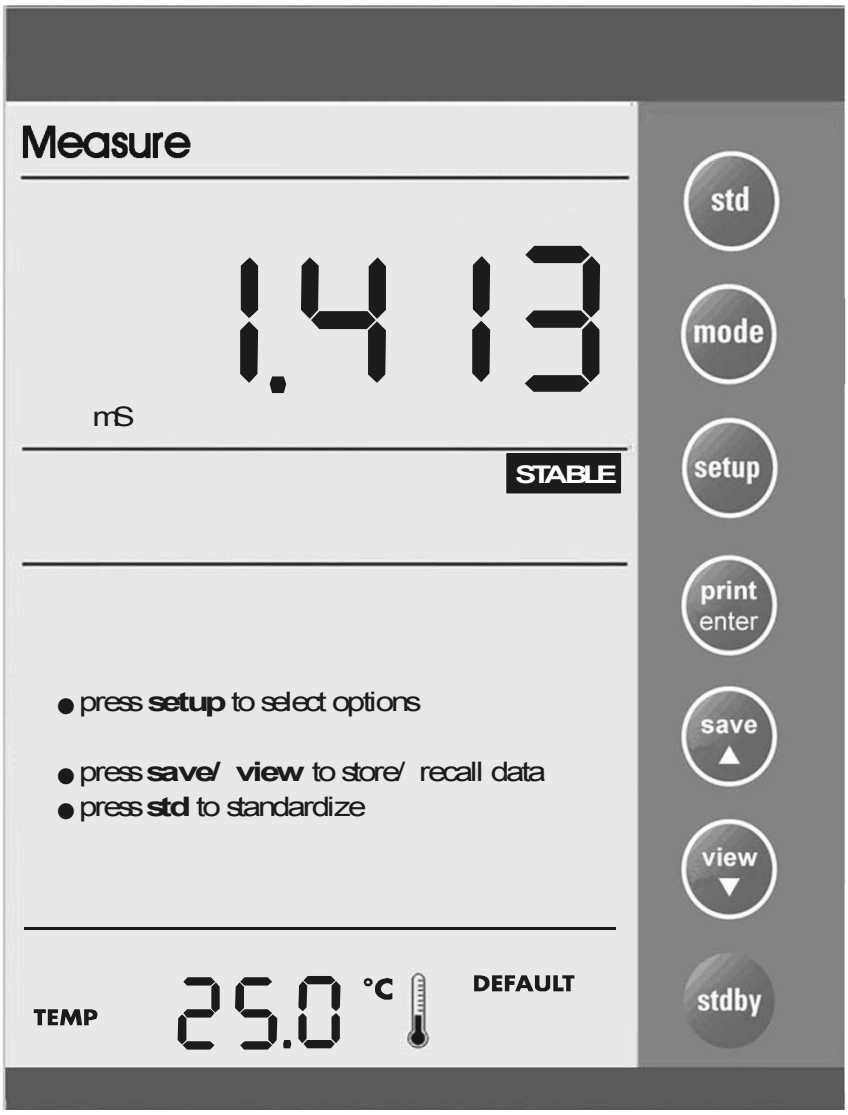
ATC: Maximum adjustable temperature offset is ±5.0°C/ 9.0°F.
MTC: Maximum adjustable temperature settings is -5.0°C to 105.0°C (23.0°F to 221.0°C).

7. MEASUREMENT

7.1. Conductivity Measurement

1. Immerse the electrode into the sample solution. Stir moderately.

2. When the meter senses that the reading has stabilised, the stable icon will appear under the reading. The reading may be recorded at this time.

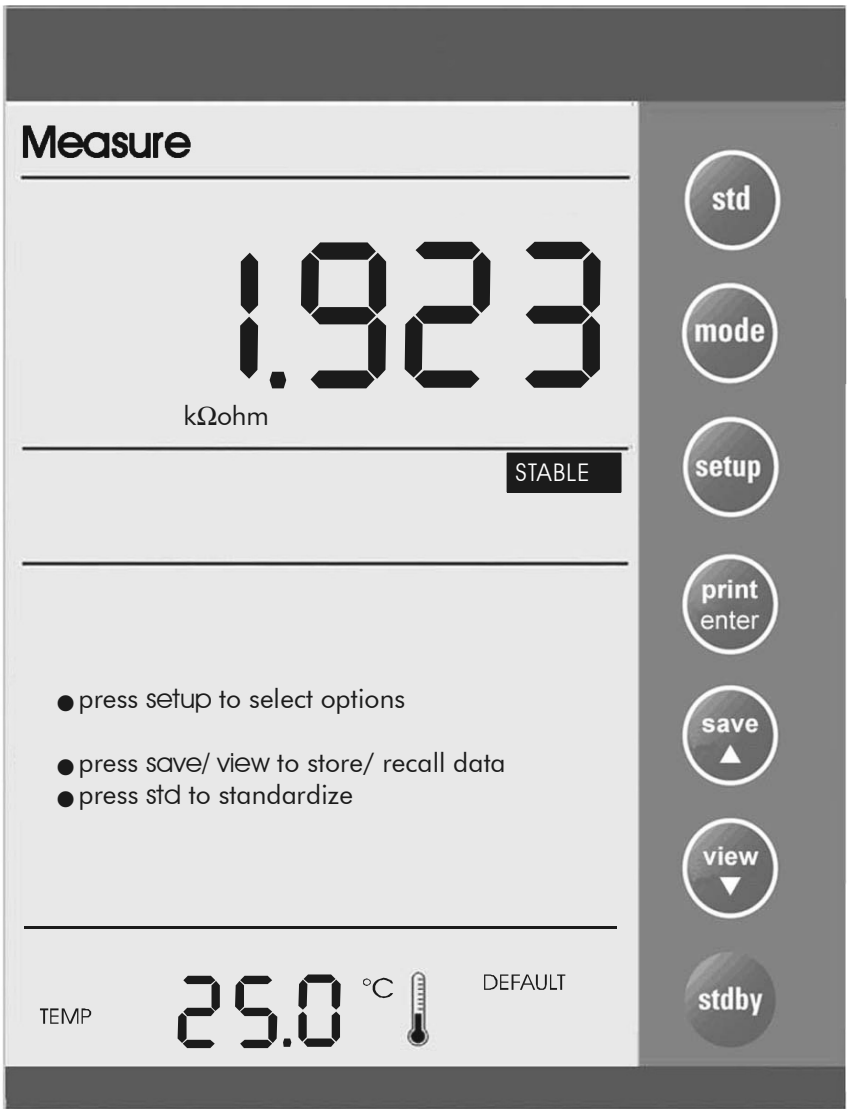


7.2. Resistivity Measurement

Unit will be in ohm, kohm or Mohm.

1. Immerse the electrode into the sample solution. Stir moderately.

2. When the meter senses that the reading has stabilised, the stable icon will appear under the reading. The reading may be recorded at this time.

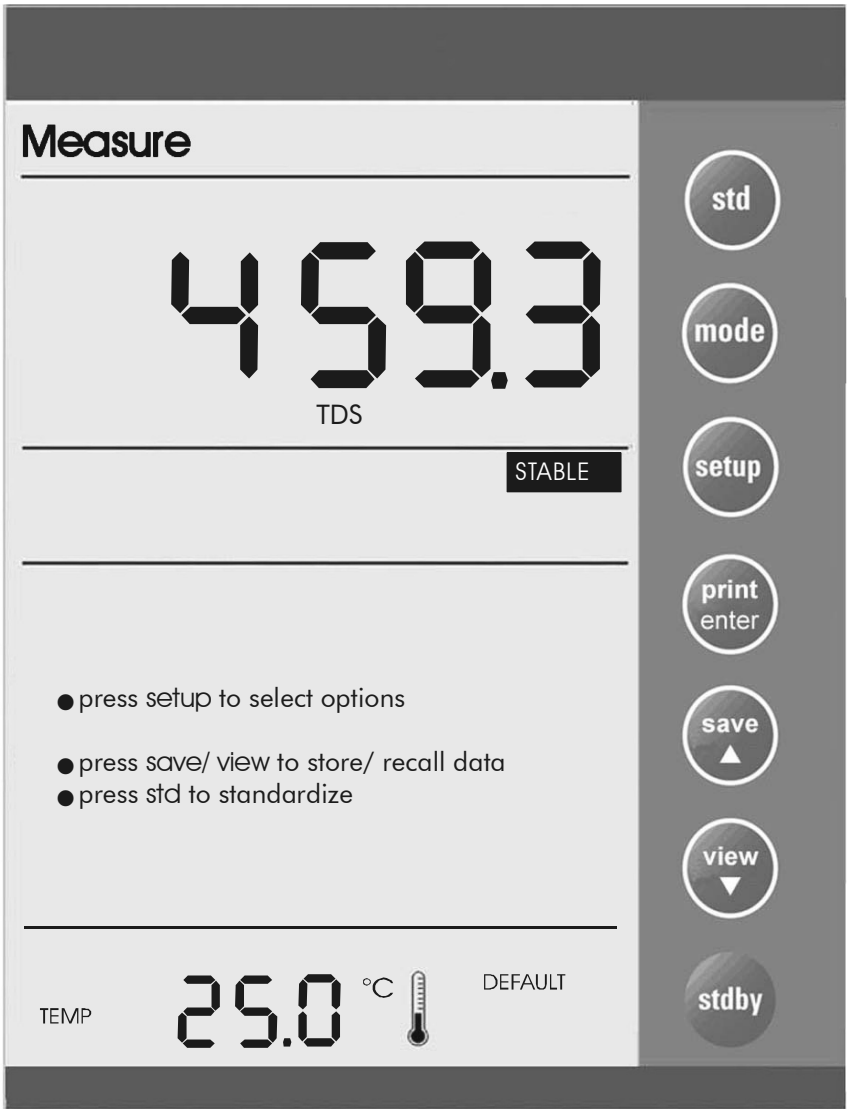


7.3. TDS Measurement

TDS readings will be in ppm unit. TDS factor can be selected from the setup menu. (0.40 to 1.0). Default: 0.66.

1. Immerse the electrode into the sample solution. Stir moderately.

2. When the meter senses that the reading has stabilised, the stable icon will appear under the reading. The reading may be recorded at this time.



8. MEMORY

8.1. Store Value into Memory

In any measurement mode, press **▲/save** key to store the displayed reading into the meter's non-volatile memory. A memory location is shown momentarily and the meter returns to measurement mode.

8.2. Recall Value from Memory

In any measurement mode, pressing **▼/view** key retrieves data from the meter's memory on the Last-In-First-Out (LIFO) basis. The screen displays the last stored memory location. To view stored data in that particular memory location, press **enter** key. If you wish to view data at specific memory location, use **▲/save** or **▼/view** keys to scroll and select. Press **enter** key to view data contents.

Pressing **enter** key repeatedly allows you to view data contents until a series of dashes appear on the display which indicates an empty data location.

Pressing **std** key allows you to return to the measurement mode in any sequence of memory recall.

9. PRINT DATA

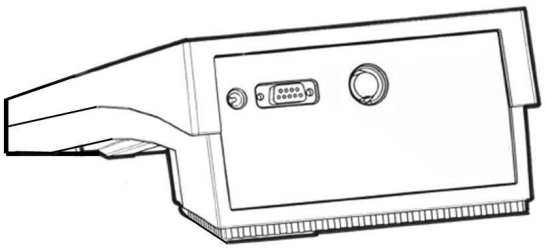
9.1. Printing Data

print
enter

std

Depending on the print option in the meter setup, pressing the **print** key allows you to print either current displayed reading or stored data from meter to a PC or printing device via a RS232 communication cable. Ensure that both meter and peripheral have the same configuration in terms of baud rate, parity bit and stop bit. Please check with the printer's or peripheral's manufacturers for details of any specific settings of the device in use.

If there is an error message during operation, the screen displays Err1. This indicates a communication error due to incorrect baud rate, parity or stop bit being selected. Press **std** key to return to the measurement mode.



Please refer to the CyberComm Pro Data Acquisition Software Instruction Manual for details on installation use for communication to the CyberScan CON 1500.

10. CONDUCTIVITY THEORY

Conductance is a metric associated with the ability of primarily aqueous solutions to carry an electrical current, I, between two metallic electrodes when a voltage E is connected to them. Though water itself is a rather poor conductor of electricity, the presence of ions in the water increases its conductance considerably, the current being carried by the migration of the dissolved ions. This is a clear distinction from the conduction of current through metal, which results from electron transport.

The conductance of a solution is proportional to and a good, though non-specific indicator of the concentration of ionic species present, as well as their charge and mobility. It is intuitive that higher concentrations of ions in a liquid will conduct more current. Conductance derives from Ohms law, E= IR, and is defined as the reciprocal of the electrical resistance of a solution.

C= 1/ R

C is conductance (siemens)
R is resistance (ohms)

One can combine Ohms law with the definition of conductance, and the resulting relationship is:

C= I/ E

I is current (amps)
E is potential (volts)

In practice, conductivity measurements involve determining the current through a small portion of solution between two parallel electrode plates when an ac voltage is applied. Conductivity values are related to the conductance (and thus the resistance) of a solution by the physical dimensions- area and length- or the cell constant of the measuring electrode. If the dimensions of the electrodes are such that the area of the parallel plates is very large, it is reasonable that more ions can reside between the plates, and more current can be measured. The physical distance between the plates is also critical, as it affects the strength of the electric field between the plates. If the plates are close and the electric field is strong, ions will reach the plates more quickly than if the plates are far apart and the electric field is weak. By using cells with defined plate areas and separation distances, it is possible to standardise or specify conductance measurements. Thus comes the term specific conductance or conductivity.

The relationship between conductance and specific conductivity is:

Specific Conductivity, S.C.= (Conductance) (cell constant, k) = siemens * cm/ cm2 = siemens/ cm

C is the Conductance (siemens)
K is the cell constant, length/ area or cm/ cm2

Since the basic unit of electrical resistance is the ohm, and conductance is the reciprocal of resistance, the basic unit of conductance was originally designated a “mho:- ohm spelled

backwards- however, this term has been replaced by the term “siemen”. Conductivity measurements are reported as Siemens/ cm, since the value is measured between opposite faces of a cell of a known cubic configuration. With most aqueous solutions, conductivity quantities are most frequently measured in microSiemens per cm (µS/ cm) or milli-Siemens per cm (mS/ cm).

The CyberScan CON 1500 meter automatically converts conductivity readings from micro or milli Siemens to other derived units that are widely used. These are ppm TDS (total dissolved solids), and Resistivity (ohm*cm).

Some users prefer the use of Resistivity units to describe their water, particularly where high purity water is involved. The unit most often used to describe Resistivity is Mohm*cm, which is simply the reciprocal of conductivity (µS/ cm). The chart below shows the relationship between these units.

*The CyberScan CON 1500 meter displays resistivity as ohm*cm (as Ωohm on the display). Readings of 1 Mohm*cm and higher are displayed as MΩohm. Readings less than 1 Mohm*cm are displayed kΩohm.*

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Conductivity Measurement

CyberScan conductivity probes consist of glass or epoxy bodies in which platinum or platinised sensing elements and are designated two-cell electrode has two such sensing elements and are designated two-cell electrodes. The previous discussion has focused on this type of electrode. Four cell electrodes are also available, and the theory and application of these are in a separate section.

These sensors contact the solution whose conductivity value is sought. The exact cell constant of the electrode must be determined prior to measuring the sample. In essence, this is accomplished by fixing the nominal cell constant of the electrode into the meter, and recording the observed conductivity value associated with a standard conductivity solution (usually a KCI solution) with a precisely known value. The following calculation yields the actual cell constant.

K= standard value of solution (µS)/ observed value of solution (µS)

Fortunately, the CyberScan CON 1500 meter automatically does this calculation for you by touching the **std** button.

To produce an appropriate current signal for the meter it is important to choose an electrode with an appropriate cell constant. The following table lists the optimum conductivity ranges for electrodes with cell constants of 0.1, 1, and 10.

Cell Constant	Optimum Conductivity Range (µS/cm)
0.1	0.5 to 200
1.0	10 to 2000
10.0	1000 to 200,000

Prior to use, the probes should be conditioned in distilled or deionised water for at least 10 minutes or in accordance with the manufacturer's instructions.

The 4-cell electrode

Traditionally, conductivity measurements were made with a “2-cell” electrode. This electrode used two metallic sensors, an anode and a cathode to which ions migrated. Under the influence of DC current the electrodes quickly became polarised. In this situation, molecules formed at the electrode surfaces and ions migrating to the area collect around the respective anode or cathode and actually screen it from other ions. In essence the flow of ions stops, and current ceases to flow. Polarisation and associated errors can be minimised by using AC voltage, the appropriate cell constant, and a large electrode surface area. The influence of polarisation can also be minimised by the use of a four-cell electrode.

The four cell configuration consists of two cells, an outer cell and an inner cell. Voltage is applied to the sensors of the outer cell, which in turn generates a voltage across the sensors of the inner cell. The inner cell is connected to a high impedance circuit and, unlike the outer cell generates no current. Since no current is generated across the inner cell, polarisation cannot occur at the inner cell. By measuring the voltage of the inner cell, which is adjusted to match the reference voltage by increasing or decreasing the current through the inner cell, one obtains a true picture of conductivity minus the influence of polarisation.

Conductivity and Temperature

Conductivity in aqueous solutions reflects the concentration, mobility, and charge of the ions in solution. The conductivity of a solution will increase with increasing temperature, as many phenomena influencing conductivity such as solution viscosity are affected by temperature.

The relationship between conductivity and temperature is predictable `and usually expressed as relative % change per degree centigrade. This temperature coefficient (% change per degree) depends on the composition of the solution being measured. However, for most medium range salt concentrations in water, 2% per degree works well. Extremely pure water exhibits a temperature coefficient of 5.2%, and concentrated salt solutions about 1.5%.

Since temperature effects the conductivity measurement so profoundly, the usual practice is to reference the conductivity to some standard temperature. This is typically 25°C; therefore, measurements are reported as if the sample were at 25°C.

The CyberScan CON 1500 permits you to enter one of four temperature coefficients (0.00, 1.5, 2.0, or 5.2%) and use an ATC probe to automatically temperature compensate back to a reference temperature of 25°C.

The meter requires no regular maintenance, but it is recommended to occasionally wipe down the front with a damp cloth. If there are any further questions regarding maintenance, contact Eutech Instruments at (65) 6778 6876.

11. CLEANING

This meter requires no regular maintenance, but it is recommended to occasionally wipe down the front with a damp cloth from time to time.

12. TROUBLESHOOTING

The CyberScan CON 1500 displays pertinent error messages to guide you should an error occur with a measurement or meter operation.

Message	Description
Error Icon	Error message for Conductivity Cal error.
Or	Conductivity Reading > 500mS /
	Resistivity >100Mohm
	TDS >99999 ppm
Ur	Resistivity is short
-5.0°C/ 23.0°F	When the temperature is under range
105°C/ 221.0°F	When the temperature is over range
Err1	Communication error

13. WARRANTY

Eutech Instruments supplies this bench meter with a 3-year warranty and 6-month warranty for electrode against manufacturing defects from the date of purchase. If repair or adjustment is necessary and has not been the result of abuse or misuse within the warranty period, please return, freight prepaid, and correction will be made without charge. Out of warranty items will be repaired on a charge basis.

Exclusions to the Warranty

The warranty shall not apply to defects resulting from:

- Improper or inadequate maintenance by customer;
- Unauthorised modification or misuse;
- Operation outside of the environmental specifications of the products.

Return of Items

Authorisation must be obtained from your Eutech Instruments' Authorised Distributor or Eutech Instruments' Customer Service Dept. before returning items for any reason. When applying for authorisation, please include data regarding reason the items are to be returned.

Packing the item for repair should be done using the original packaging or material, with information about any fault identified.

Shipment damage as a result of inadequate packaging is your or your distributor's responsibility, whoever applicable.

Note:
Eutech Instruments reserves the rights to make improvements in design, construction, and appearance of products without notice.

14. NOTICE OF COMPLIANCE

Warning
This meter generates, uses, and can radiate radio frequency energy. If not installed and used properly, that is in strict accordance with the manufacturer's instructions, it may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area may cause interference, in which case the user, at his own expense, will be required to take whenever measures may be required to correct the interference.

This product is to be used only as described in the manual. This product is for indoor use only, and must be used in a well ventilated area.

Warning!
To meet or exceed FCC regulations and comply with CE requirements, the Eutech Instruments supplied power supply must be used. Use of a power supply that is not approved by Eutech Instruments may cause safety hazards and/or cause unit to exceed EMC limits and/or damage unit. When using his meter with a computer or printer, a shielded RS232 cable must be used to meet or exceed FCC regulations, and comply with CE Mark requirements.

15. METER SPECIFICATIONS

		Conductivity	Resistivity	TDS
Range		0.000 to 500.0 mS/cm	0.000 to 99.99 MΩ	0.000 to 99999 ppm
Internal Range	R1	0.000 to 200.0 uS	0.000 to 20.00KΩ	0.000 to 200.0 ppm
	R2	200.0 uS to 2.000 mS	20.00K to 200.0K	200.0 ppm to 2000 ppm
	R3	2.000 mS to 20.00 mS	200.0K to 2.000M	2000 ppm to 20000 ppm
	R4	20.00 mS to 500.0 mS	2.000M to 100.0M	20000 ppm to 99999 ppm
Resolution		0.001 (0.000 to 9.999 uS/cm) 0.01 (10.00 to 99.99 uS/cm) 0.1 (100.0 to 999.9 uS/cm) 0.001 (1.000 to 9.999 mS/cm) 0.01 (10.00 to 99.99 mS/cm) 0.1 (100.0 to 500.0 mS/cm)	0.001 (0.000 to 9.999 Ω) 0.01 (10.00 to 99.99 Ω) 0.1 (100.0 to 999.9 Ω) 0.001 (1.000 to 9.999 kΩ) 0.1 (100.00 to 999.9 kΩ) 0.001 (1.000 to 9.999 MΩ) 0.01 (10.00 to 99.99 MΩ)	0.001 (0.000 to 9.999 ppm) 0.01 (10.00 to 99.99 ppm) 0.1 (100.0 to 999.9 ppm) 1 (1000 to 99999 ppm)
Accuracy		±0.5% full scale reading		
Temperature range		-5.0 to 105.0°C (23.0 to 221.0°F)		
Resolution		0.1°C (0.1°F)		
Accuracy		±0.3°C (±0.5°F)		
Temperature Coefficient		0.000 to 10.000		
Normalisation temperature		15.0 to 30.0°C (59.0 to 86.0°F)		
TDS Factor		0.40 to 1.00		
Cell Constant		0.1, 1.0, 10.0		
Display		105 X 75 mm (screen size) custom LCD with contrasted background		
Memory		100 data sets		
Power Requirement		Power Adapter 110/ 220VAC, 12V DC, 500mA, centre negative		
Inputs and Outputs		power socket, socket pin (2-cell conductivity), DIN (4-cell conductivity), 2.5 mm phono socket (ATC) and bi-directional RS232		
Dimension/ weight		23 X 18 X 6 cm; 950g (without box) / 40X 26 X 9 cm; 1.6kg (boxed)		

18 ACCESSORIES

Consult your Authorised Distributors for these items and other range of specialised electrodes.

Replacement Meter & Meter Accessories

EC-CON1500/13S	CyberScan CON 1500 Bench Conductivity/ Resistivity/ TDS with 4-cell epoxy bodied conductivity electrode, K=1.0 (EC-620-165), integral electrode holder, Data Acquisition Software & 110 VAC power adapter 60X030115.
EC-CON1500/23S	CyberScan CON 1500 Bench Conductivity/ Resistivity/ TDS with 4-cell epoxy bodied conductivity electrode, K=1.0 (EC-620-165), integral electrode holder, Data Acquisition Software & 220 VAC power adapter 60X030118.
EC-620-155	Glass-body 2-ring Conductivity Electrode, cell constant K=1.0, dual pin connector, 1m cable length
EC-620-156	Glass-body 2-ring Conductivity Electrode, cell constant K=0.1, dual pin connector, 1m cable length
EC-620-157	Glass-body 2-ring Conductivity Electrode, cell constant K=10.0, dual pin connector, 1m cable length
EC-620-160	Epoxy-body 2-ring Conductivity Electrode, cell constant K=1.0, dual pin connector, 1m cable length
EC-620-161	Epoxy-body 2-ring Conductivity Electrode, cell constant K=0.1, dual pin connector, 1m cable length
EC-620-162	Epoxy-body 2-ring Conductivity Electrode, cell constant K=10.0, dual pin connector, 1m cable length
EC-620-163	Glass-body 4-ring Conductivity Electrode, cell constant K=1.0, DIN connector, 1m cable length
EC-620-164	Glass-body 4-ring Conductivity Electrode, cell constant K=10.0, DIN connector, 1m cable length
EC-620-165	Epoxy-body 4-ring Conductivity Electrode, cell constant K=1.0, DIN connector, 1m cable length
EC-620-166	Epoxy-body 4-ring Conductivity Electrode, cell constant K=10.0, DIN connector, 1m cable length
EC-620-19	Temperature Probe, 1m cable length (for use with 2-ring electrode)
60X030115	110/120 VAC Power Adapter (50/60 Hz), 2-flat pin US type center negative, 12 VDC 800mA
60X030117	220/230 VAC Power Adapter (50/60 Hz), 3-flat pin UK type center negative, 12 VDC 800mA
60X030118	220/230 VAC Power Adapter (50/60 Hz), 2-round pin Euro type center negative, 12 VDC 800mA

Conductivity & TDS 442 Standard Solutions

EC-CON-100BT	100 µS KCl Calibration Solution (480 ml)
EC-CON-500BT	500 µS KCl Calibration Solution (480 ml)
EC-CON-1413BT	1'413 µS KCl Calibration Solution (480 ml)
EC-CON-2764BT	2'764 µS KCl Calibration Solution (480 ml)
EC-CON-1288BT	12.88 mS KCl Calibration (480 ml)
EC-CON-10BS	10 µS Conductivity Sachets (20 X 20ml)
EC-CON-447BS	447 µS Conductivity Sachets (20 X 20ml)
EC-CON-1413BS	1'413 µS Conductivity Sachets (20 X 20ml)
EC-CON-2764BS	2'764 µS Conductivity Sachets (20 X 20ml)
EC-CON-15000BS	15'000 µS Conductivity Sachets (20 X 20ml)
EC-442-50BT	50 ppm 442 Calibration Solution (20 X 20ml)
EC-442-300BT	300 ppm 442 Calibration Solution (20 X 20ml)
EC-442-1000BT	1'000 ppm 442 Calibration Solution (20 X 20ml)
EC-442-3000BT	3'000 ppm 442 Calibration Solution (20 X 20ml)

Note:

COA and MSDS information can be downloaded from our homepage site at www.eutechinst.com under Tech-tips.

For a complete selection of electrodes and accessories, please contact your Eutech Instruments nearest distributor or sales representative for details.

NOTES

For more information on Eutech Instruments products, contact your nearest Eutech Instruments distributor or visit our website listed below:

Manufactured by:	***Distributed by:***
Eutech Instruments Pte Ltd. Blk 55, Ayer Rajah Crescent, #04-16/24 Singapore 139949 Tel: (65) 6778 6876 Fax: (65) 6773 0836 E-mail: marketing@eutechinst.com Web-site: www.eutechinst.com	