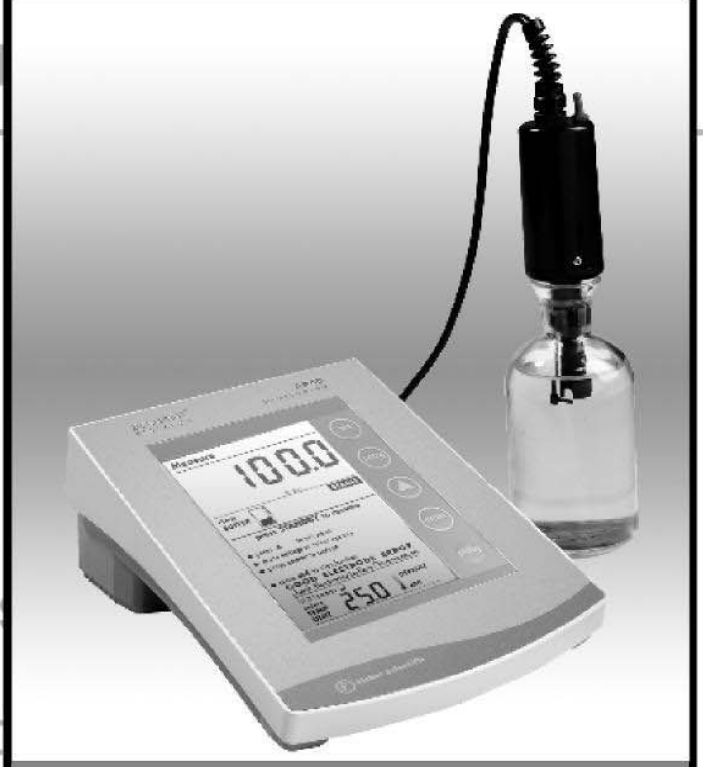
Measure

accumet® BASIC

AB40



- press **std** to
- press **enter** t

USER Manual

select TEMP UNIT

DEFAULT

std

setup

enter

stdby

TABLE OF CONTENTS

1. INTRODUCTION

Thank you for selecting a Fisher Scientific Accumet Dissolved Oxygen 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 meter is designed to provide all the information necessary to guide the user through the process of measuring DO with a series of prompts on the screen.

The Accumet BASIC AB40 provides microprocessor precision in a compact bench top design that's easy to use. Five function keys control all procedures, letting you:

- Set the barometric pressure
- Set the salinity value of the sample
- Read DO in mg/L or % Saturation

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

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

2. UNPACKING THE METER

The following is a listing of what you should have received with your new Accumet AB40 Dissolved Oxygen meter:

Meter with kit includes:

- meter
- power supply
- BOD probe
- membrane kit
- Instruction manual

Meter only includes:

- meter
- power supply
- Instruction manual

If any of these items are missing, please contact the Fisher Lab Equipment Group Electrochemistry Division by dialing 1888-358-4706.

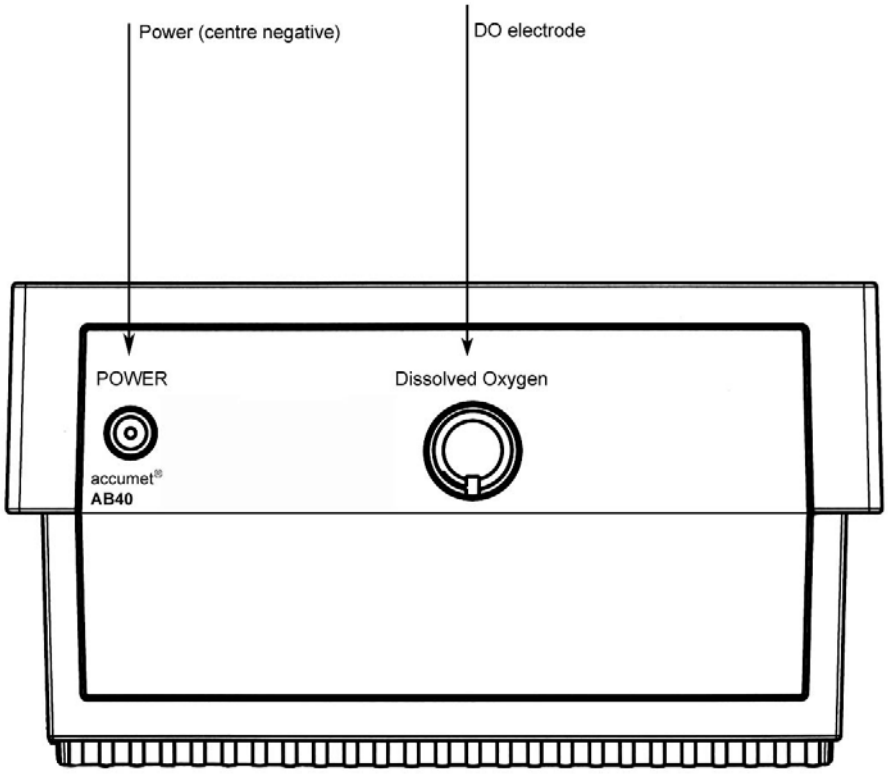
Accessories are available and can be ordered by calling Fisher Scientific Customer Service at 1888-358-4706.

BOD probe: 13-620-SSP
Membrane kit: 13-637-DOM

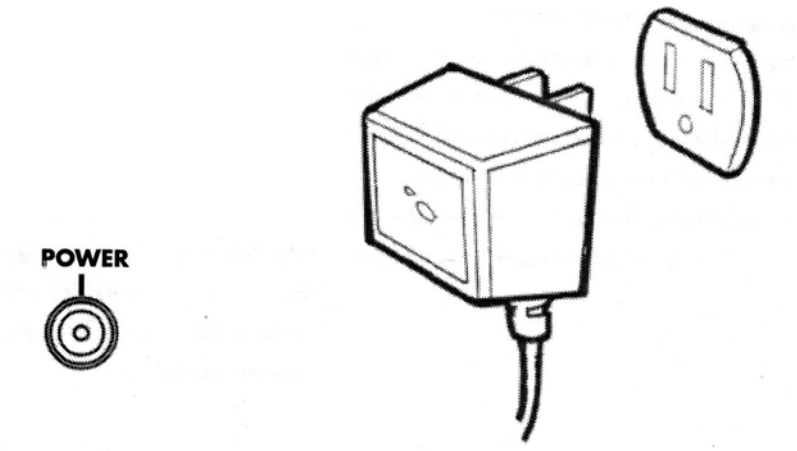
3. GETTING STARTED

3.1. Connectors

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



2. 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.



4. USING THE METER

4.1. The Electrode

This meter comes equipped with a self-stirring BOD probe, model 5010, from YSI. Read the accompanying manual prior to installation and operation. The 5010 probe need be plugged into the meter only, as the meter supplies both its operation power and stirring power.

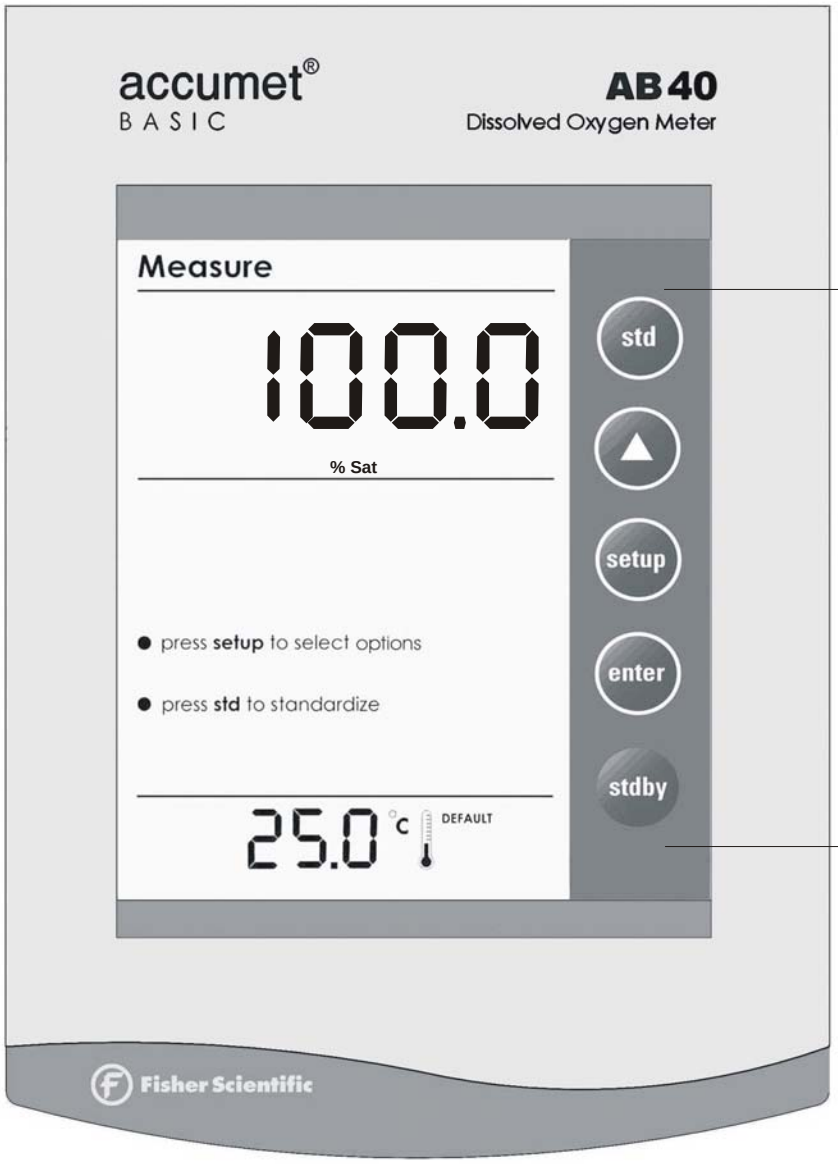
1. Prepare the electrode as described in its instruction manual.

2. Plug the electrode into the DO socket located at the rear panel of the meter.

3. Place the probe into a BOD bottle filled with at least 1 inch of water. Allow the probe to warm up for 30 minutes before calibration or taking a measurement.

4.2. Display/ Keys

Overview of the meter screen display and function key layout.



Press **std** key to initiate standardization from measure mode or press **std** key at the Standardization mode to confirm the standardization and return to measurement mode.

Press ▲ to adjust values/ selection.

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

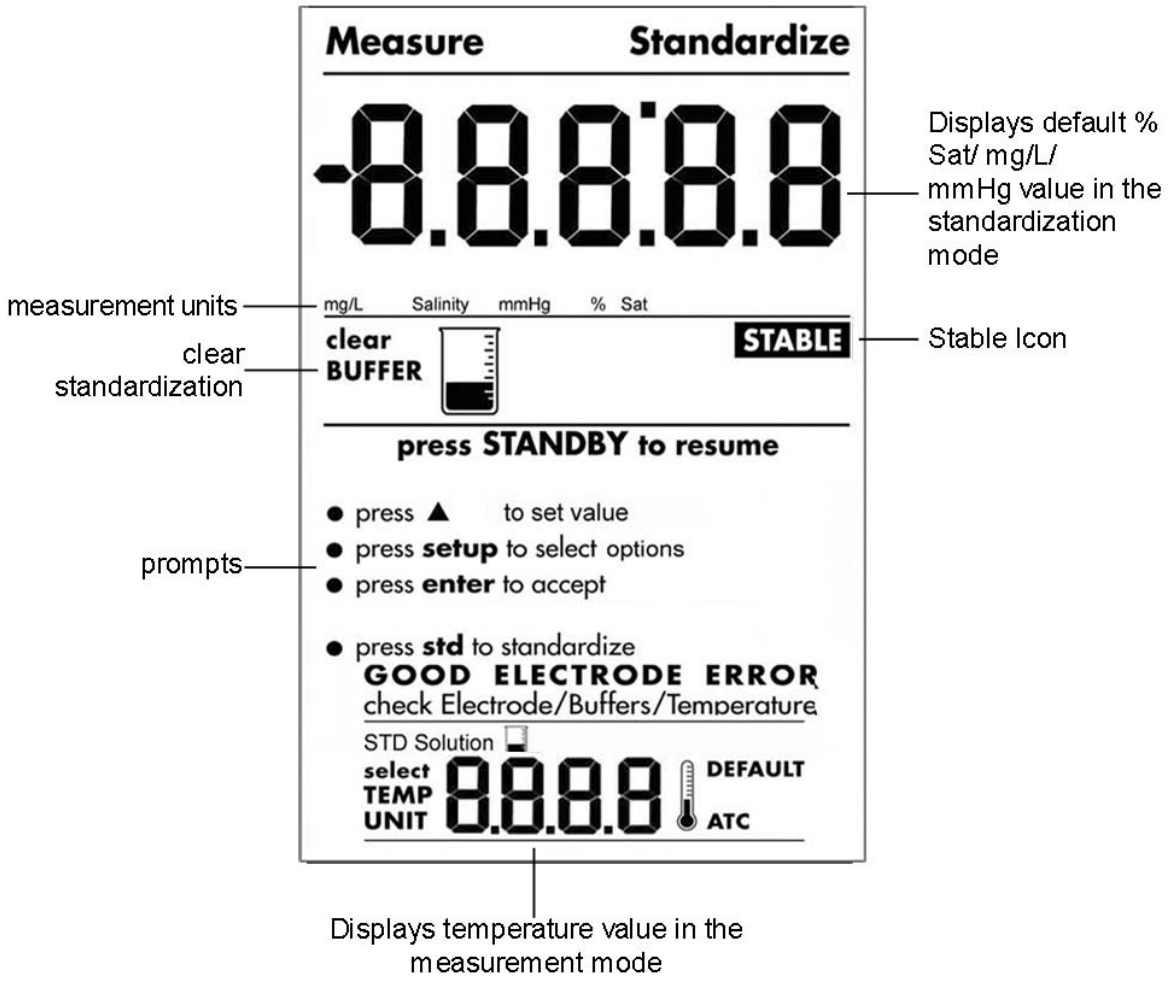
Press **enter** key to confirm selection or change being made.

Press **stdby** key to start up or

Meter Display: AB 40

4.3. Screen Display

Familiarize yourself with the layout of the digital screen display.



5. SETUP PROCEDURE CHECK

5.1. Using Setup

Setup allows you to set the operating parameters of the meter to meet your requirements. There are two ways to access setup, and the parameters that you can set will be different depending on how you accessed setup. Determine which access route you need to utilize from the chart below:

To set the following parameter	Access Setup from the following screen
View the last calibration factor	From the **Measurement Mode Screen**
Select the type of measurement unit you wish to measure dissolved oxygen in %Sat, mg/L and associated units.	From the **Measurement Mode Screen**
Select the pressure value	From the **Measurement Mode Screen**
Select the salinity value	From the **Measurement Mode Screen**
Select the number of Calibration Points (For %Sat mode only)	From the **Measurement Mode Screen**
Enable/ Disable Auto Calibration	From the **Measurement Mode Screen**
Select Temperature units	From the **Measurement Mode Screen**
Enable/ Disable Stability Indicator	From the **Measurement Mode Screen**
Clear Standardization	From the **Measurement Mode Screen**

The **setup** button is in essence a scroll key which allows you to change several operating parameters. While in the **setup mode** you may:

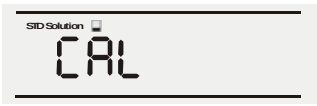
Press **std** to exit from setup to measure screen without making change.

Press ▲ to set values within each setup option.

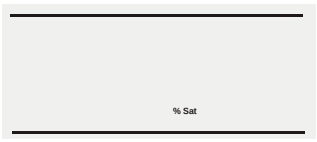
Press **setup** to scroll to the next parameter to view or change.

Press **enter** to accept the displayed parameter. The meter will then return to the measurement mode.

Press **stdby** to return to the standby mode without making a change. Pressing standby again will place the meter in the Measure mode.



Setup Page 1: View last calibrated Calibration Factor
- View the last calibration factor and 0% offset value.
Note: You will be able to view both Cal Factor and 0%Sat offset ONLY if you had



Setup Page 2: Select % Sat mode
- Select to measure DO in %Sat.

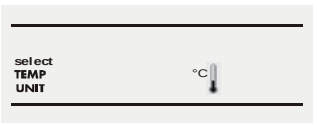
Setup Page 3: Set mg/L mode
- Select to measure DO in mg/L.

Setup Page 4: Set the Pressure (450 mmHg-825 mmHg)
- Adjust and select Pressure value.

Setup Page 5: Set the Salinity (0.0 - 45.0 ppt)
- Adjust and Select salinity value.

Setup Page 6 & 7: Select number of calibration points for %Sat calibration
- Select 1 point or 2 point calibration for %Saturation.

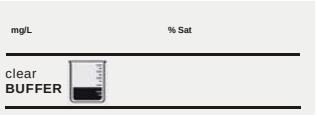
Setup Page 8 & 9: Select Auto Calibration
- Set Auto calibration or Manual calibration for %Sat and mg/L.



Setup Page 10 & 11: Select Temperature Unit
- Select unit of measure for Temperature either in °C or °F.

Setup Page 12: Enable Stability Indicator
-Set the stability indicator to be displayed on the screen. Select On.

Setup Page 13: Disable Stability Indicator
-Set the stability indicator to be NOT displayed on the screen. Select OFF.



Setup Page 14: Clear Standardization
- Select to clear standardization.

Overview of Setup Menus in AB 40

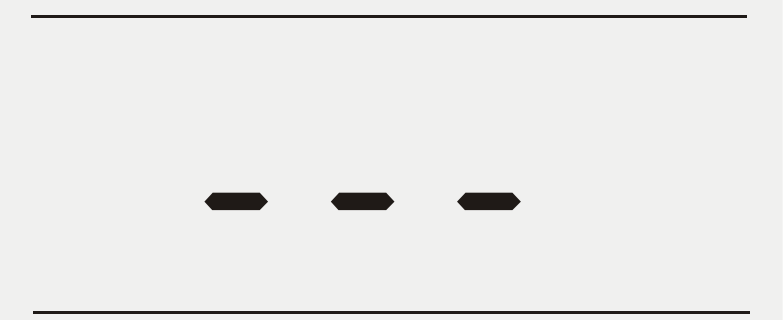
5.1.1. Setup Page 1: View last calibration factor

This setup menu allows you to view the last calibration factor in % Sat after standardization is successfully done.

To view last calibration factor

1. Access the *View Last calibration factor* setup page by pressing **setup** while in measurement mode to view the last calibration factor.

2. If the unit has not been standardized, a series of dashes will appear on the display rather than a number.



3. Press **enter** to return to measurement mode

   OR

4. Press **setup** to go to the next setup option without making any changes.

If you access this setup page from %Sat mode and if you have calibrated one point (100% Sat) then you can view the last calibration factor. Should you have calibrated 2 points (100%Sat and 0%Sat), you will be able to view both the last calibration factor and 0% offset.

If you access the setup page from mg/L mode, and if you have calibrated mg/L, you will be able to view the last calibrated value in mg/L.

5.1.2. Setup page 2: Select % Sat Mode

The setup option allows you to measure DO in % Sat.

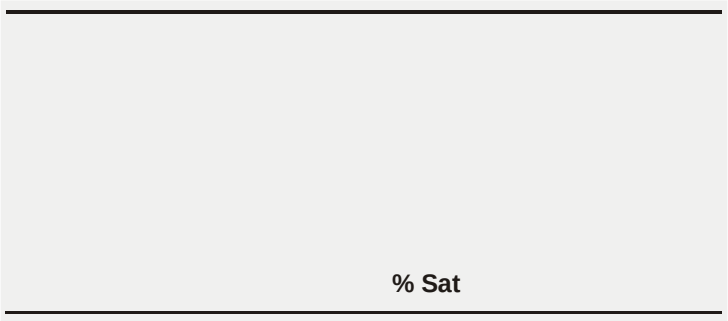
To select % sat Mode

1. Access the *Select % Sat Mode* setup page by pressing the **setup** key while in measurement mode till page displays as figure shown below.

2. Press **enter** to accept the option of measurement in % Sat Mode and return to measurement mode

   OR

3. Press **setup** again to go to the next setup page without making any changes.



5.1.3. Setup Page 3: Set the mg/L mode

The setup option allows you to measure DO in mg/L.

To select mg/L mode

1. Access the *Select mg/L setup* page by pressing the **setup** key while in measurement mode till the page displays as figure shown below.

2. Press **enter** to accept the option of measurement in mg/L Mode and return to measurement mode

   OR

3. Press **setup** to go to next setup page without making any changes.

5.1.4. Setup Page 4: Set the Pressure

The setup option allows you to set the atmospheric pressure (mmHg) value. You are able to set the pressure value in the range of (450mmHg to 825 mmHg).

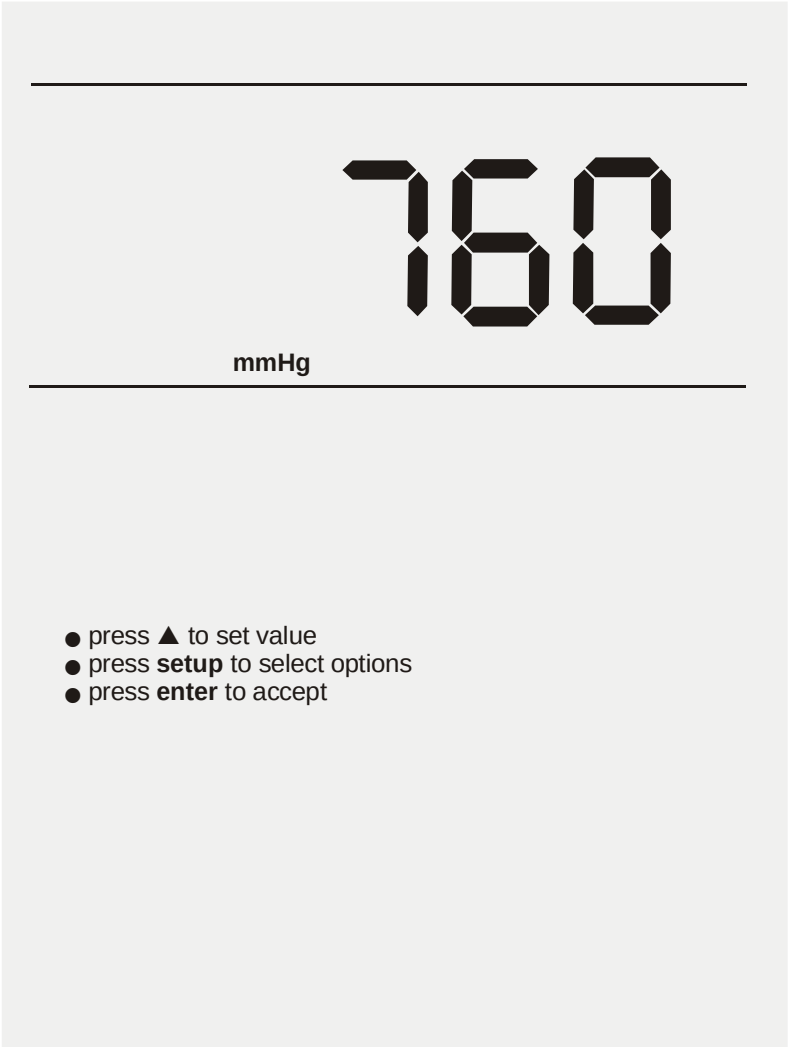
To set Pressure

1. Access the Set the Pressure (mmHg) setup page by pressing the **setup** key while in measurement mode till the page displays as figure shown below.

2. Press **enter** to accept the current pressure value and return to measurement mode

   OR

3. Press ▲ to adjust and set the value.



4. Press **enter** key to confirm selection and return to measurement mode.

   OR

5. Press **setup** to go to next setup page without making any changes.

You can escape setup mode at any time by pressing **std**. Pressing **enter** will always return the display to measurement mode after accepting the setup option.

5.1.5. Setup Page 5: *Set the Salinity Value*

The setup option allows you to set the Salinity (as ppt) value. You are able to set the salinity value in the range of 0.0- 45.0 ppt.

To set Salinity

1. Access the *Set the salinity (ppt)* setup page by pressing the **setup** while in measurement mode key till the page displays as shown below.

2. Press **enter** to accept the current salinity value and return to measurement mode.

   OR

3. Press ▲ to adjust and set the value.

4. Press **enter** key to confirm selection and return to measurement mode.

5. Press **setup** to go to next setup page without making any changes.

5.1.6. Setup Page 6: Select Number of User Cal Points for % Sat calibration

This setup option allows you to select the number of user calibration points for % Sat calibration to be either **1** or **2**.

To Select Number of User Cal Points

1. Access the *Select Number of User Cal Points* setup page by pressing the **setup** key while in measurement mode till the page displays as shown in the following page.

2. Press **enter** to accept the current User Cal Point (1) and return to measurement mode.

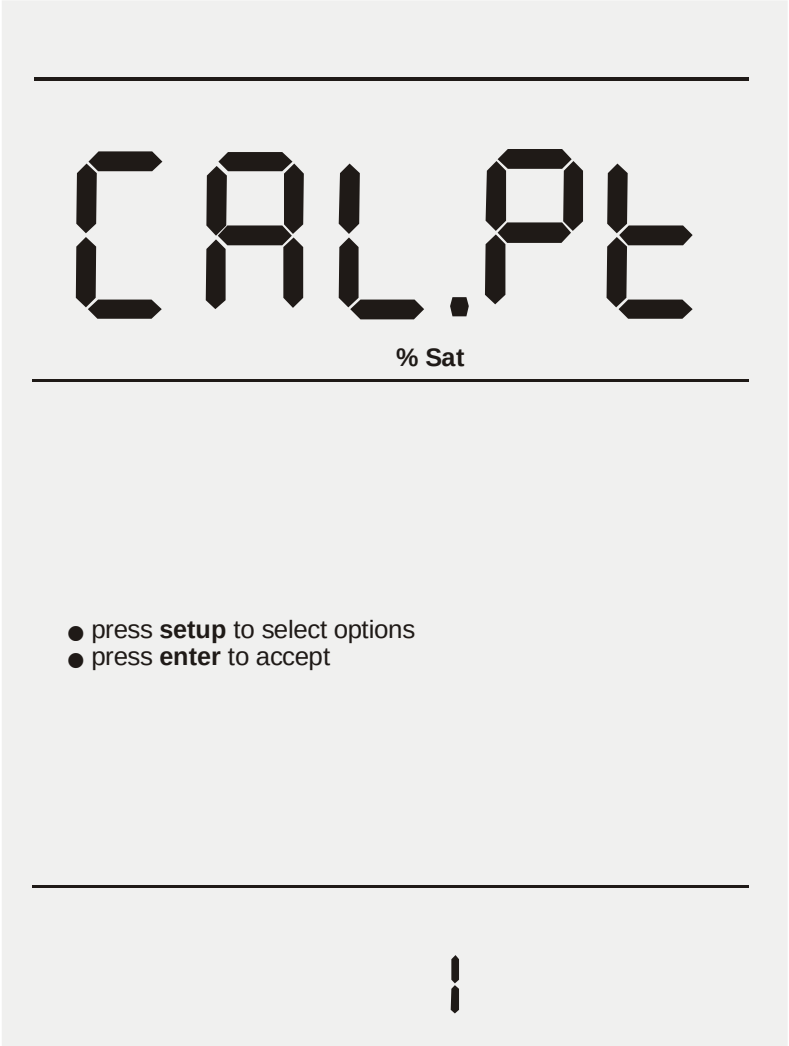
   OR

   Press **setup** to go to next setup page which is User Cal Point (2) setup page.

3. Press **enter** to accept selection and return to measurement mode.

   OR

   Press **setup** again to go to next setup option without making any changes.


CAL.Pt
% Sat
● press **setup** to select options
● press **enter** to accept
1


2

5.1.7. Setup Page 7: Enable/ Disable Auto Cal

This setup option allows you to enable the auto calibration for % Sat and mg/L modes.

To Enable/ Disable Auto Cal

1. Access the *Auto Cal* setup page by pressing the **setup** key while in measurement mode till the page displays as shown in the following page.

2. Press **enter** to accept (YES) to enable auto calibration and return to measurement screen

   OR

   Press **setup** to go to Disable Auto Cal Page (NO).

3. Press **enter** key to confirm selection

   OR

   Press **setup** again to go to next setup option without making any changes.


Auto.C
press setup to select options
press enter to accept
YES


nO

5.1.8. Setup Page 8: Select the Temperature Unit

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

To Select Temperature Unit

1. Access the *Select Temperature Unit* setup page by pressing the **setup** key while in measurement mode till the page displays as shown below. a

2. Press **enter** to accept the °C temperature unit and return to the Measure screen

   OR

   Press **setup** again to display the °F temperature unit setup page as shown below.

3. Press **enter** to accept the °F temperature unit and return to the Measure screen

   OR

4. Press **setup** to go to next setup option without making any changes.

5.1.9. Setup Page 9: Enable/ Disable Stability Indicator

This setup option allows you to set the stability indicator to be displayed on the screen whenever reading has stabilized, thus minimizes guesswork.

To Set Stability Indicator

1. Access the *Set Stability Indicator* setup page by pressing the **setup** key while in measurement mode till the page displays as shown below.

2. Press **enter** to accept (ON) to enable stability indicator and return to measurement screen

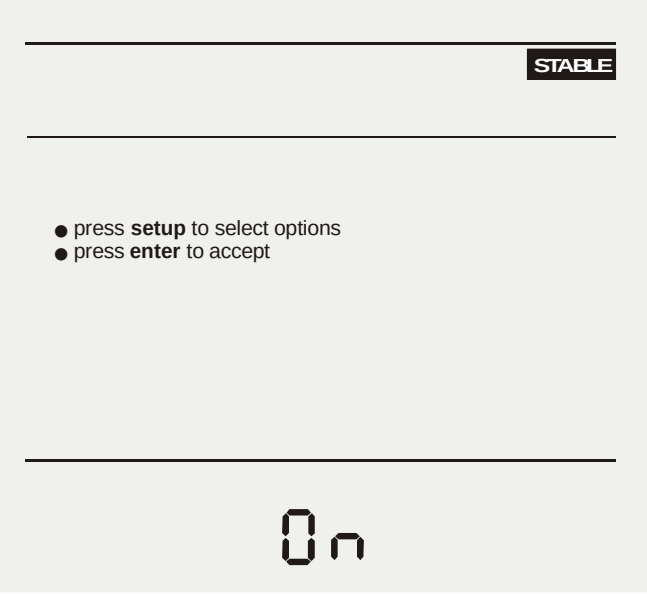
   OR

   Press **setup** to go to *Disable Stability Indicator (OFF)* setup page as shown on the following page.

3. Press **enter** key to confirm selection and return to measurement mode

   OR

   Press **setup** again to go to next setup option without making any changes.




STABLE
● press **setup** to select options
● press **enter** to accept
OFF

5.1.10. Setup Page 10: Clear the Calibrated Buffers

This setup option allows you to clear the Calibrated Buffers.

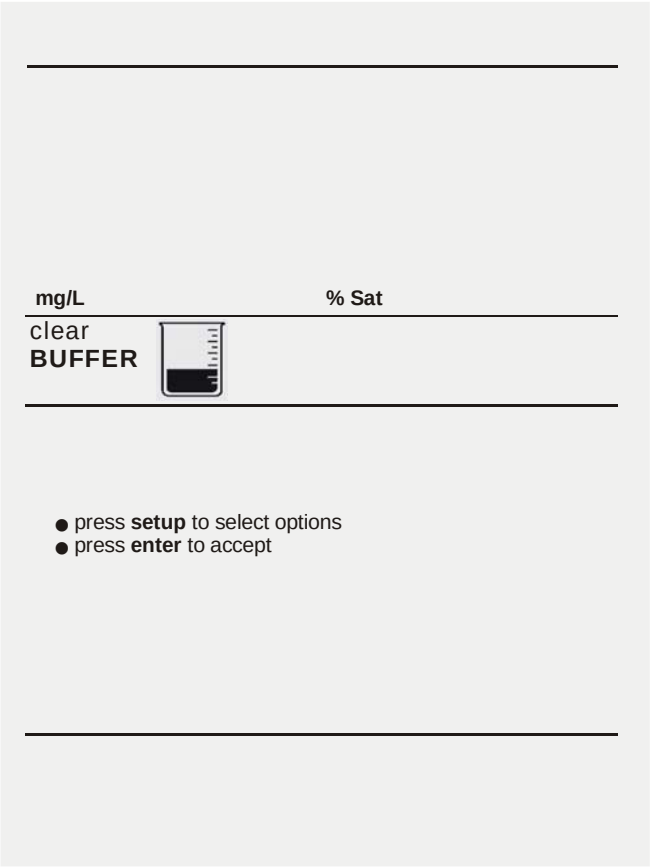
To Clear the Calibrated Buffers

1. Access the *Clear Calibrated Buffers* setup page by pressing the **setup** key till the page displays as shown below.

2. Press **enter** key to make selection and return to measurement mode

   OR

   Press the **setup** key return to measurement mode without making any changes.



1. *If you access this page from %Sat measurement mode, the above action clears both %Sat and mg/L calibration.*
2. *If you access this setup page from mg/L measurement mode, the above action only clears mg/L calibration.*

6. USER CALIBRATION

6.1. %Sat- One Point Calibration (Auto)

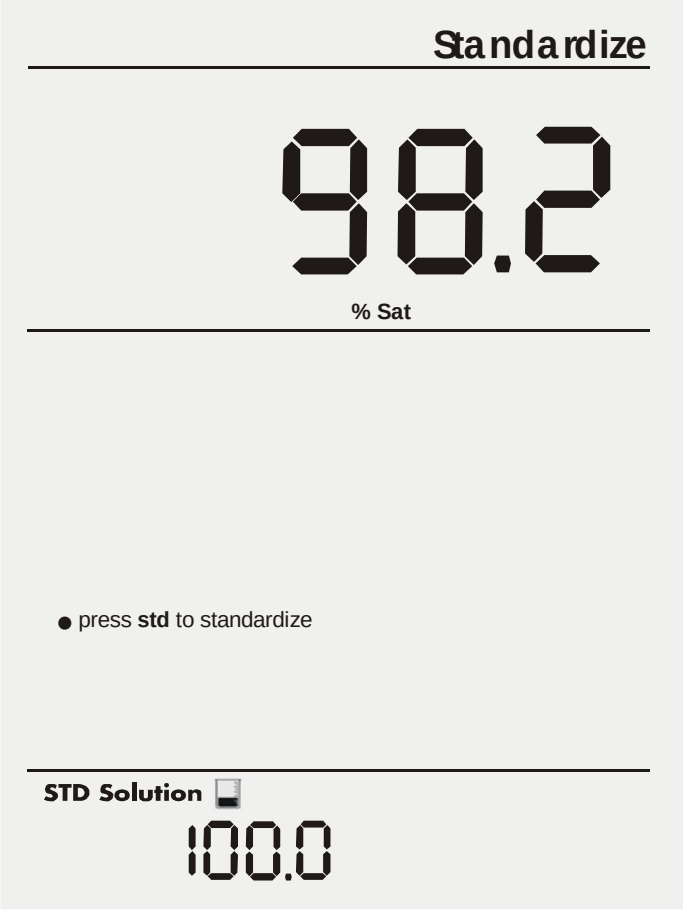
User can do the 100%Sat calibration. The pressure that has been set in the setup will be applied only during the calibration.

Accepted window for 100% Sat calibration is 30% - 200%Sat. (Any value that falls within this range will be accepted as 100%Sat)

Press **std** to enter to 'Standardize' screen. Upper display shows the present measured value, while lower display shows the pressure compensated 100% sat.

Hold probe in air.

Wait for the upper display value is stabilized. Press **std** key to confirm calibration. Meter blinks the calibration values for few seconds before exiting to measurement mode.



6.2. %Sat – Two Point Calibration (Auto)

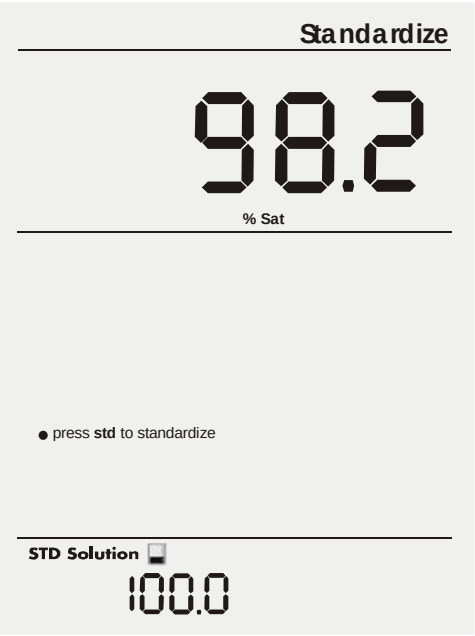
The 0.0%Sat calibration has to be done first if a 2-point %Sat calibration is selected. The 0.0%Sat calibration point will be considered as offset.

☞

*After successful 0%Sat calibration, meter will prompt for the 100% Sat calibration. User must do the two points. Otherwise meter displays an error message. Press **enter** if meter displays the error message.*

Accepted window for 0% Sat Calibration is below 5% Sat.
Accepted window for 100% Sat Calibration = 30% - 200%Sat

1. Press **std** to enter to 'Standardize' screen. Upper display shows the present measured value, while lower display shows the 0.0%Sat.
2. Put the DO electrode into 0%Sat solution.
3. Wait for the upper display value to be stabilized. Press **std** key to confirm calibration. Meter blinks the cal values for few seconds and prompts for the 100%Sat calibration.
4. Upper display shows the present %Sat value and lower display shows the pressure compensated 100%Sat value.
5. Hold the DO probe in air, for 100%Sat calibration.
6. After the upper display reading stabilized, press **std** to confirm the reading. Meter blinks the calibrated value for few seconds before it returns to measurement mode.



6.3. %Sat- One Point Calibration (Manual)

User can calibrate to the known value. The accepted window is set to 70% of the default value. Lowest value that can be calibrated is 20.0 %Sat.

1. Press **std** to enter to 'Standardize' screen. Both Upper and lower display shows the present measured value.

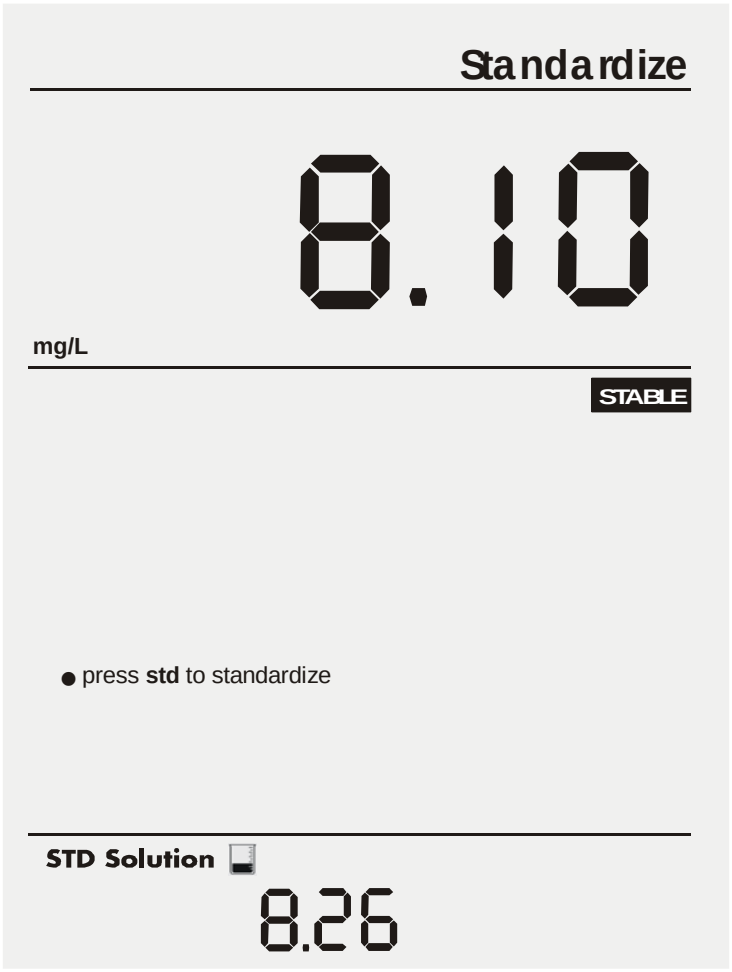
2. Put the electrode into the solution to which you want to calibrate. Wait for the upper display value to be stabilized. Use ▲ key to adjust the lower display to the known cal value.

3. Press **std** to confirm the reading. Meter blinks the cal values for few seconds before returning to measurement mode.

6.4. mg/L- One Point Calibration (Auto)

User can do calibration in mg/L.

1. Hold the DO probe in air; wait for the upper display reading to stabilize.
2. Press **std** to enter to 'Standardize' screen. Upper display shows the present measured value while lower display shows theoretical value. [Based on pressure and salinity setting]
3. User can just confirm the theoretical reading.
4. Acceptance window is ±70% of the present measured value.
5. Press **std** key to confirm calibration. Meter blinks the cal values for few seconds before returning to measurement mode.



6.5. mg/L One Point Calibration (Manual)

User can do calibration in mg/L.

1. Put the DO probe into the known solution to which you want to calibrate the meter.

2. Press **std** to enter to 'Standardize' screen. Both upper and lower display shows the present measured value.

3. Use the ▲ key to adjust the known standard value.

4. Window provided for the adjustment is ±70% of the present reading. Lower value that can be set is 2.00mg/L; higher value is 60.00 mg/L.

5. After set the value, press **std** key to confirm calibration. Meter blinks the cal values for few seconds before returning to measurement mode.

6.6. ATC Calibration

User can adjust the ATC temperature offset.

☞

DO/BOD probe must be connected to be able to access the ATC calibration setup page.

To access the temperature calibration mode:

1. Connect DO/BOD probe to back panel of the meter.
2. From the **stdby** mode, PRESS AND HOLD **setup** key followed by the **stdby** key.
3. Release the **stdby** key while holding on to the **setup** key.
4. Release the **setup** key after seeing the following screen.
5. Put the probe into the known temperature bath. Wait for reading to stabilize.
6. Use the ▲ key to adjust the offset.
7. After set the value, press **std** to confirm calibration.

7. DO THEORY

The polarographic type Oxygen probe used with the Accumet AB40 meter responds to the partial pressure exerted by oxygen in a given sample. As Oxygen reaches the probe's cathode, it is reduced according to the following equation:

$$O_2 + 2\ H_2O + 4e^- = 4\ OH^-$$

When oxygen is reduced at the cathode (along with concurrent oxidation of silver at the anode) current flows through the cell. The more oxygen that is reduced, the more current is generated. The relationship is linear, and by measuring the current generated in a sample, and comparing it to that of a standard, one can compute the amount of oxygen in the sample.

The primary influence on how much oxygen reaches the anode is the partial pressure exerted by oxygen on the probes' membrane. More partial pressure brings more oxygen, and therefore more current. The partial pressure that oxygen exerts is fixed for a given temperature and atmospheric pressure. This fixed level corresponds to the saturation level for a given temperature and pressure. The AB40 meter uses the known relationship between these parameters to permit simple, automatic standardization.

In sample measurements, however, another factor influences the relationship among partial pressure, temperature, and dissolved oxygen. This is the factor of how much salt is contained or dissolved in the sample. The presence of dissolved salt lowers the sample's ability to dissolve oxygen. Therefore a sample with a high level of dissolved salt will contain less oxygen than a sample with less or no salt at the same temperature and pressure. Fortunately, the relationship between dissolved salt or salinity and dissolved oxygen is well defined. The Accumet AB40 uses this fact to provide accurate dissolved oxygen measurements in samples whose salinity range from 0 to 40 ppt.

8. METER SPECIFICATIONS

Description	Accumet AB 40
% Saturation	
Range	0.0 to 600.0%
Resolution	0.1
Accuracy	±0.5% Full Scale + 1 LSD
Calibration	• User selectable Auto one (100%) or two point calibration (0% and 100%). • Manual calibration (one point)
mg/L	
Range	0.00 to 60.00 mg/L
Resolution	0.01
Accuracy	±0.5% Full Scale + 1 LSD
Calibration	Manual and Auto.
Salinity Correction	0.0 to 45.0 ppt
Barometric pressure compensation	450 to 825 mmHg
Temperature	
Range	-5.0 to 46.0 °C (23.0 to 114.8 °F)
Calibration	YES
Accuracy	0.3 °C
Display	3” (W) X 4¼”(H) Custom LCD with contrasted background
Power Requirement	12VDC, centre negative (11VAC/ 220VAC)
Input	DIN (DO)
Dimension/ Weight	140 X 191 X 83 cm; 800 g (meter only)

9. 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.

10. TROUBLESHOOTING

The Accumet AB40 displays pertinent error messages to guide you should an error occur with a measurement or meter operation.

Message	Description
Error Icon	Error message for %Sat Cal error.
"---"	DO reading is out of range

11. SETTING THE BAROMETRIC PRESSURE

Use the actual local barometric pressure whenever possible. This is obtained from a mercury barometer. Do not use the weather bureau pressure, as it is corrected to sea level. If a barometer is not available, estimate the atmospheric pressure at your altitude from the following table:

Altitude in feet	mmHg pressure
0	760
200	754
400	749
600	744
800	738
1000	733
1200	728
1400	722
1600	717
1800	712
2000	707
2200	702
2400	696
2600	692
2800	686
3000	681
3200	676
3400	672
3600	666
3800	661
4000	657
4200	652
4400	647
4600	642
4800	637
5000	632
5200	628
5400	623
5600	618

12. WARRANTY

The Fisher Scientific Company (“Fisher”) warrants to the direct purchaser that the accumet AB40 meter and DO probe will be free from defects in material or workmanship for a specified warranty period. During that period, Fisher will repair or replace the product or provide credit, at its sole option, upon prompt notification and compliance with its instructions. For accumet meters, that specified period is 24 months from delivery date. For the electrode, that specified period is 12 months.
Unless otherwise agreed, the warranty is limited to the country in which the product is sold.
No Fisher employee, agent or representative has the authority to bind Fisher to any oral representation or warranty concerning any product sold. Any oral representation or warranty made prior to purchase of any product and not set forth in writing and signed by a duly authorized officer of Fisher shall no be enforceable by the purchaser.

FISHER EXPRESSLY DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE IMPLIED WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

Fisher’s sole responsibility and the purchaser’s exclusive remedy for any claim arising out of the purchase of any product listed above is repair, replacement or credit as described above, where applicable. In no event: 1) shall the cost of the exclusive remedy exceed the purchase price: 2) shall Fisher be liable for any special, indirect, incidental, consequential, or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
Each article that Fisher furnishes will conform to the written specifications given in this manual, or those of a further improved model. Changes are made often to the information in the manual and will be incorporated into future editions.

13. 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 Fisher Scientific supplied power supply must be used. Use of a power supply that is not approved by Fisher Scientific 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.

14. REPLACEMENT PARTS AND ACCESSORIES

Description	Fisher Catalog Number
AB40 meter kit includes meter, self-stirring BOD probe (13-620-SSP), membrane kit (13-620-DOM), user manual and power supply.	13-636-AB40
Accumet self-stirring BOD probe	13-620-SSP
Adapter allows use of YSI™ DO probes with Accumet meter	13-637-DOADPT
Dissolved oxygen membrane kit. Includes 6 membrane caps, polishing disk and electrolyte filling solution.	13-637-DOM

To place an order, please call 1-888-358-4706.

Electrochemical Questions?

call our Technical Specialists at:

1-888-358-4706

MODEL NUMBER _____

SERIAL NUMBER _____

PURCHASE DATE _____

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