MARTEK® MARK 25
ULTRAPURE WATER
DISSOLVED OXYGEN ANALYZER

MARTEK INSTRUMENTS INC. MANUFACTURERS OF WATER QUALITY INSTRUMENTATION

... for accurate, continuous, in situ monitoring of up to four ultrapure water dissolved oxygen measurements

Instruction Manual

Rev C 5/10

WARRANTY POLICY

Unless otherwise stated, MARTEK INSTRUMENTS, INC. warrants this equipment to be free from defects in material and workmanship and to perform in accordance with applicable specifications for five years (one year for portable equipment) from date of shipment. All conductivity sensors are guaranteed for life.

MARTEK will provide free service at the factory, including parts, labor and transportation back to the customer, for any malfunction of its products which are returned transportation charges prepaid.

Customers desiring to return a product to MARTEK for repair should contact the Service Department by telephone at (800) 628-8834 or fax (919) 790-2375 or via our website at www.martekinstruments.com to obtain return authorization. The information required at this time will be the complete model number and serial number of the product and a brief description of the problem.

All shipments to MARTEK must be freight prepaid and addressed as follows:

> *MARTEK INSTRUMENTS, INC.*
> *5201 Old Poole Rd*
> *Raleigh, NC 27610*
> *Attn: Repair Department*

A complete and detailed statement of the reason for return must accompany the unit. If possible, include a copy of sample reading or a printout.

Returned units must be packed as well as they were when first shipped. If possible, use the original packing. Do not return detachable cords or manuals with the unit.

MARTEK reserves the right to void this warranty if the product has been subjected to misuse, neglect, accident, improper installation or application, and for consumable items such as batteries, membranes, or solutions.

This warranty is expressly in lieu of all other obligations or liabilities on the part of MARTEK. MARTEK neither assumes nor authorizes any other person or organization to assume on behalf of Martek any other liability in connection with the sales or use of MARTEK instrumentation.

Mark 25 Dissolved Oxygen Table of Contents

1. General Description

The Mark 25 Dissolved Oxygen Analyzer is a simple, low cost, **4 channel**, microprocessor-based monitoring system designed for ultrapure water applications. The system consists of a readout module that can be used with up to four galvanic-style dissolved oxygen sensors; each sensor being placed into a separate flow chamber.

A large 4 digit LED display indicates either **temperature**, **parts-per-million (ppm)** or **parts-per-billion (ppb) dissolved oxygen**. An 8-key membrane keypad allows the operator to quickly setup and calibrate the analyzer.

The Mark 25 measures dissolved oxygen in **four ranges**; 0-20 ppb, 0-200 ppb, 0-2 ppm, and 0-20 ppm. Automatic calibration within the Mark 25 provides a fairly reliable measurement. However, comparison to a referee system remains the most accurate method of calibration available. (Please refer to Martek's **Mark 21 Portable Dissolved Oxygen Analyzer** for further information).

Four alarm set points with relay contacts are standard in addition to four isolated analog recorder outputs (0-20 mA) *and* a serial RS232 digital output for hookup to external recording equipment. For maximum flexibility, **alarm set points and analog outputs can be assigned to any range on any parameter on any channel.**

Housed in a ¼ DIN corrosion-resistant plastic case, the readout module can be panel mounted with a minimum of tools. The analyzer accepts power inputs from 97 to 240 VAC 50/60 Hz or 24 VDC and comes with an **ON/OFF switch** located on the rear panel. Alarm and recorder wires are easily installed in **removable terminal strips**.

Sensors connect via a DB-9 connector located on the rear panel of the Mark 25 and the sensors mount easily to any flat surface. In addition, Martek offers **adapter plates** specifically designed to cover the space occupied by other brands of dissolved oxygen analyzers.

Sensors come standard with 6 feet (2 meters) of cable. However, longer cable lengths can be special-ordered from the factory up to lengths of 50 feet.
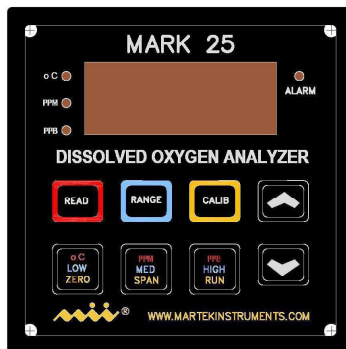
2. Specifications

Parameter	Range	Accuracy	Resolution
Dissolved Oxygen	0-20.00 ppb	$\pm$0.1 ppb	0.01 ppb
	0-200.0 ppb	$\pm$1.0 ppb	0.1 ppb
	0-2.000 ppm	$\pm$0.01 ppm	0.001 ppm
	0-20.00 ppm	$\pm$0.1 ppm	0.01 ppm
Temperature	0-50° C	$\pm$0.1^o C	00.01^o C

Power: 85-264 VAC, 47-440 Hz, .4 Amps @ 100VAC or 110-370 VDC
Available with 24 VDC power input

Recorder Output: Four isolated, scaleable 0-20 mA DC analog & RS232C serial ASCII digital output

Alarm Output: Four solid-state relays, 1 amp, 125 VAC, 110 VDC

Weight: 2 lbs (0.9 kg) including one sensor with 10 feet (3 meters)

Construction: Readout Module Case: ABS plastic, NEMA 12 (IP65)
Sensor: Type 316 Stainless Steel, Delrin, CPVC, Platinum & lead, Teflon

Cabling: 8-conductor, 24 gauge, PVC jacket, shielded, 0.25 inch (0.63 cm)

Dimensions: ¼ DIN case, 6.51 x 3.78 x 3.78 (165.5 x 96 x 96 mm) LWH

Installation: Panel mount (mounting hardware included). Recommend mounting flow chamber and sensor vertically.

Flow rate: 50-250 ml/min
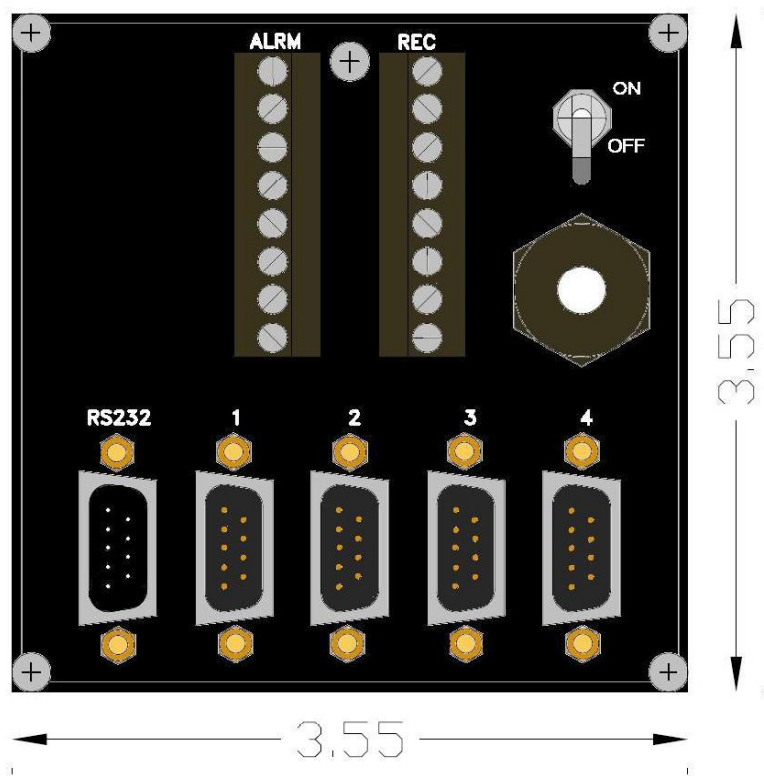
Specifications

A. Front View

Figure 2A

B. Rear View

Figure 2B

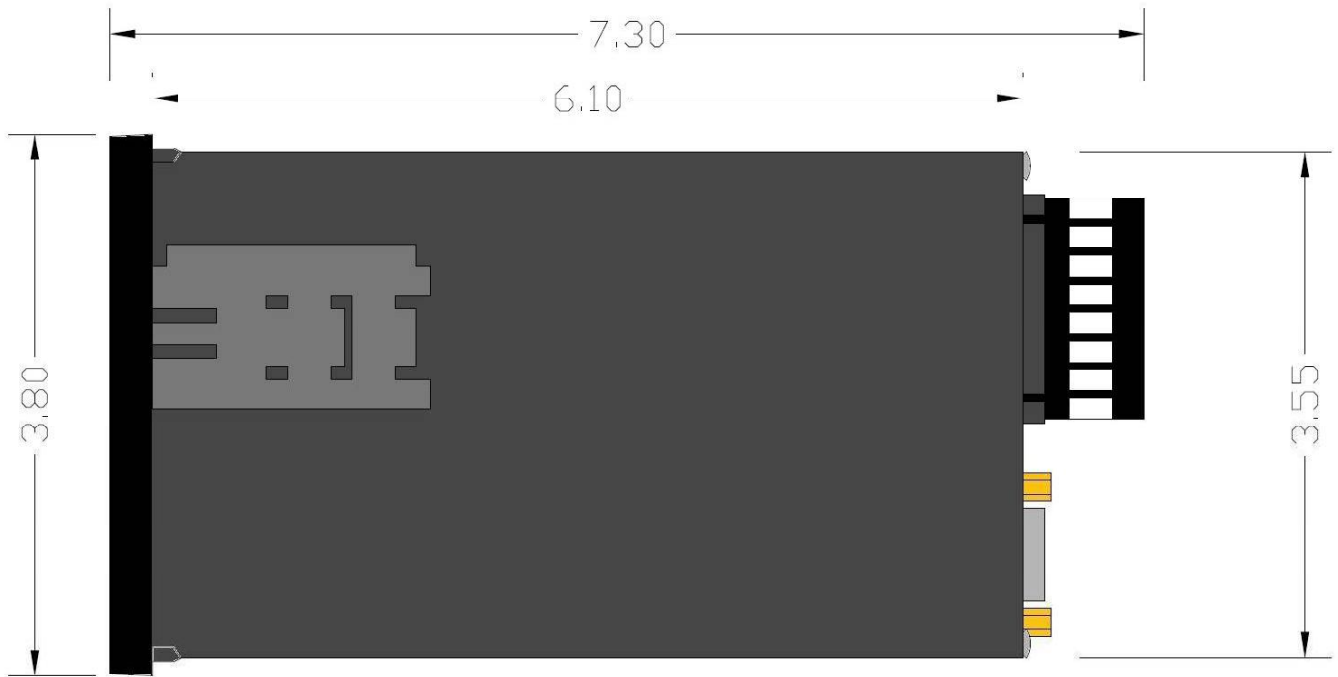## C. Right Side View

Figure 2C

D. Left Side View

Figure 2D

3. Installation

A. Unpacking And Inspection

Inspect the shipping box for damage. If there is any damage, contact the shipper immediately for instructions. Save the box. If there is no damage than unpack the box. Make sure all items listed are present. If any items are missing contact Martek Instruments at (800) 628 8834
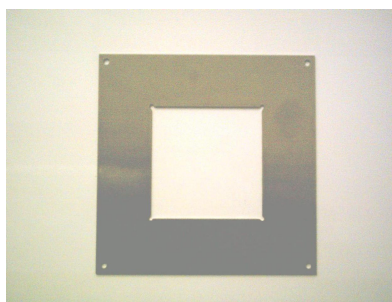

Mark 25 Analyzer

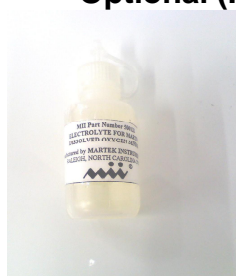

2 Terminal ships

2 Mounting Clips

Mounting Plate

CD Manual

Optional (If Purchased)

Mark 25 D.O Sensor

Electrolyte

Membrane Kit

Shortening Jumper

ABB Probe Adapter

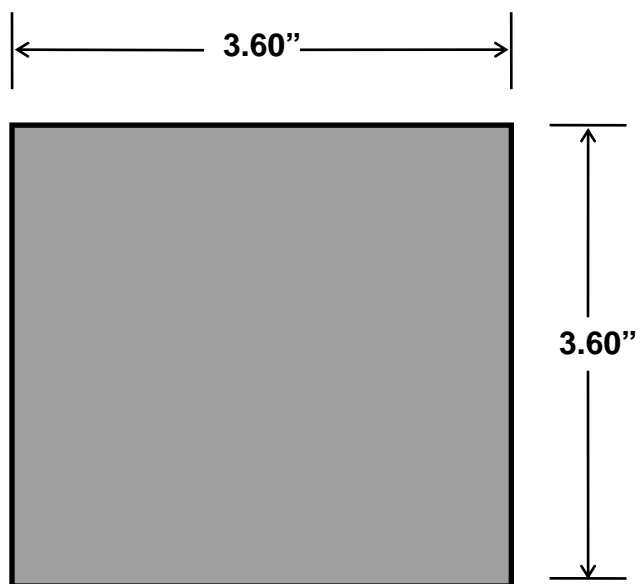ABB D.O. Sensor

Flow Chamber

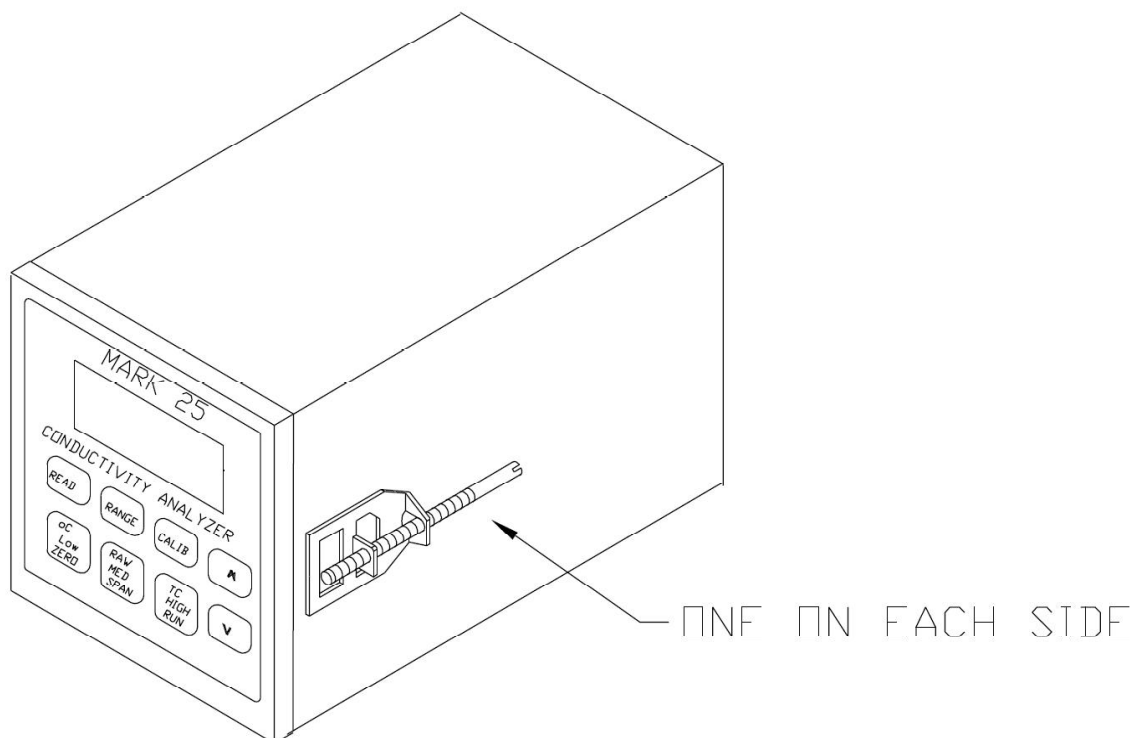## B. Panel Cutout for Monitor

Figure 3B

C. Mounting Analyzer

ONE ON EACH SIDE

Figure 3C

D. Sensor Dimensions

4.25"

Figure 3D-1

4.40"
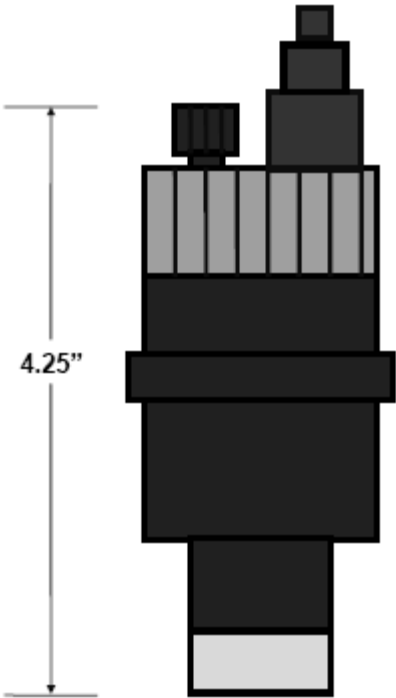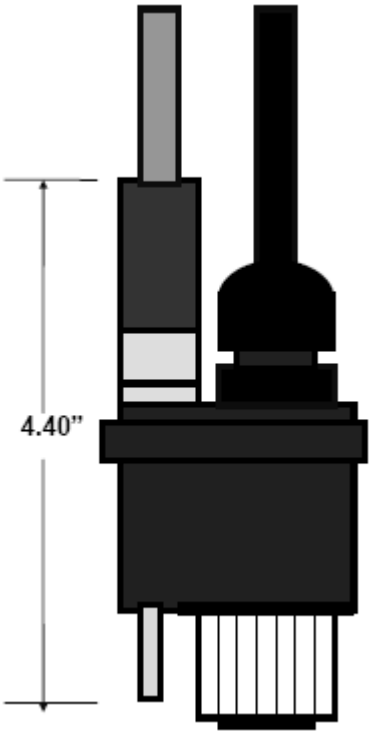
Figure 3D-2

E. Flow Chamber Dimensions

Flow Chamber Mounting Bracket

2.26"

.266" dia.

2.00"

3.10"

1.25"

Flow Chamber

2.25"

3.52"
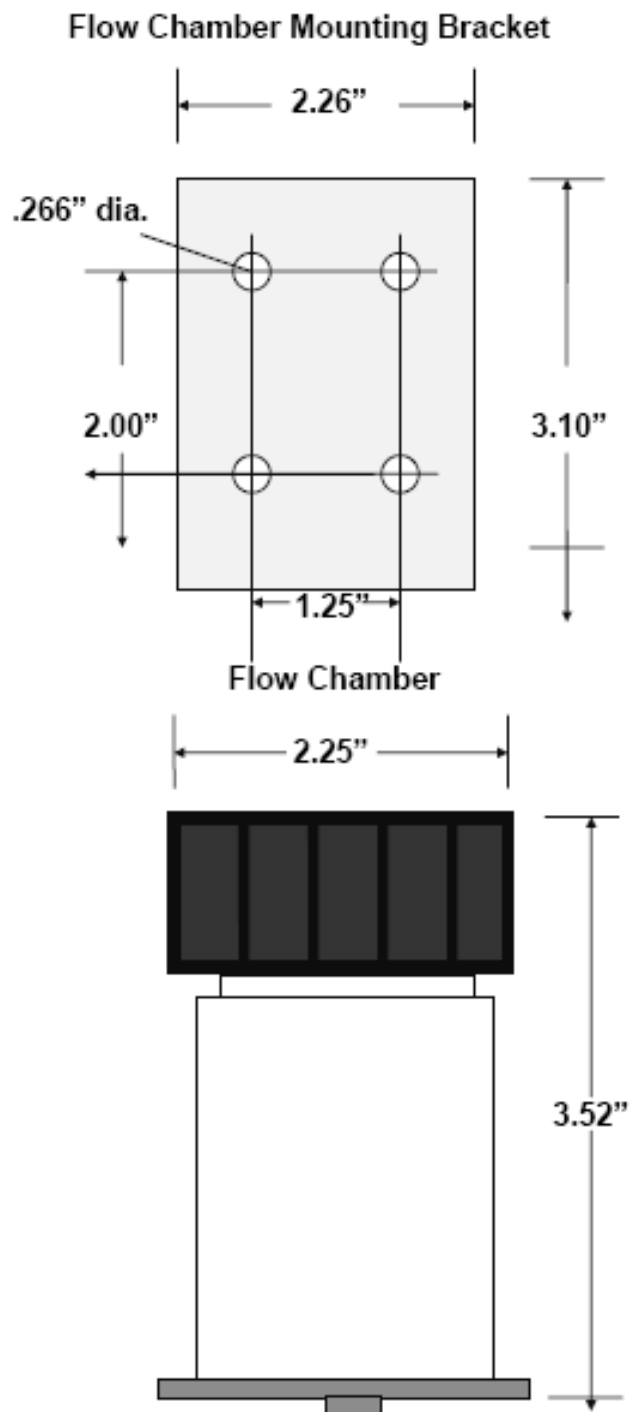
Figure 3E

F. Input and Output connections

Alarm Outputs

Recorder Outputs

On/Off Switch

RS 232 Output

Conductivity Sensor Input
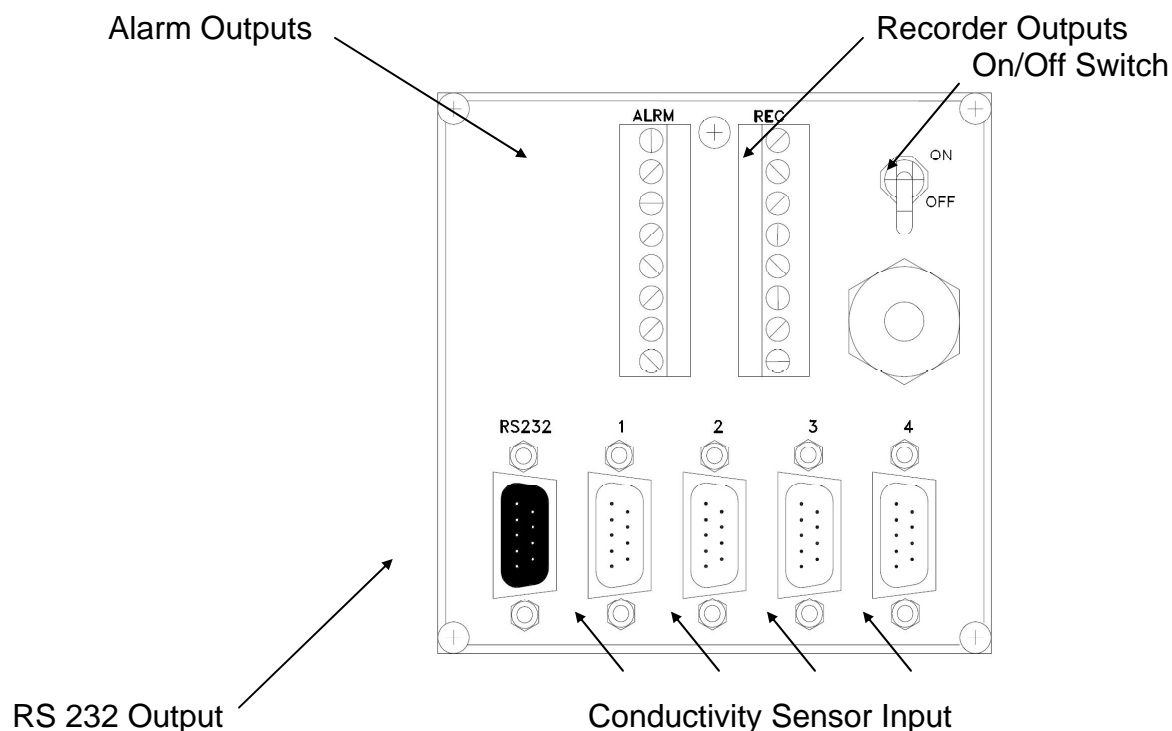
Figure 3F-1

To set up the Mark 25 for operation, simply plug the sensor connector in, then plug the AC power cord into a properly grounded outlet. If recorder, digital or alarm outputs are to be used, make certain the Mark 25 is unplugged before connecting the cable to the appropriate recorder or computer. Follow the wiring diagram below for hooking up the Mark 25 alarm and analog recorder outputs:
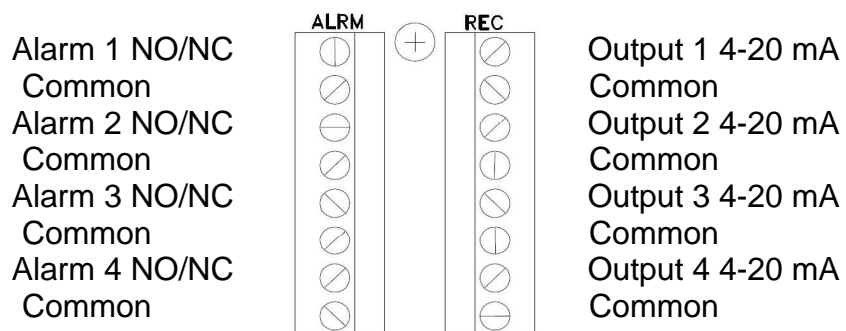
ALRM	REC	
Alarm 1 NO/NC		Output 1 4-20 mA
Common		Common
Alarm 2 NO/NC		Output 2 4-20 mA
Common		Common
Alarm 3 NO/NC		Output 3 4-20 mA
Common		Common
Alarm 4 NO/NC		Output 4 4-20 mA
Common		Common

Figure 3F-2

12

4. Operation

A. Keyboard and display

The Mark 25 front panel consists of a 4 digit red LED display, 3 parameter and channel LED's, an alarm LED, and an 8-key keypad. The display is used to present all parameter measurements, operator prompts and system errors.
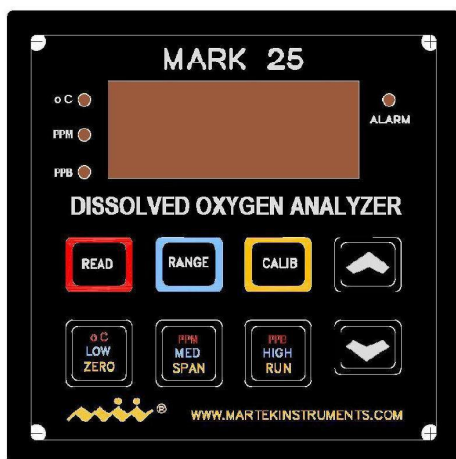
The keys are arranged in two rows, four keys in each row.

The **top row of keys** consist of three color-outlined *function keys* and are used to perform instrument operations such as selecting which parameter to view, what range the parameter is to be viewed in, parameter calibration and system set up.

The **bottom row of keys** are multi-colored, multi-legend keys and are used in conjunction with the function keys. The same colored legends correspond to the same colored function key.

The **arrow keys** are used to view channels, select functions during setup and calibration, and increment or decrement a displayed value.

READ key - When the <READ> key is pressed, the Mark 25 will display **rd**. If one of the bottom keys is selected, the parameter high-lighted in red will be displayed and its corresponding LED lit.
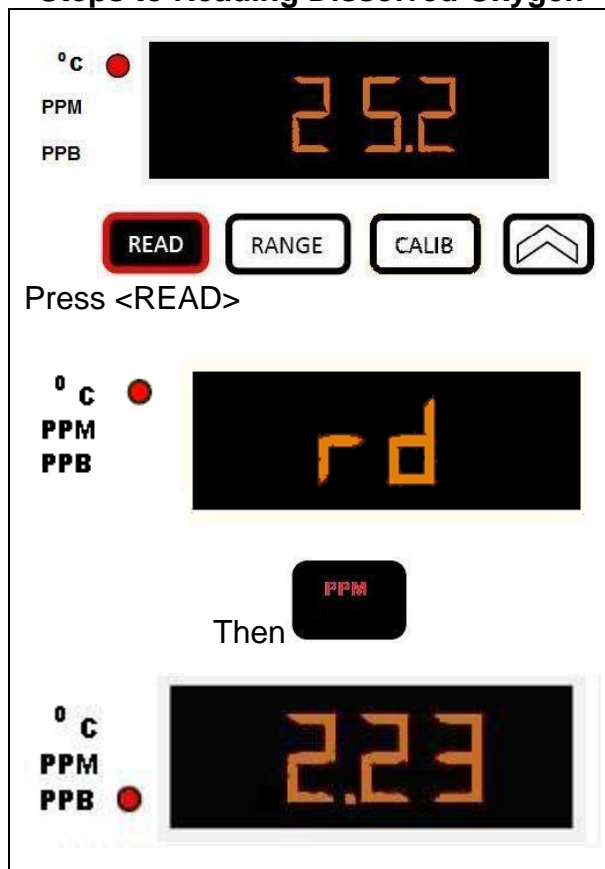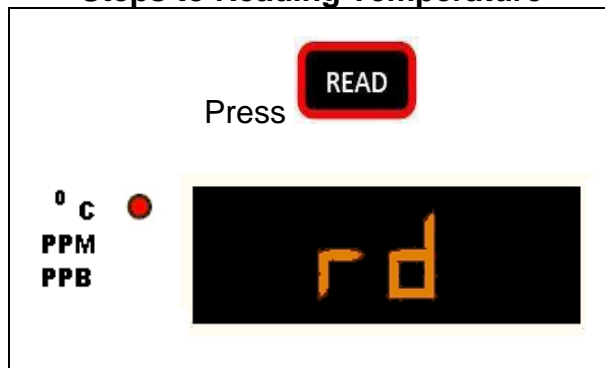
Steps to Reading Dissolved Oxygen

Press <READ>
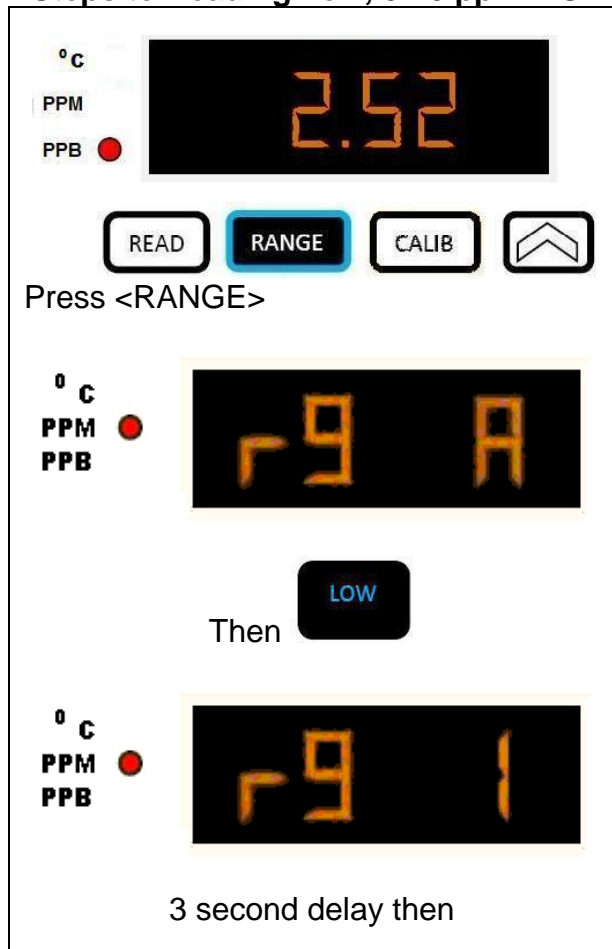
Then

Fig. 4A-1

Steps to Reading Temperature

Press

13

Then °C

Fig. 4A-2

RANGE key - Range changes can be made manually for dissolved oxygen readings only. To change the range, press the <RANGE> key, then select either LOW, MED, or HIGH to display the desired range. If the Mark 25 is setup for auto-ranging, the Mark 25 will display **rg A** as long as the <RANGE> key is pressed.

Steps to Reading Low, 0-20 ppB D.O.

Press <RANGE>

Then LOW

3 second delay then

Fig. 4A-3

Or

Steps to Reading Med, 0-200ppB D.O.

Press RANGE

Then MED

3 second delay then
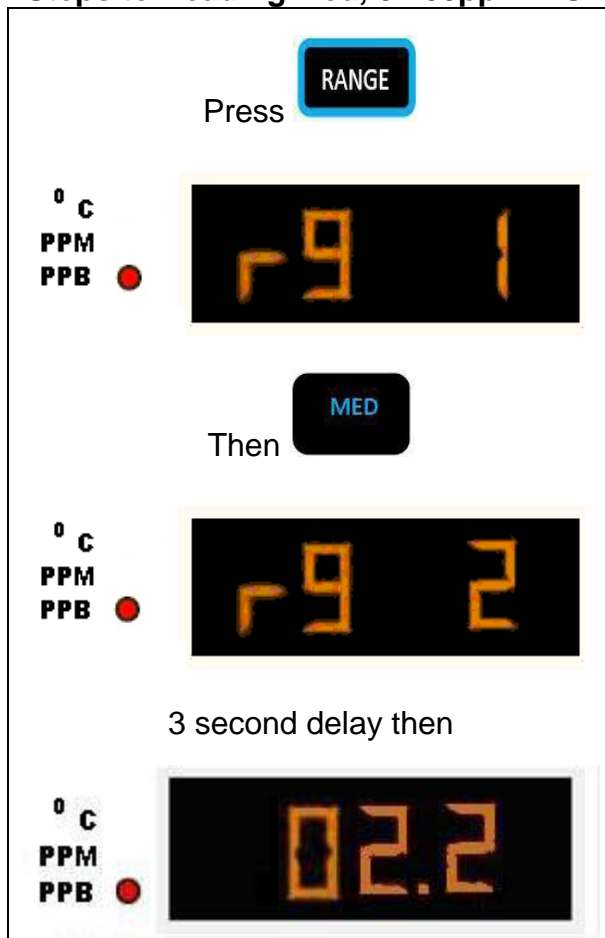
Fig. 4A-4

Or

Steps to Reading Hi, 0-2 ppM D.O.

Press RANGE

14

Then **HIGH**

°C
PPM
PPB ●
r9 3

3 second delay then

°C
PPM ●
PPB
.2.23
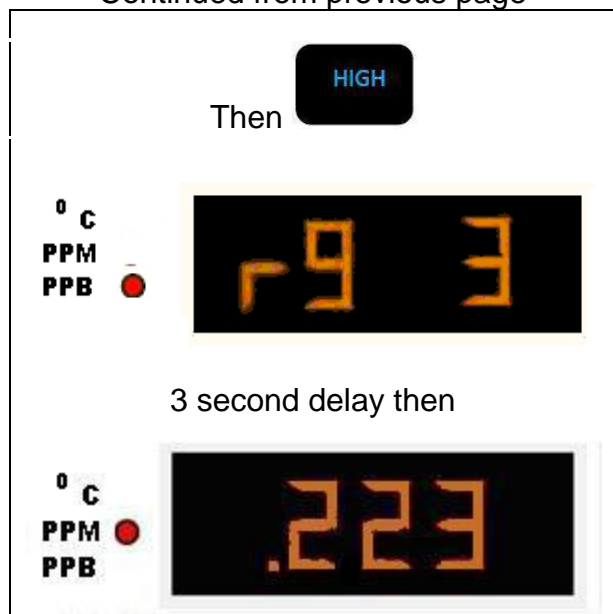
Fig. 4A-5

Or

Steps to Reading Hi, 0-20 ppM D.O.

Press **RANGE**

°C
PPM ●
PPB
r9 3

Then ⌄

°C
PPM ●
PPB
r9 4

3 second delay then

°C
PPM ●
PPB
0.22
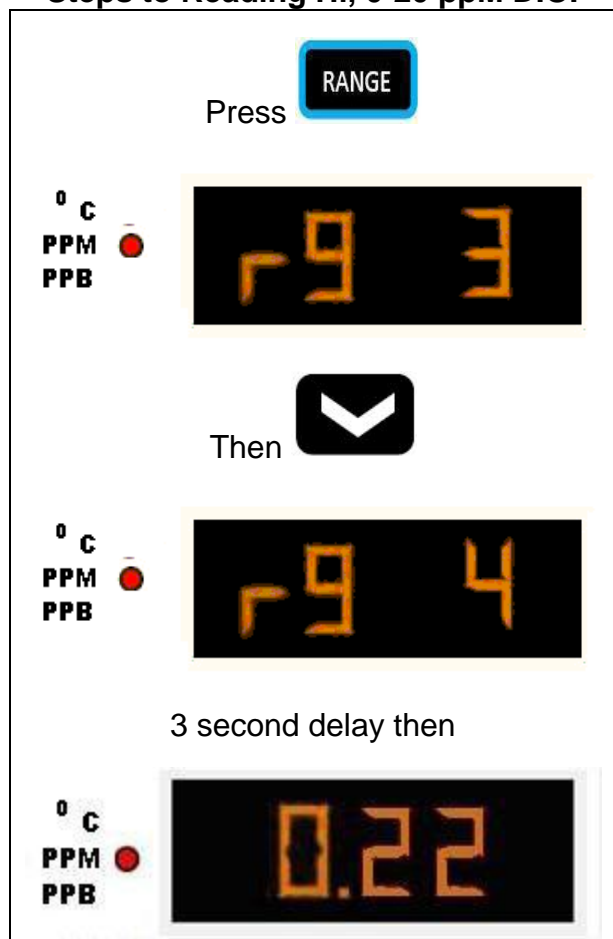
Fig. 4A-6

Or

Steps to Reading Auto Ranged D.O.

Press **RANGE**

°C
PPM ●
PPB
r9 4

Then ⌃

°C
PPM ●
PPB
r9 A

3 second delay then

°C
PPM
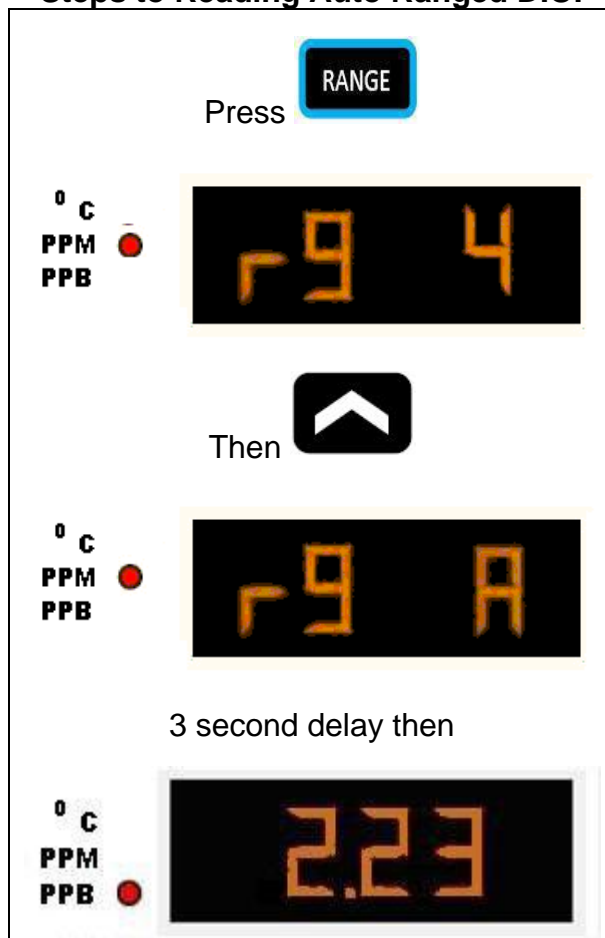PPB ●
2.23

Fig. 4A-7

NOTE: *Manually changing the range for dissolved oxygen changes the analog recorder output scaling. See Section **F. Recorder Outputs** for more details.*

Viewing a different channel is easily done by pressing the <UP> or <DOWN> arrow key. The parameter LED's to the left of the Mark 25 display also indicate which channel is being viewed. Channel ID's are as follows:
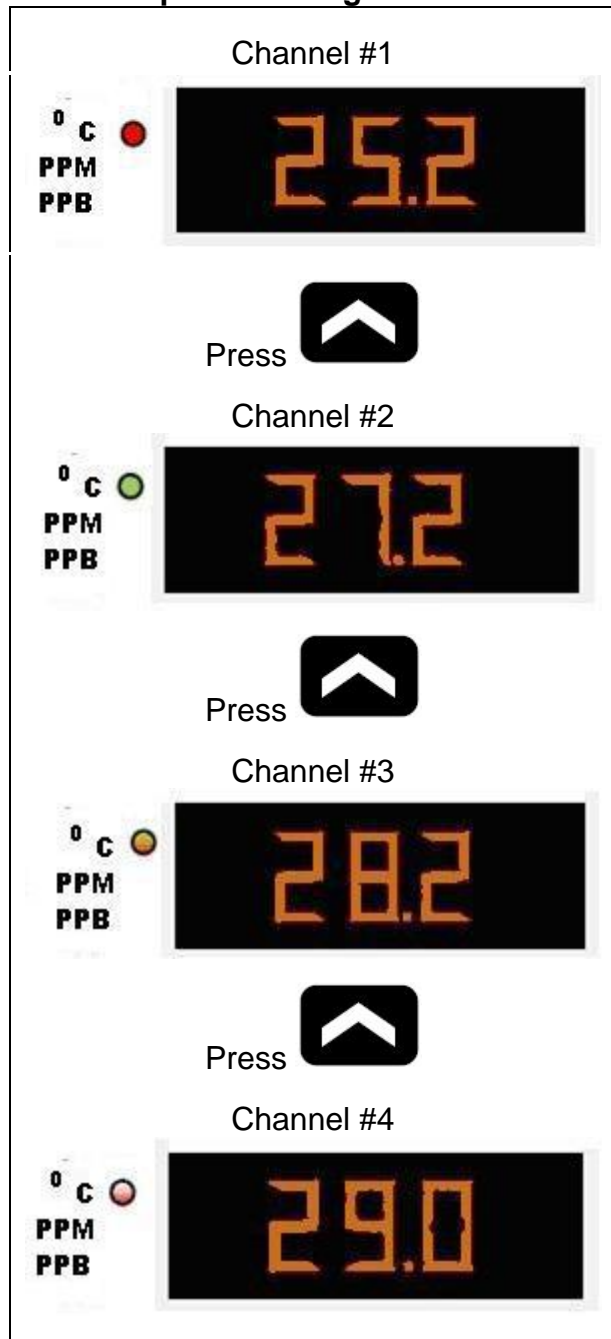
15

Steps to viewing Channels

Channel #1

Press

Channel #2

Press

Channel #3

Press

Channel #4

Fig. 4A-8

Red LED - Channel 1
Green LED - Channel 2
Red/Green LED - Channel 3
Flashing Red LED - Channel 4

B. The CALIB key

All setup and calibration functions are conducted via the <CALIB> key. The <CALIB> allows you to set the following:

- Calibrate temperature and dissolved oxygen

- Assign and set alarm points

- Assign and set recorder outputs

- Set a password

- Set up an analyzer ID, serial output, and auto-ranging functions

Once the sensors have been connected to the Mark 25, the power cord can be plugged into any outlet supplying 97-240 V AC 50/60 Hz power. When the Mark 25 is switched on, it will immediately start monitoring temperature.
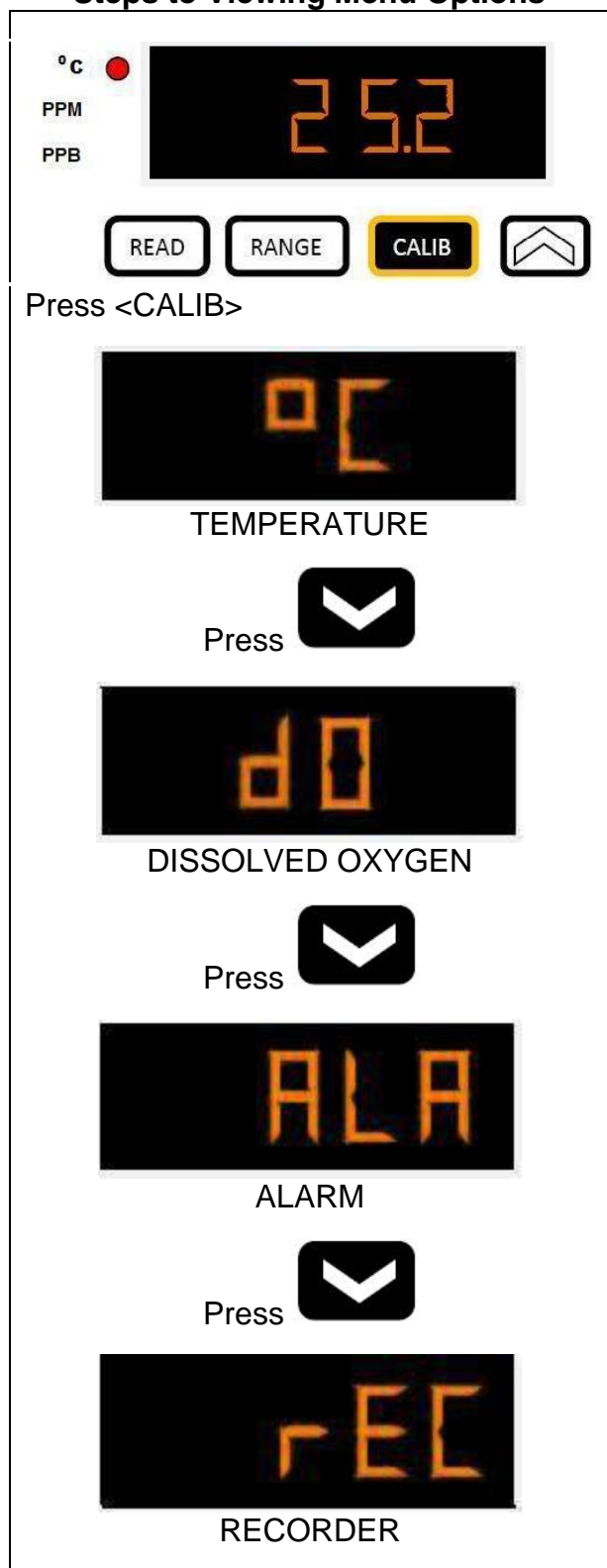
Pressing the <CALIB> key will cause the Mark 25 to display a flashing **°C**.

If you continue pressing the <DOWN ARROW> key the display will flash the following prompts: **dO, ALA, rEC, PAS, uSr, tLA**. After **tLA**, the Mark 25 returns to monitoring temperature.

Here are two **basic rules** to remember when using the <CALIB> key:

1. Pressing the <UP ARROW> key will select any flashing prompt.
2. Pressing the <RUN> key will return the Mark 25 to the monitoring mode.

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Steps to Viewing Menu Options

°C
PPM
PPB

25.2

[READ] [RANGE] [CALIB] [⌄⌄]

Press <CALIB>

°C

TEMPERATURE

Press ⌄

d0

DISSOLVED OXYGEN

Press ⌄

ALA

ALARM

Press ⌄

rEC

RECORDER

Press ⌄

PAS

PASSWORD

Press ⌄

uSr

USER

Press ⌄

tLA

TEMPERATURE DEVICE
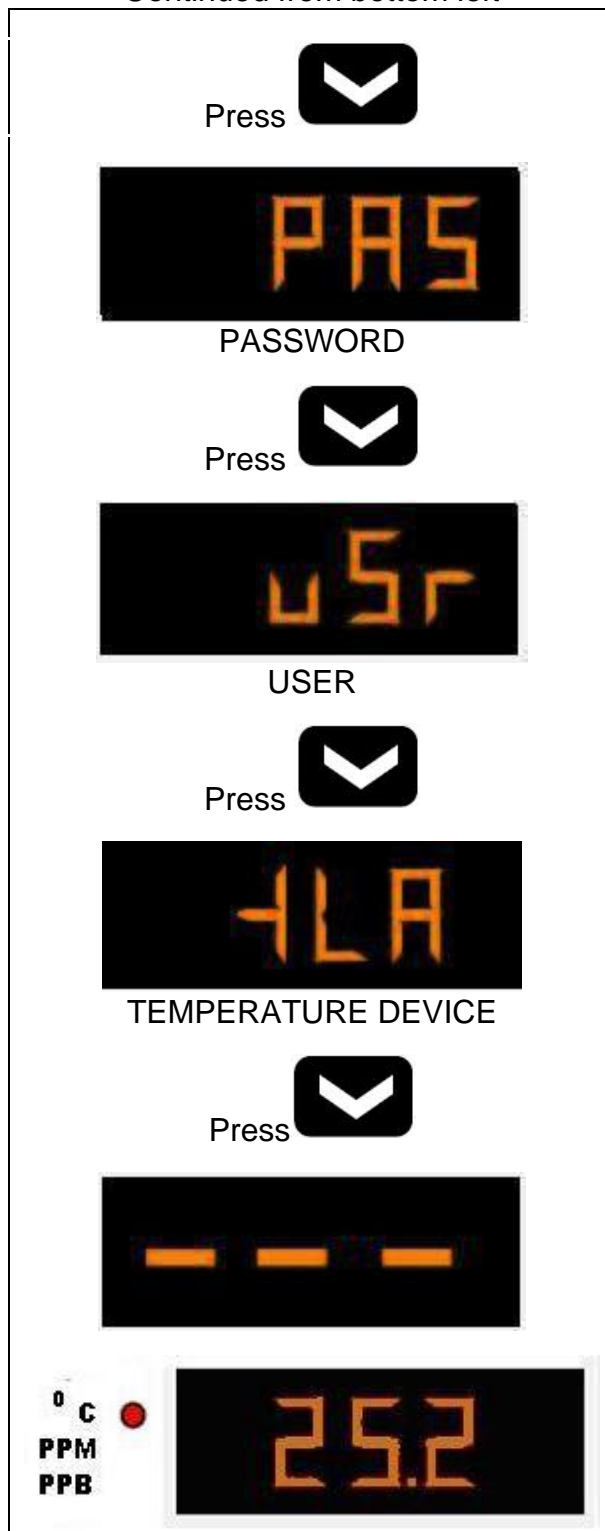
Press ⌄

— — —

°C
PPM
PPB

25.2

Fig. 4B-1

C. Calibrating Temperature

The Mark 25 can be calibrated automatically or manually for temperature.

NOTE: *Automatic, electronic calibration is a less accurate method of calibration. For best results, the Mark 25 should be calibrated to ASTM or NIST- traceable standards or a referee system such as the **Martek Mark 21 Dissolved Oxygen.***

To calibrate temperature, press the <CALIB> key. The display will flash **°C**. Press the <UP ARROW> key. The flashing will stop. Next, press the <ZERO> key. The Mark 25 will display **Aut** which is short for Automatic.

To automatically zero calibrate temperature, press the <UP ARROW> key. Calibration bars will briefly appear then the Mark 25 will return to the monitoring mode.

Steps to Auto Zero Temperature Calibration

Press <CALIB>

Then

-Continued on top right of this page-
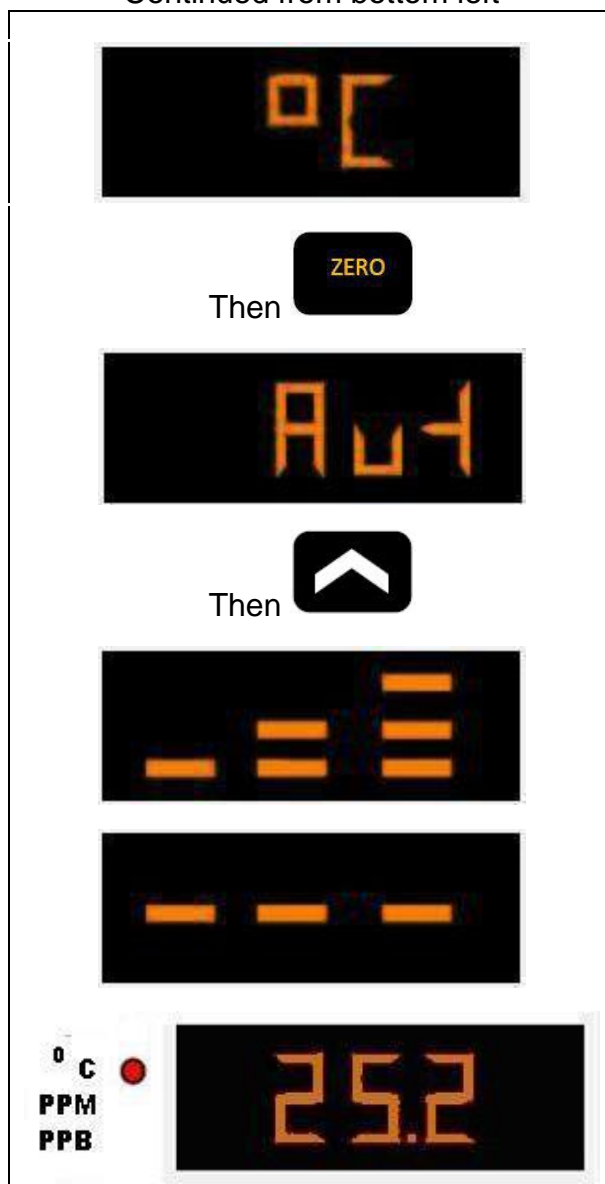

Fig. 4C-1

To manually zero calibrate temperature, simply press the <DOWN ARROW> key when **Aut** is displayed. The Mark 25 will momentarily display three lines then a number indicating the input voltage will appear in the display. Once this number has stabilized, press the <CALIB> key and select the appropriate zero value using the up or down arrow keys (the display defaults to 0 deg. C). When complete, press the <CALIB> key to enter the data into the Mark 25's memory.

18

Steps to Manual Zero Temperature Calibration

Aut

Then

— — —

.034

Then **CALIB**

00.0

Scroll up or down to desired value

Then **CALIB**

— — —

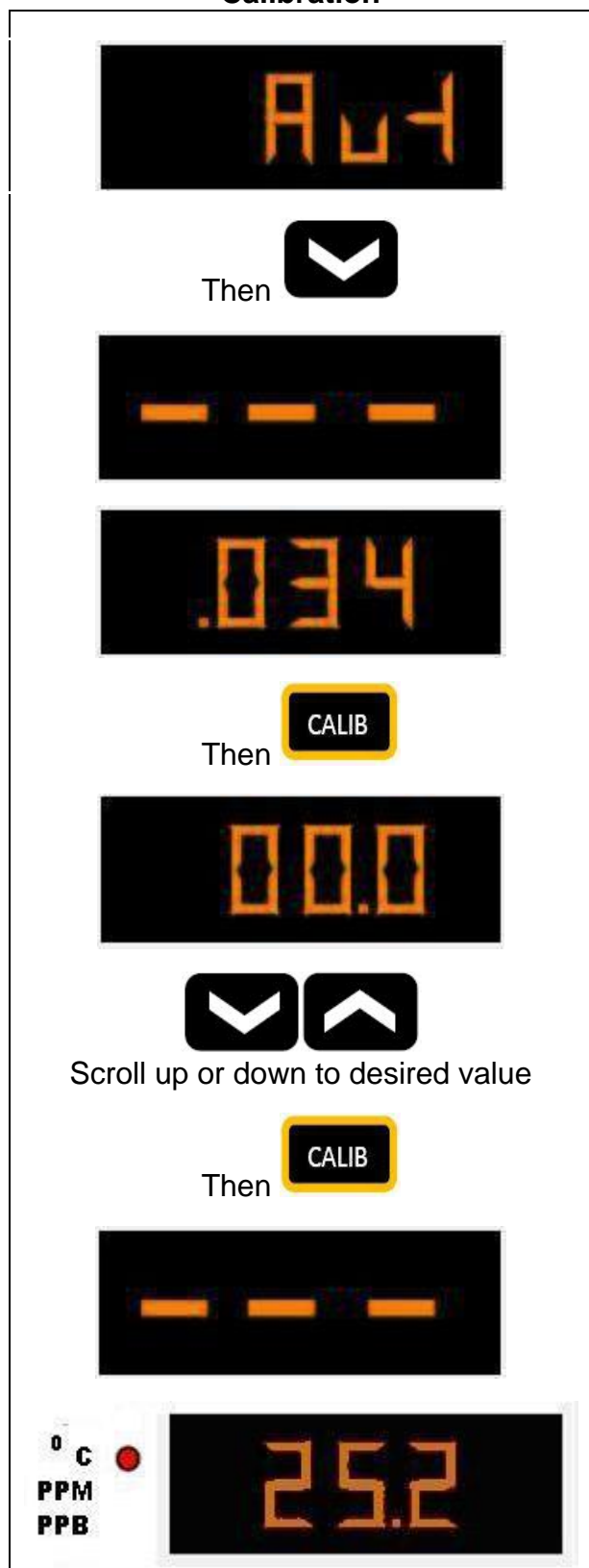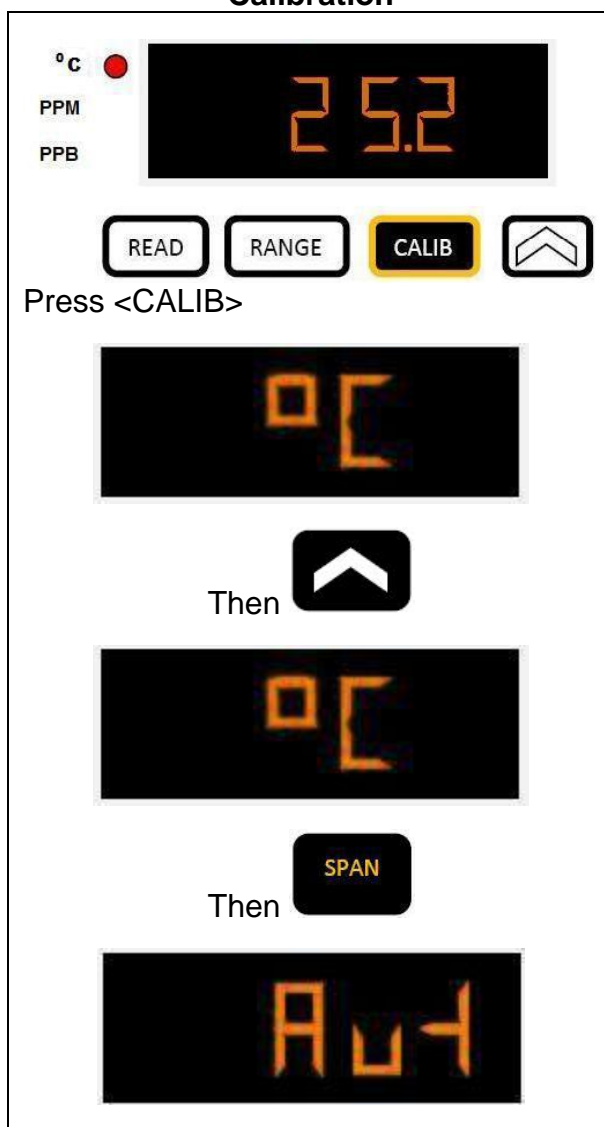°C PPM PPB **25.2**

Fig. 4C-2

To span temperature, press the <CALIB> key, then the <UP ARROW> key when the temperature prompt is displayed. Next, select the <SPAN> key. The Mark 25 will display **Aut** which is short for Automatic.

To automatically span calibrate temperature, press the <UP ARROW> key. After the calibration bars appear, the Mark 25 will briefly display a span temperature of **50.0** before returning to monitor mode.

Steps to Auto Span Temperature Calibration

°C PPM PPB **25.2**

READ RANGE **CALIB**

Press <CALIB>

°C

Then

°C

Then **SPAN**

Aut

19

Steps to Manual Span Temp Calib.

Then ▲
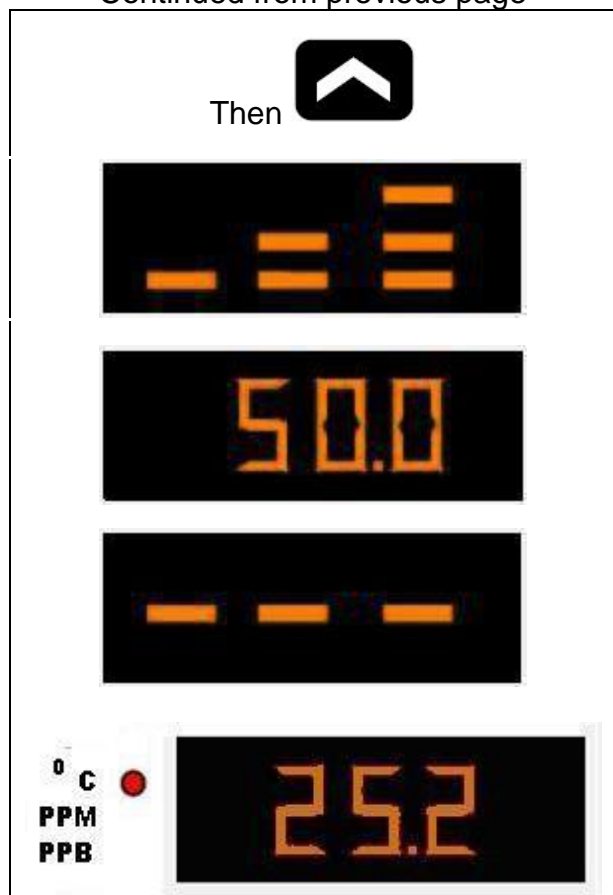
50.0

— — —

°C ●
PPM
PPB
25.2

Fig. 4C-3

The Mark 25 has now been calibrated for temperature.

To manually span calibrate temperature, simply press the <DOWN ARROW> key when **Aut** is displayed. The Mark 25 will momentarily display three lines, then a number indicating the input voltage will appear in the display. Once this number has stabilized, press the <CALIB> key and select the appropriate span value using the up or down arrow keys (the display defaults to 50 deg. C). When complete, press the <CALIB> key to enter the data into the Mark 25's memory.

Aut

Then ▼

— — —

.587

Then CALIB

25.0

▼ ▲

Scroll up or down to desired value
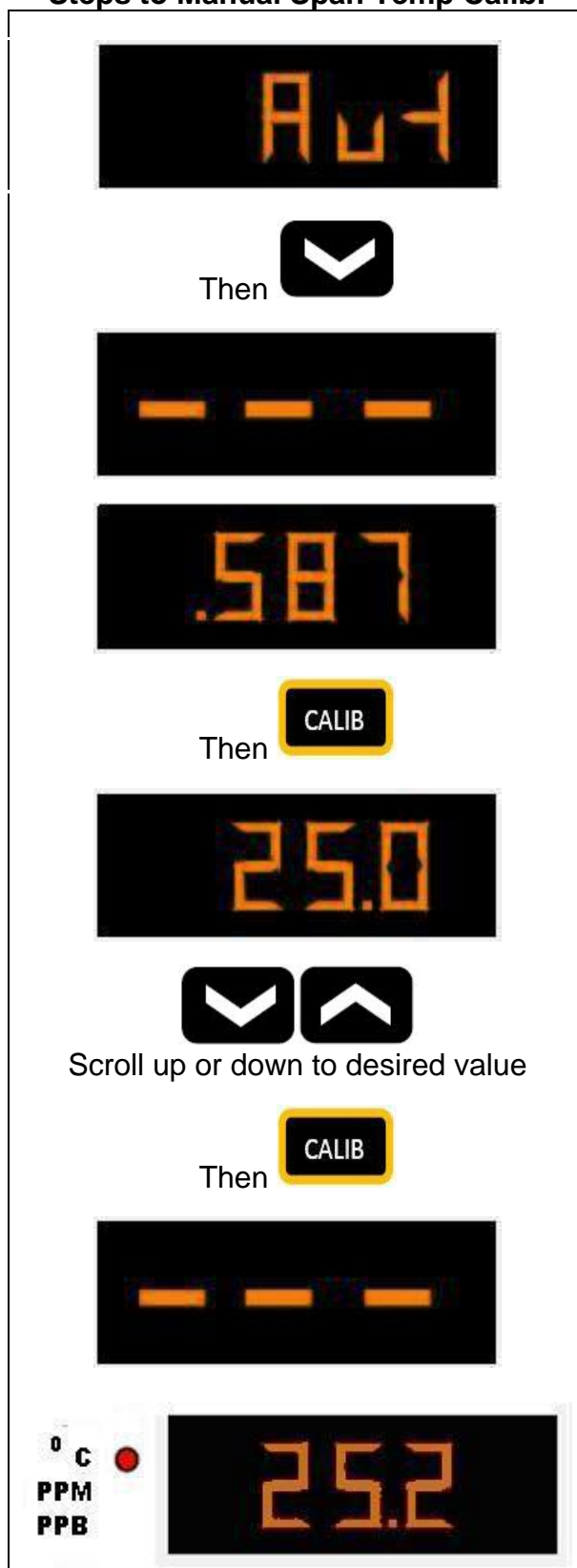
Then CALIB

— — —

°C ●
PPM
PPB
25.2

Fig. 4C-4

D. Calibrating Dissolved Oxygen

Calibrating dissolved oxygen follows the same procedure as the temperature calibration. However, if the Mark 25 is not set up for auto-ranging prior to calibration, the desired range must be selected (for information on auto-ranging, see section **K. Auto-ranging**).

To calibrate dissolved oxygen, press the <CALIB> key. The display will flash **°C**. Press the <DOWN ARROW> key until **dO** is flashing, press the <UP ARROW> key. The flashing will stop. Next, press the <ZERO> key. The Mark 25 will display **Aut** which is short for Automatic.

To automatically zero calibrate dissolved oxygen press the <UP ARROW> key. Calibration bars will briefly appear then the Mark 25 will return to the monitoring mode..

Steps to Auto Zero D.O. Calibration
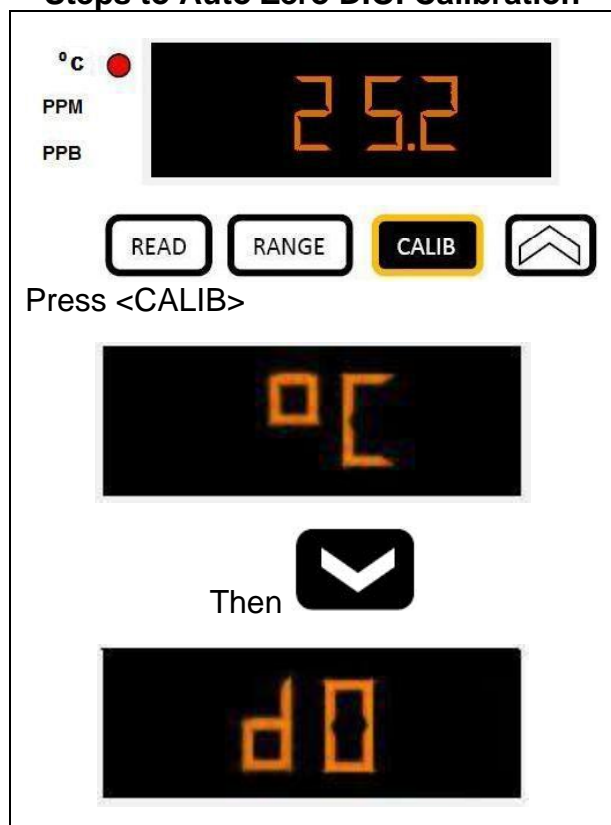
Press <CALIB>

Then

Then

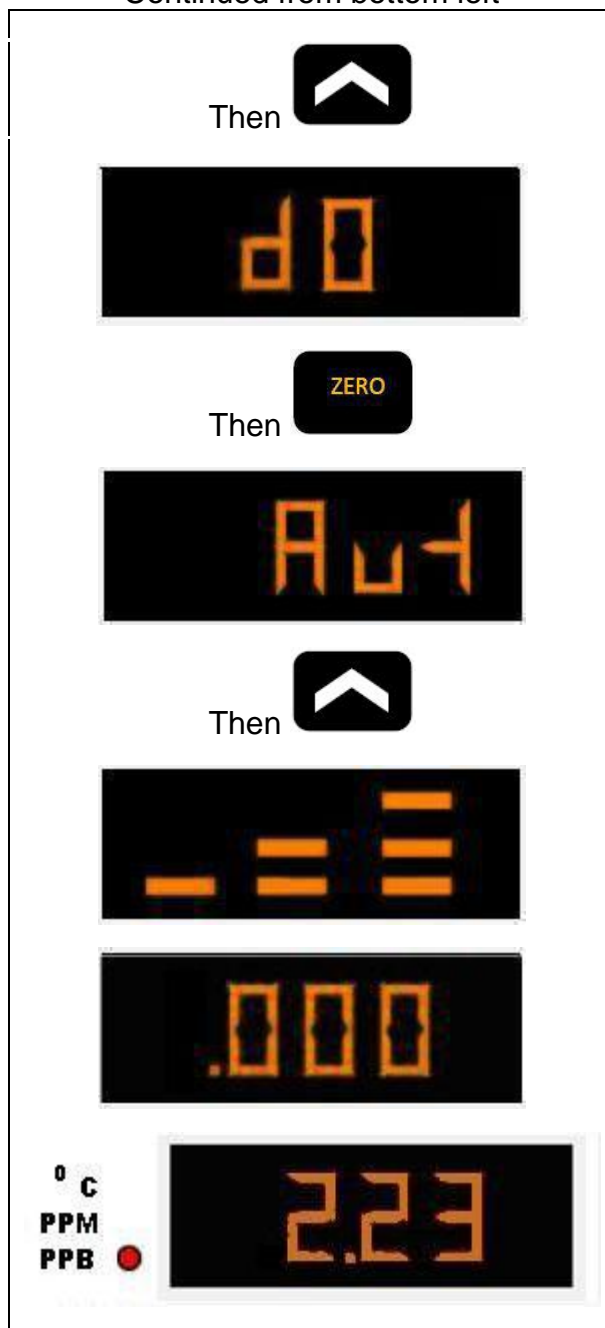Then

Then

Fig. 4D-1

To manually zero calibrate dissolved oxygen simply press the <DOWN ARROW> key when **Aut** is displayed. The Mark 25 will momentarily display three lines, then a number indicating the input voltage will appear in the display. Once this number has stabilized, press the <CALIB> key and select the appropriate zero value using the up or down arrow keys When complete, press the <CALIB> key to enter the data into the Mark 25's memory.

Steps to Manual Zero D.O. Calibration

Then

Then

Scroll up or down to desired value

Then
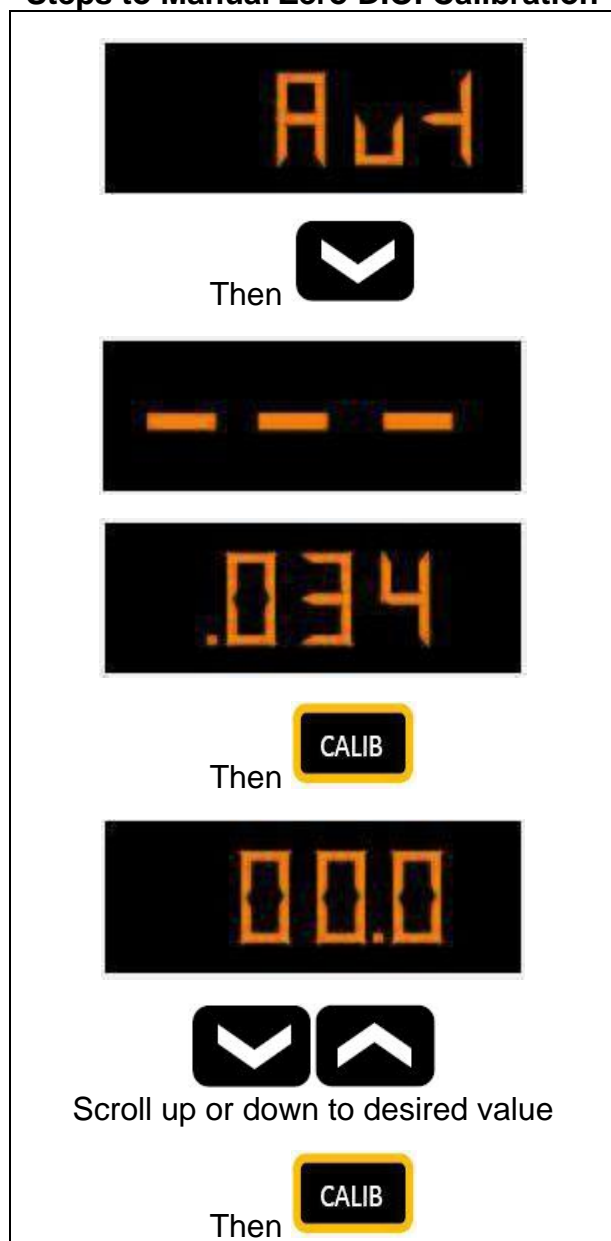
Fig. 4D-2

To span calibrate dissolved oxygen, press the <CALIB> key. The display will flash **°C**. Press the <DOWN ARROW> key until **dO** is flashing**,** press the <UP ARROW> key. The flashing will stop. Next press the <SPAN> key. The Mark 25 will display **Aut** which is short for Automatic.

To automatically span calibrate dissolved oxygen, press the <UP ARROW> key. After the calibration bars appear, the Mark 25 will briefly display a span value of 8.24 before returning to monitor mode.

Steps to Auto Span Dissolved Oxygen

Press <CALIB>
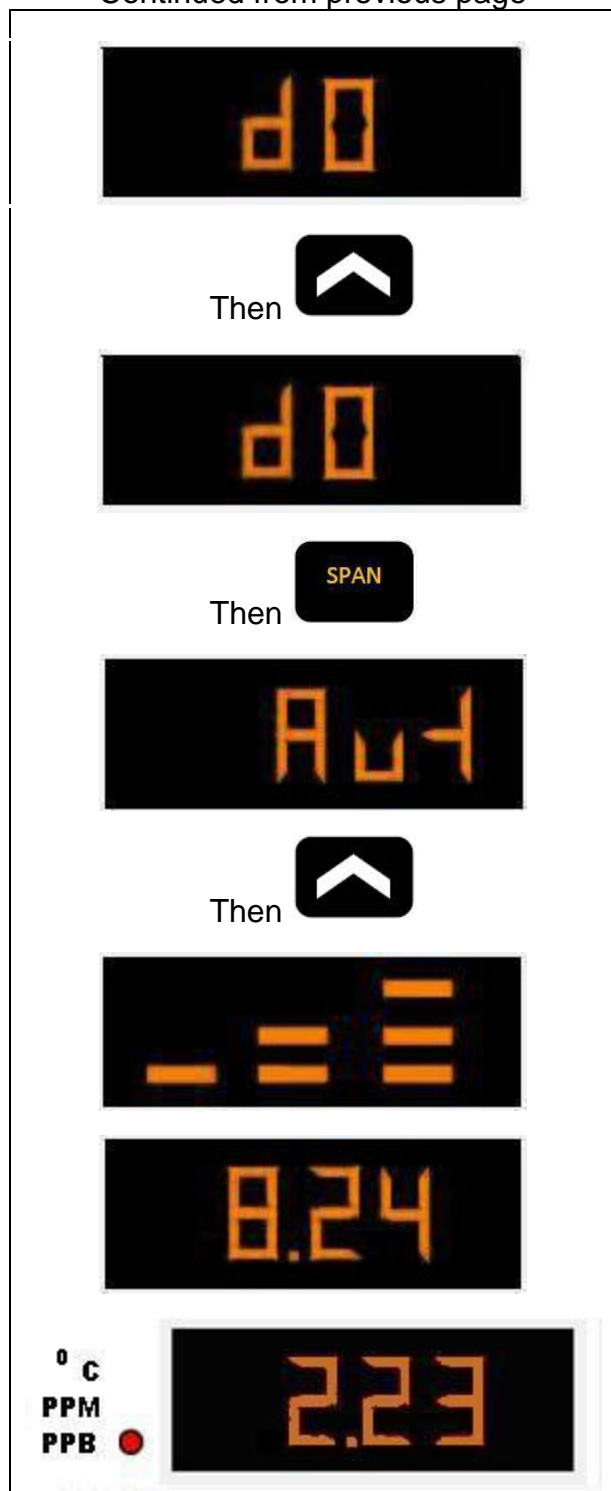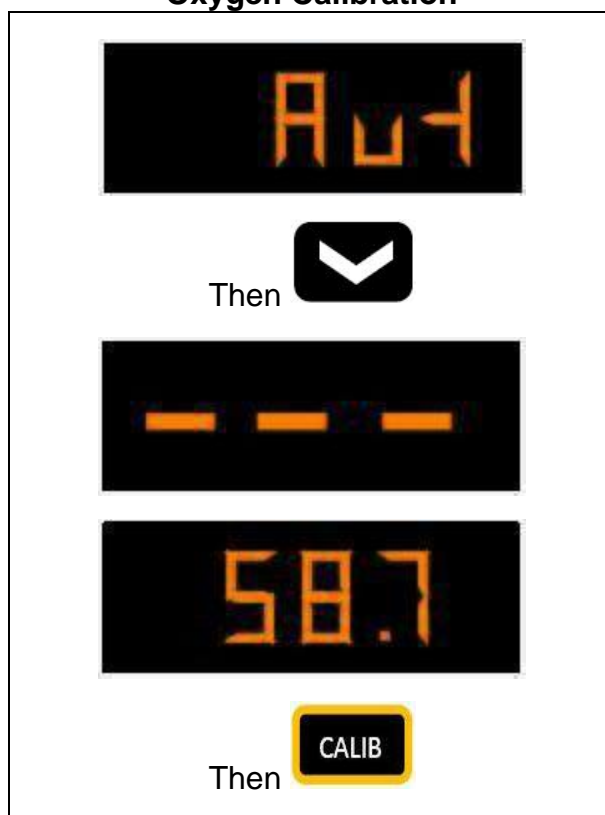

Then

Then

Then **SPAN**

Then

Fig. 4D-3

The Mark 25 has now been calibrated for dissolved oxygen.

To manually span calibrate dissolved oxygen the dissolved oxygen probe must be exposed to air (**Refer to DO Sensor manual for how to build and operate your purchased DO Sensor before exposing to air**). Press the <DOWN ARROW> key when **Aut** is displayed. The Mark 25 will momentarily display three lines, then a number indicating the input voltage will appear in the display. Once this number has stabilized, press the <CALIB> key and select the appropriate span value using the up or down arrow keys. When complete, press the <CALIB> key to enter the data into the Mark 25's memory.

Steps to Manual Span Dissolved Oxygen Calibration

Then

Then **CALIB**

23

Steps to Setting Alarms

8.24

Scroll up or down to desired value

Then **CALIB**

— — —

8.24

Fig. 4D-4

°C

PPM

PPB

25.2

Press <CALIB>

°C

Then
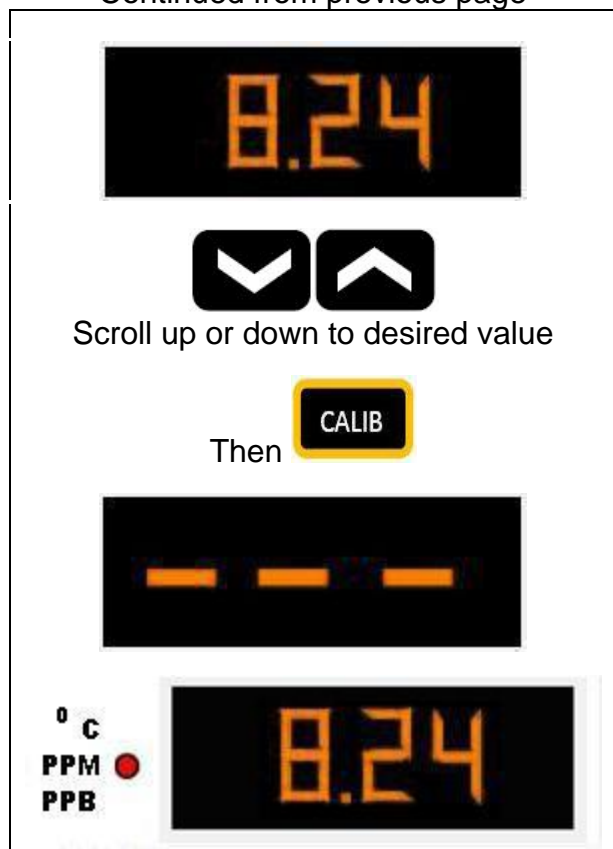
d0

Then

ALA

Then

AL 1

Then

AL 2

E. Setting Alarms

The Mark 25 has four alarm set points that can be assigned to any parameter on any channel.

To set alarms, press the <CALIB> key. The display will flash **°C**, press the <DOWN ARROW> key until **ALA** is flashing. Next, press the <UP ARROW> key. The display will prompt with **AL   1** and all parameter LED's will be lit. The <UP ARROW> key can be used to change the alarm set point to 2, 3, or 4.
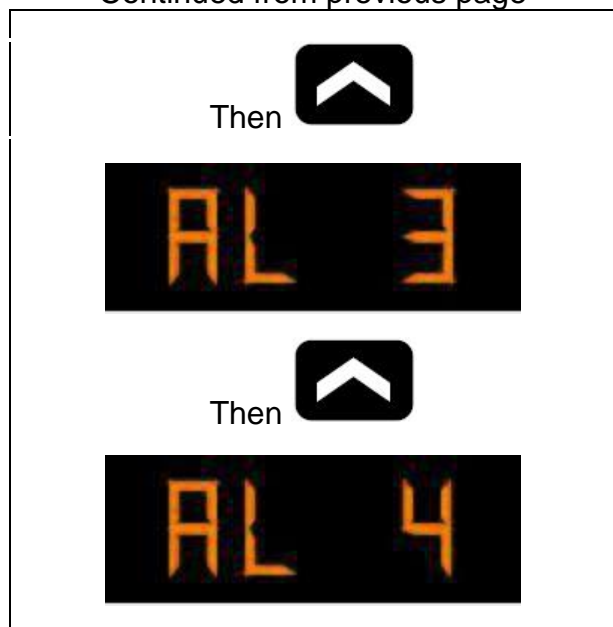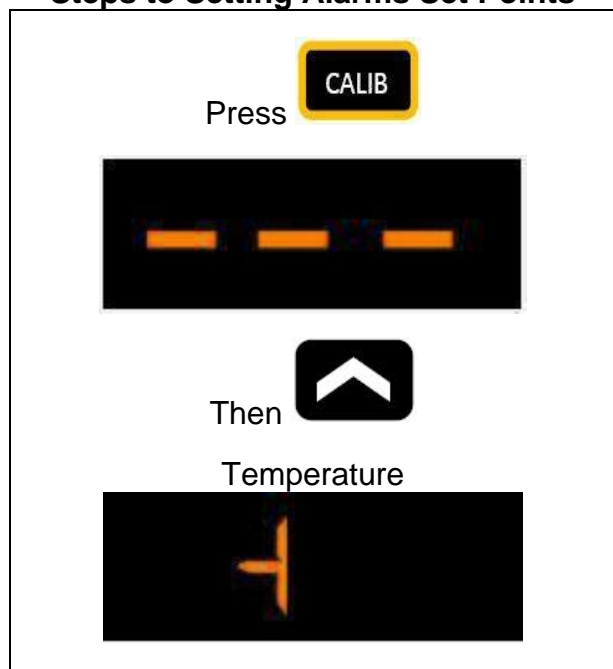
24

Then

AL 3

Then

AL 4
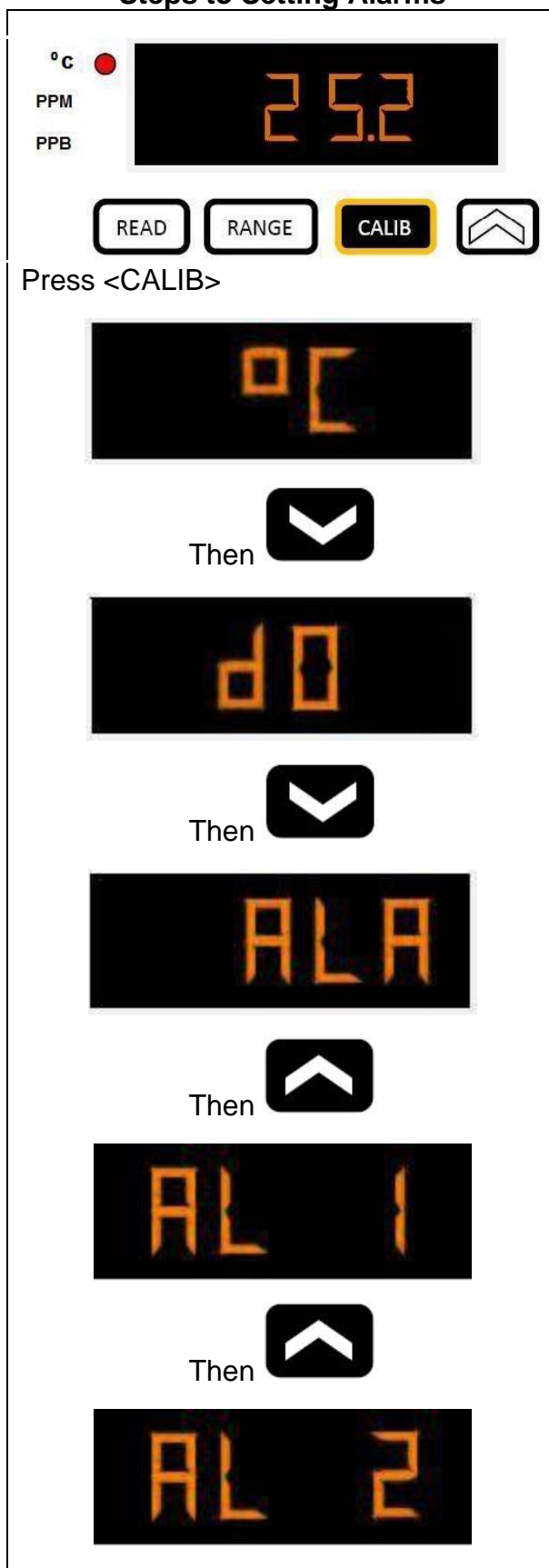
Fig. 4E-1

To assign a particular alarm set point, press the <CALIB> key on the desired Alarm output (AL1, 2, 3 and 4). The Mark 25 will display three bars. The bars indicate no alarm set point. Use the <UP> or <DOWN ARROW> keys to select temperature (**t)**, dissolved oxygen (**do**).

Steps to Setting Alarms Set Points

Press **CALIB**

Then

Temperature

Then

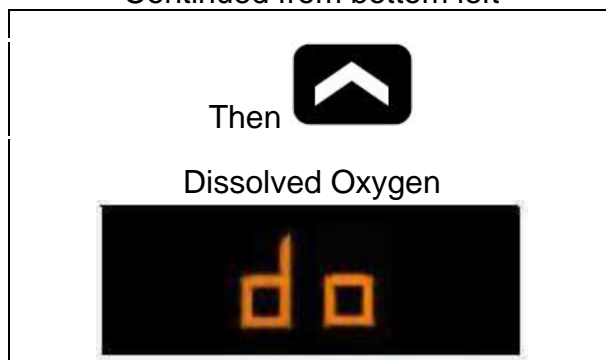Dissolved Oxygen

do

Fig. 4E-2

Press the <CALIB> key to select the desired parameter. The Mark 25 will then display **Lo**. To select a low set point, press the <CALIB> key. If a high alarm set point is desired, use the <UP> or <DOWN ARROW> key to change the display to **hi** then press the <CALIB> key to select.

The Mark 25 will display **.000** though the decimal point may vary depending on the range.

Use the <UP> or <DOWN ARROW> key to change the value to the desired alarm set point. When the desired set point is reached, press the <CALIB> key to set and activate alarm.

NOTE: *For convenience, pressing the <RANGE> key will advance the digit left of the decimal point.*

Setting Low or High Alarms

Press **CALIB**

Lo

Scroll up or down to desired value

25
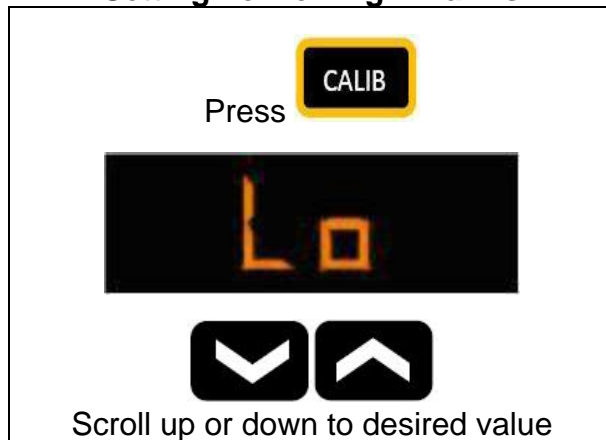
Fig. 4E-3

Setting Low Alarm For Temperature

Press [CALIB]

Scroll up or down to desired value

Press [CALIB]

Fig. 4E-4

Setting Hi Alarm For Temperature

Press [CALIB]

Scroll up or down to desired value

Press [CALIB]

Fig. 4E-5

Setting up Low Alarm for Dissolved Oxygen

Press [CALIB]

0-20 ppB

Or

Press [RANGE]

0-200 ppB

Or

Press [RANGE]

0-2 ppM

Or

26

Press [RANGE]

0-20 ppM

⁰ C
PPM ●
PPB

[display: 0.00]

[down arrow] [up arrow]

Scroll up or down to desired value

Press [CALIB]
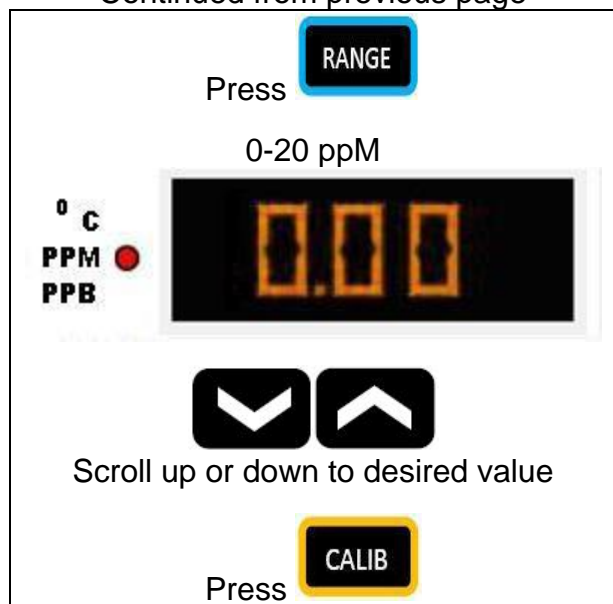
Fig. 4E-6

Setting up Hi Alarm for Dissolved Oxygen

[display: h ı]

Press [CALIB]

0-20 ppB

⁰ C
PPM
PPB ●

[display: 0.00]

Or

Press [RANGE]

0-200 ppB

⁰ C
PPM
PPB ●

[display: 00.0]

Or

Press [RANGE]

0-2 ppM

⁰ C
PPM ●
PPB

[display: .000]

Or

Press [RANGE]

0-20 ppM

⁰ C
PPM ●
PPB

[display: 0.00]

[down arrow] [up arrow]

Scroll up or down to desired value

Press [CALIB]

Fig. 4E-7

27
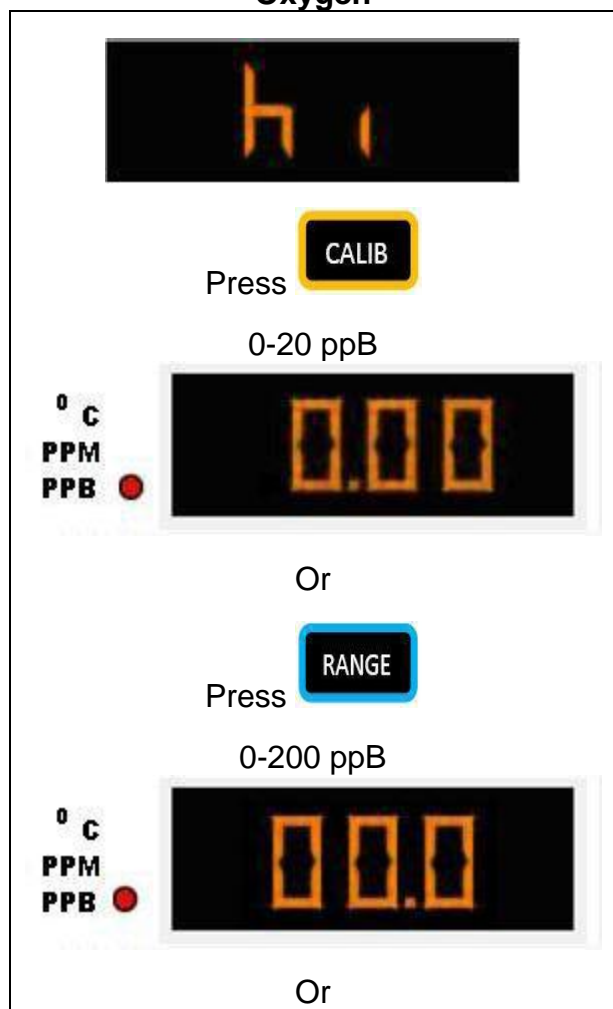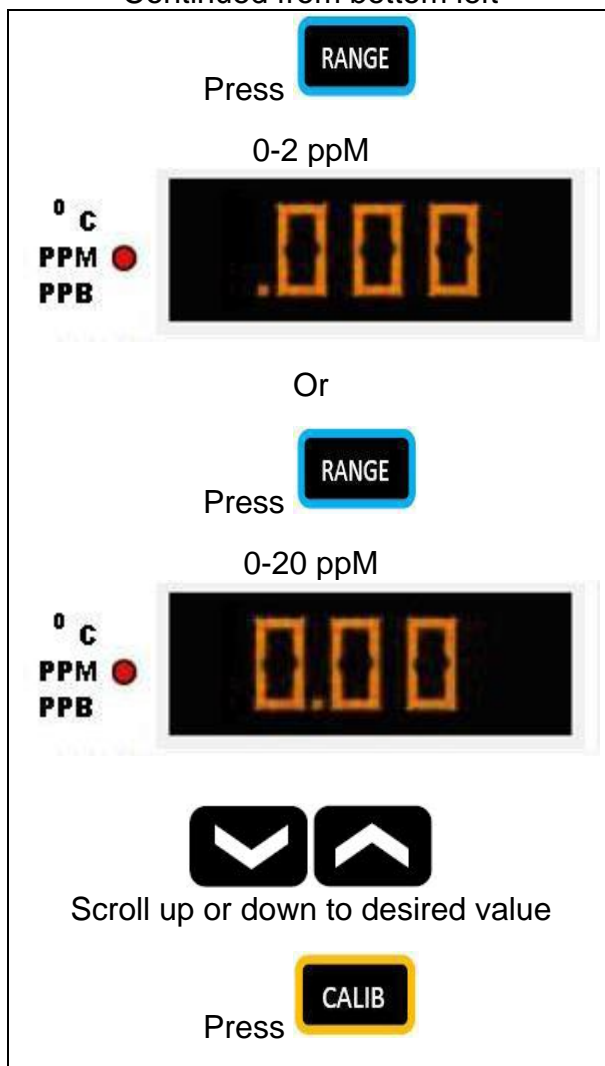
To disable a alarm, return the parameter set point back to three dashes **- - -** .
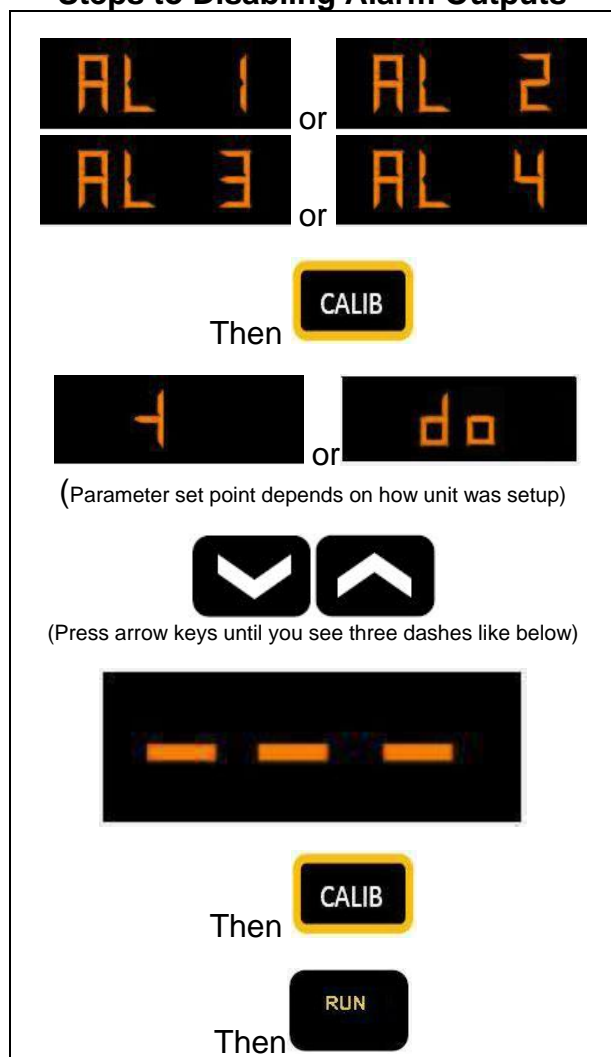
Steps to Disabling Alarm Outputs

Fig. 4E-8

Once an alarm set point has been assigned to a particular parameter on a channel, it cannot be assigned to another parameter or channel until it has been disabled.

When the Mark 25 reaches an alarm state, the Alarm LED will light and the alarm relay activate. The factory-set position for the alarm relays is NORMALLY OPEN. To change to a NORMALLY CLOSED position, contact Martek Instruments.

NOTE: *The Alarm LED will blink if there are active alarms that are not being viewed and will remain steady if the channel viewed is in an alarm state.*

F. Setting Recorder Outputs

The Mark 25 comes standard with four 4-20 mA analog recorder outputs and one RS232 digital output. Like the alarm set points, the four analog recorder outputs can be assigned to any range of any parameter on any channel.
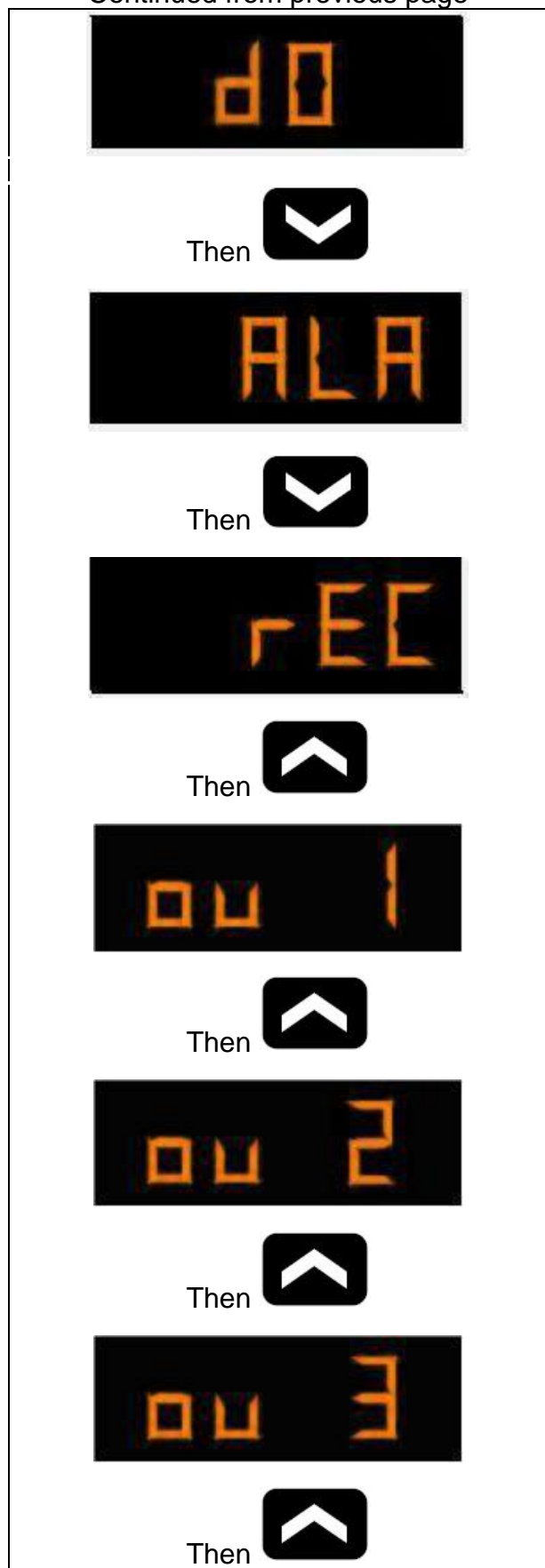
To set recorders , press the <CALIB> key. The display will flash **°C**, Press the <DOWN ARROW> key until **REC** is flashing. Next, press the <UP ARROW> key. The display will prompt with **ou 1** and all parameter LED's will be lit. The <UP ARROW> key can be used to change the recorder output from alarm set point to 2, 3, or 4.

Steps to Setting Recorder Outputs

Then

Then

Then

Then

Then

Then

Fig. 4F-1

To assign a particular analog output, press the <CALIB> key. The Mark 25 will display three bars. The bars indicate no analog output assigned. Use the <UP> or <DOWN ARROW> keys to select temperature (**t)**, or dissolved oxygen (**do**).

Steps to Setting Recorder Set Points

Press

Then

Temperature

Then
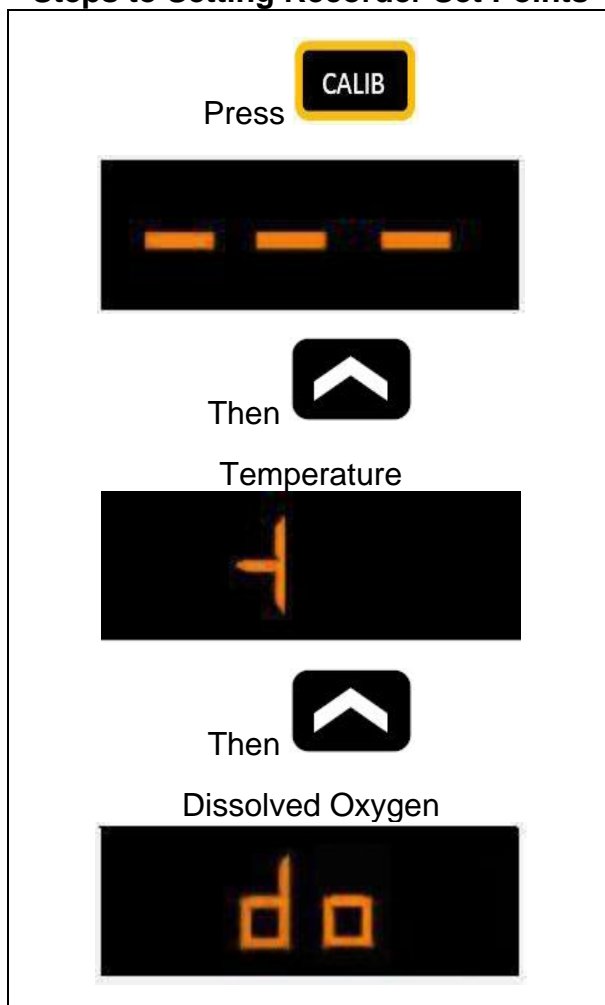
Dissolved Oxygen

Fig. 4F-2

Press the <Range> key to select desired range for dissolved oxygen (**do).**

NOTE: *A decimal point will be present for **do** which indicates what range these parameters are currently using. The auto-ranging function must be ON, in order to manually select ranges.* (for information on auto-ranging, see section **K. Auto-ranging**).
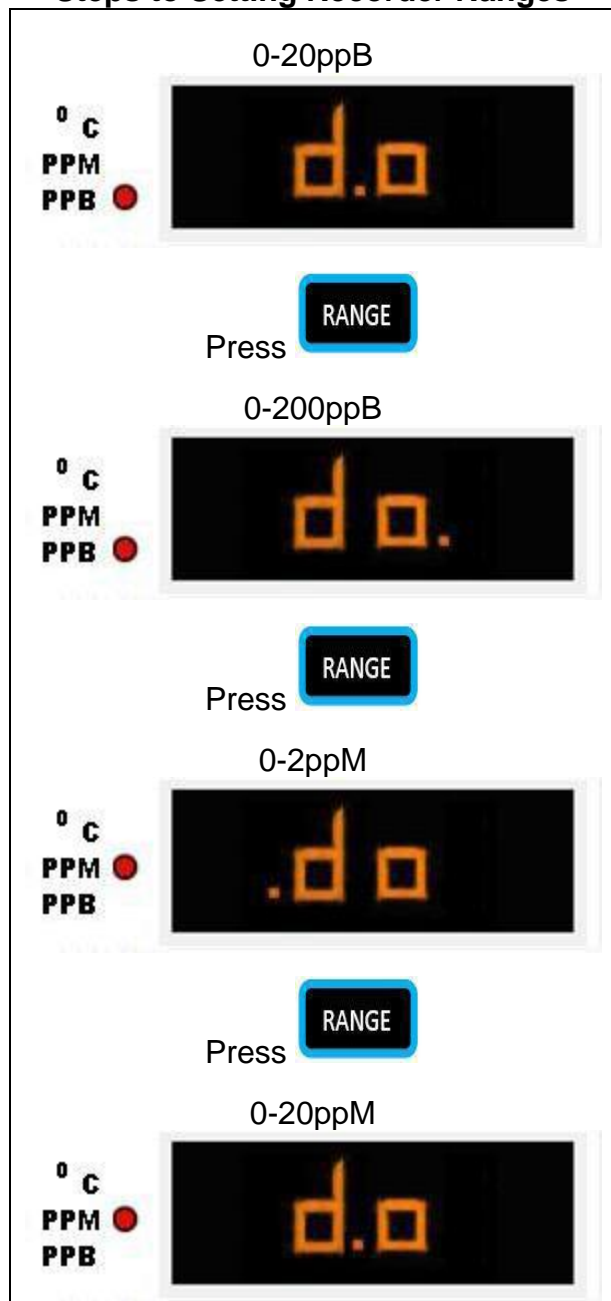
Steps to Setting Recorder Ranges

0-20ppB

Press RANGE

0-200ppB

Press RANGE

0-2ppM

Press RANGE

0-20ppM

Fig. 4F-3

At this point, the standard 4-20 mA output range can be changed to any value desired. In addition, a "balance" is provided to "fine-tune" each end of the recorder range.

To change the lower end of the recorder range, press the <ZERO> key. The Mark 25 will display **4.00**. Use the <UP> or <DOWN ARROW> key to change the number to the desired value. When the desired value is reached, press the <CALIB> key to set the value in memory.

At this point, the Mark 25 will then display **000**. This is the "balance". Use the <UP> or <DOWN ARROW> key to change the value in order to make the lower end of the recorder range to agree with the external recorder. When the desired balance is reached, press the <CALIB> key to set the value in memory.

At this point, the Mark 25 will then display **0.00**. This is the "actual zero value select". Use the <UP> or <DOWN ARROW> key to change the value desired to be assigned to the 4ma output. When the desired value is reached, press the <CALIB> key to set the value in memory

Steps to Setting Low Recorder Out	**Steps to Setting Hi Recorder Out**

Steps to Setting Low Recorder Out

 or

(Parameter set point depends on how unit was setup)

Press **ZERO**

Scroll up or down to desired mA value

Press **CALIB**

Scroll up or down to align output

Press **CALIB**

 or

(Parameter set point depends on how unit was setup)

Scroll up or down to desired low value

Press **CALIB**

Fig. 4F-4

Steps to Setting Hi Recorder Out

 or

(Parameter set point depends on how unit was setup)

Press **SPAN**

Scroll up or down to desired mA value

Press **CALIB**

Scroll up or down to align output

Press **CALIB**

 or

(Parameter set point depends on how unit was setup)

Scroll up or down to desired Hi value

Press **CALIB**

31

To exit menu press <RUN> key twice.
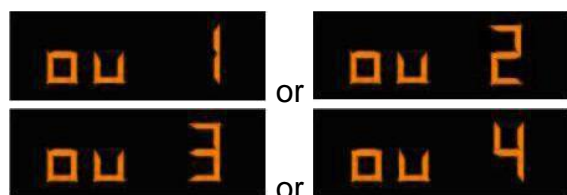

Press

Then

Fig. 4F-5

To disable any assigned analog recorder output, select the particular output and press the <CALIB> key. Once the parameter is displayed, use the <UP> or <DOWN ARROW> keys until three bars are displayed. Press the <CALIB> key to disable the output.

Steps to Disabling Recorder Outputs

or

or

Then

(Parameter set point depends on how unit was setup)

(Press arrow keys until you see three dashes like below)

Then

Then

Fig. 4F-6

Once a recorder output has been assigned to a particular parameter on a channel, it cannot be assigned to another parameter or channel until it has been disabled.
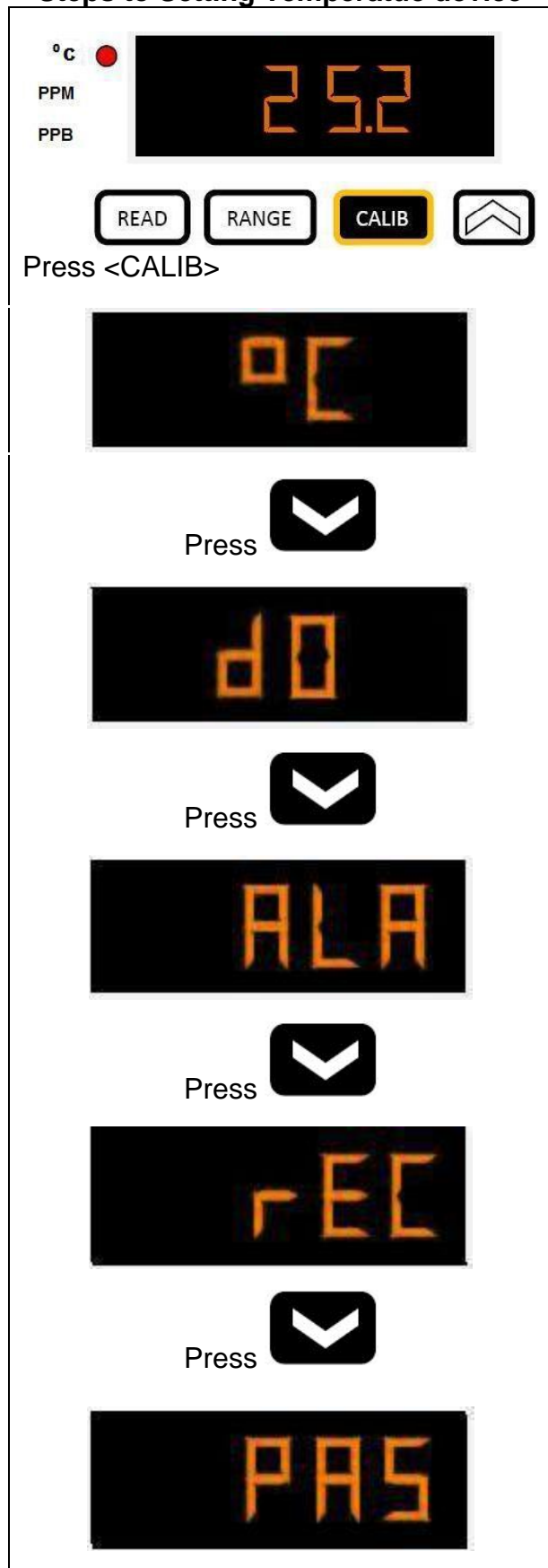
NOTE: *When the auto-ranging function is OFF, changing a conductivity range with an assigned analog output automatically changes the scaling of the recorder output to the new range. When the auto-ranging function is ON, the assigned analog output will remain in the range it was assigned to.*

.

G. Setting the Temperature device

The Mark 25 can be configured to utilize RTD or TLA temperature sensors for water measurements. The setting applies to all channels.

To set the Mark 25 temperature device use with RTD press the <CALIB> key. The display will flash **°C**. Press the <DOWN ARROW> key until **tLA** is flashing. Next, press the <UP ARROW> key. The **tLA** will stop flashing. The <UP ARROW> key can be used to toggle between **tLA** and **RTD**. Once the desired device is chosen press the <CALIB> key and the Mark 25 will go to the monitoring display.

Steps to Setting Temperatue device

°C ●
PPM
PPB

2 5.2

[READ] [RANGE] [CALIB] [⌃]

Press <CALIB>

°C

Press ⌄

d0

Press ⌄

ALA

Press ⌄

rEC

Press ⌄

PAS

Press ⌄

uSr

Press ⌄

ALA

Press ⌃

ALA

⌄ ⌃

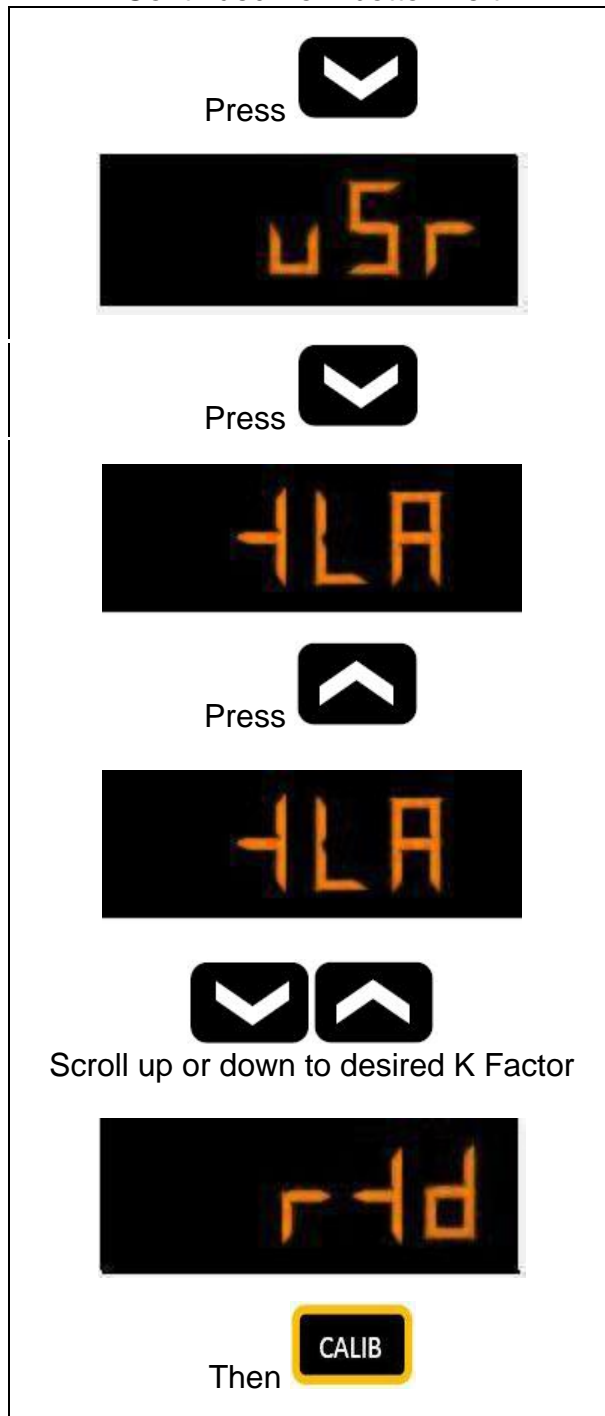Scroll up or down to desired K Factor

rd

Then [CALIB]

Fig. 4G-1

33

H. Setting the Password

The Mark 25 can be assigned a numeric password to prevent unauthorized personnel from changing any of the settings.

Press the <CALIB> key. The display will flash **°C**. Press the <DOWN ARROW> key until password prompt, **PAS** appears. Next, press the <UP ARROW> key. The display will prompt with **1999** and all parameter LED's will be lit and flashing. Use the <UP> or <DOWN ARROW> keys to change the displayed value to any number other than 0. When the desired value has been reached, press the <CALIB> key to set and activate the password.

Steps to Setting Password

Press <CALIB>

Press

Press

-Continued on top right of this page-

Press

Press

Press

Scroll up or down to desired password

Then
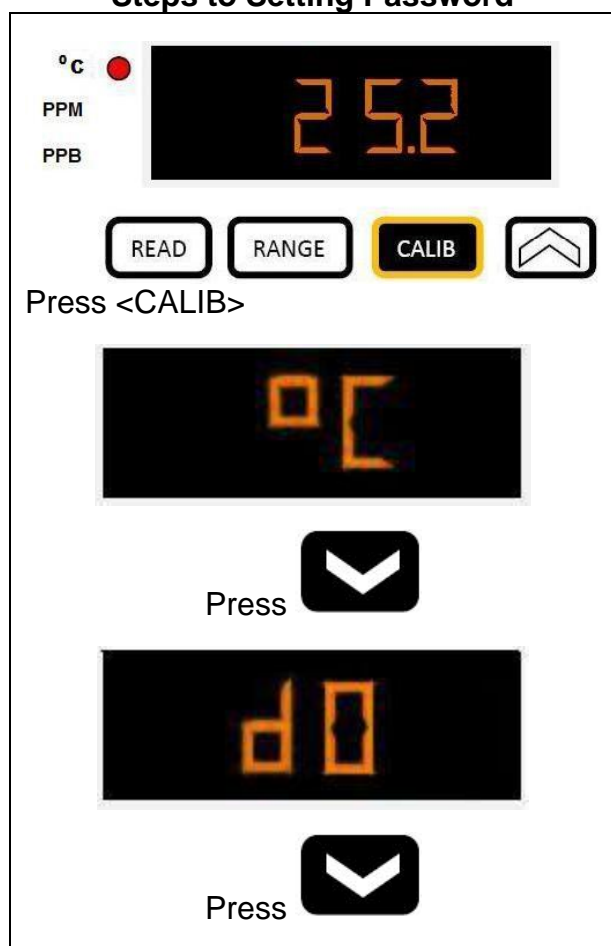
Fig. 4H-1

Once the password is enabled, the display will default to **1999** whenever the password prompt is selected. To gain access to any other function, you must use the arrow keys to scroll to the correct value password then press the <CALIB> key.

34

To disable the password, use the <UP ARROW> key to move the value to 0 then press the <CALIB> key.

Steps to Disabling Password

Press ▲
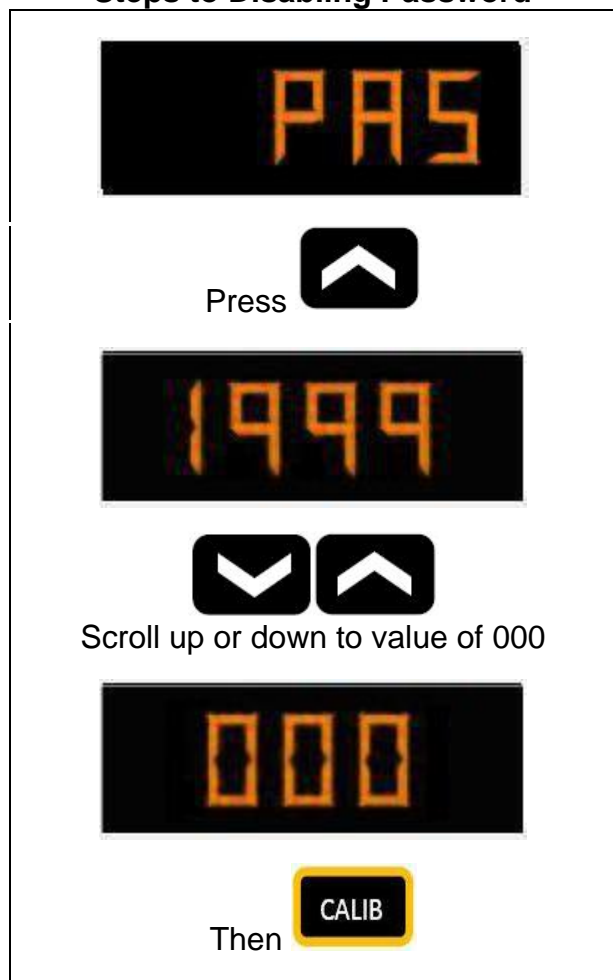
Scroll up or down to value of 000

Then **CALIB**

I. Setting the ID Number

The Mark 25 can be assigned a three digit numeric ID number that will be displayed on the digital output.

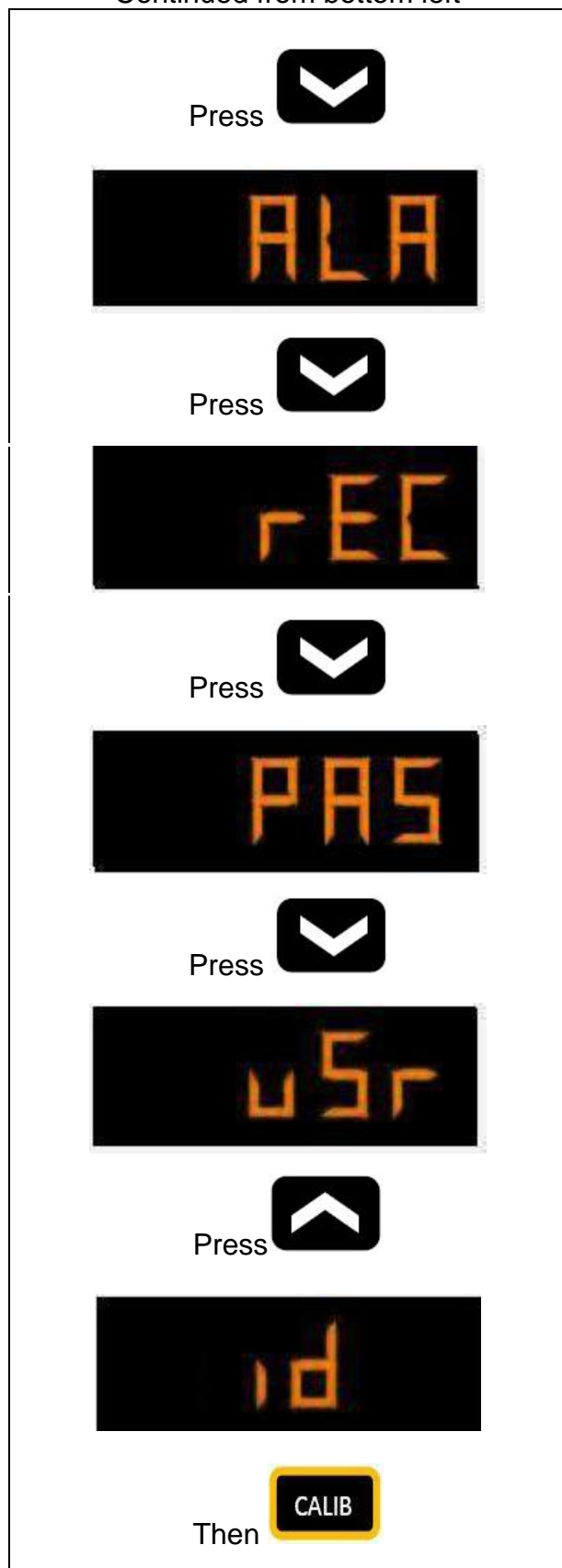Press the <CALIB> key. The display will flash **°C**. Press the <DOWN ARROW> key until user prompt, **uSr** is flashing. Next, press the <UP ARROW> key. The display will prompt with **id** and all parameter LED's will be lit and flashing. When the <CALIB> is pressed, the Mark 25 will display **000**. To assign an ID number, use the <UP> or <DOWN ARROW> keys to change the displayed value to any number other than 000. When the desired value has been reached, press the <CALIB> key to set the ID number.

Steps to Setting ID Number

Press <CALIB>

Press ▼

Press

ALA

Press

rEC

Press

PAS

Press

uSr

Press

id

Then CALIB

000

Scroll up or down to the desired ID
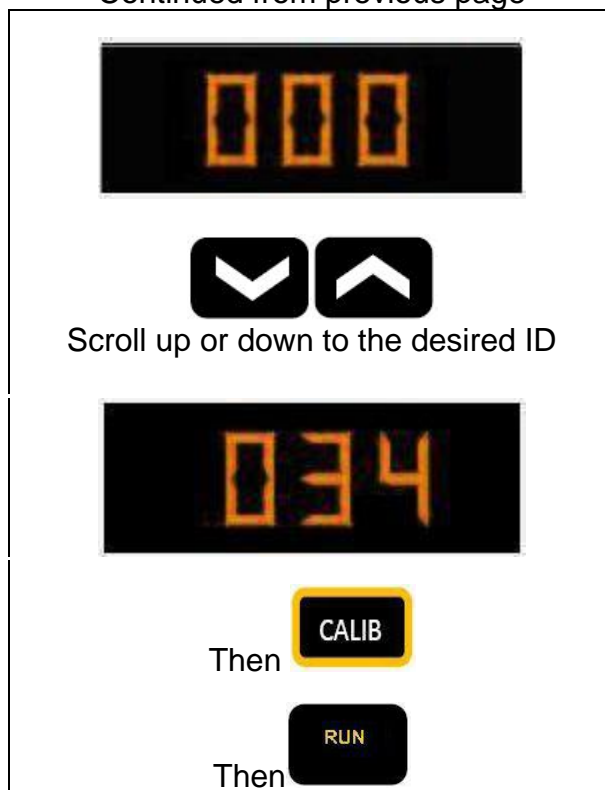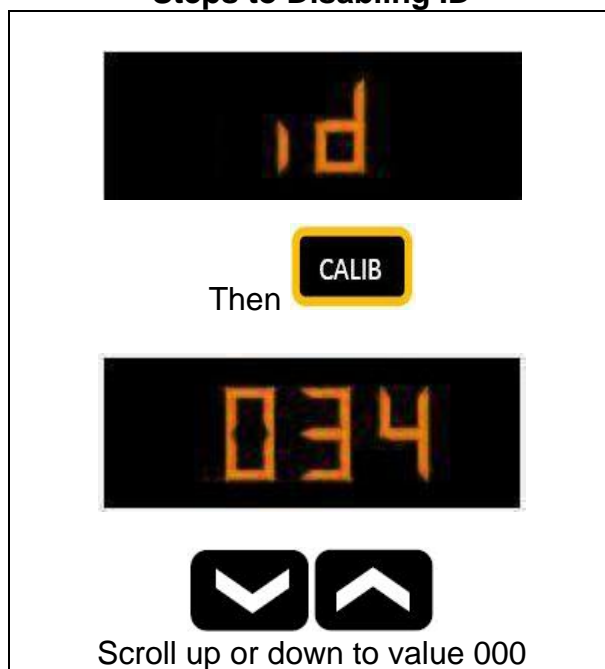
034

Then CALIB

Then RUN

Fig. 4I-1

To disable the ID number, use the <UP ARROW> key to move the value to 000 then press the <CALIB> key. The ID function will then be disabled.

Steps to Disabling ID

id

Then CALIB

034

Scroll up or down to value 000

Then **CALIB**

Then **RUN**
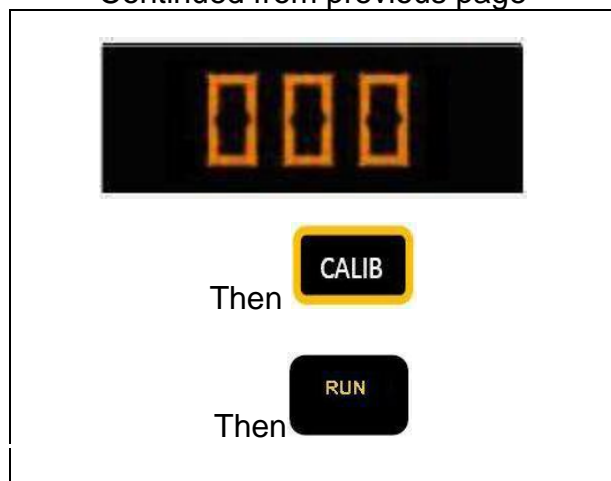
Fig. 4I-2

J. Changing the Serial Output

The Mark 25 provides a standard RS232 digital output. This output can be configured in one of two ways:

1. Polling - The Mark 25 will provide the digital output only when polled by the host computer.

2. Periodic - The Mark 25 will automatically provide a digital output at a 30 second interval.

When the RS232 digital output is used, calibration is not necessary. However, the receiving computer must be set up to accommodate the Mark 25's digital output configuration:

Baud Rate - **9600**
Parity - **Even**
Word length - **7**
Stop Bit - **1**

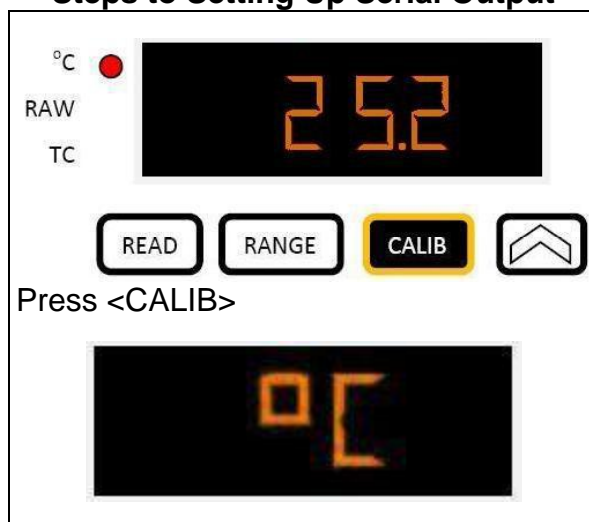A communication program such as PROCOMM or Microsoft HYPERLINK can be used to write data from the Mark 25 to a computer file which can then be imported into a spreadsheet program such as EXCEL or LOTUS NOTES. The data will be displayed in the following format:

ID,	Chan,	Temp.	DO
ID 000	CH 1	26.7 C DEG.	DO 04.24 ppb
ID 000	CH 2	26.7 C DEG.	DO 03.85 ppb
ID 000	CH 3	26.7 C DEG.	DO 01.88 ppb
ID 000	CH 4	26.7 C DEG.	DO 00.85 ppb

Press the <CALIB> key. The display will flash **°C**. Press the <DOWN ARROW> key until user prompt appears, **uSr**. Next, press the <UP ARROW> key. The display will prompt with **id** and all parameter LED's will be lit and flashing. Use the <UP> or <DOWN ARROW> key to advance to the serial prompt, **SEr**. When the <CALIB> is pressed, the Mark 25 will display **PoL**. To change the output to periodic interval, press either the <UP> or <DOWN ARROW> key until the Mark 25 displays **PEr**.

To return to the monitor mode, press the <RUN> key.

Steps to Setting Up Serial Output

Press <CALIB>

37

Press ⌄

d0

Press ⌄

ALA

Press ⌄

rEC

Press ⌄

PAS

Press ⌄

uSr

Press ⌃

id

Press ⌃

SEr

Then CALIB

PEr

⌄ ⌃

Scroll up or down to desired output

PoL

Then CALIB

SEr

Then RUN

- - -

38

Fig. 4J-1

Press

3 second delay then

Fig. 4K-1

K. Setting the Auto-Ranging Function

The Mark 25 can be set up to automatically range between the low, medium, and high ranges for dissolved oxygen.

Press the <Range> key. If the display shows **rG A** then no changes need to be made the unit is already set for auto ranging. If the display **shows rG 1,2,3 or 4** then next press <UP ARROW> key. The display will show **rG A** for 5 seconds than exit to regular display.

Steps to Setting Up Auto Ranging

Press <RANGE>
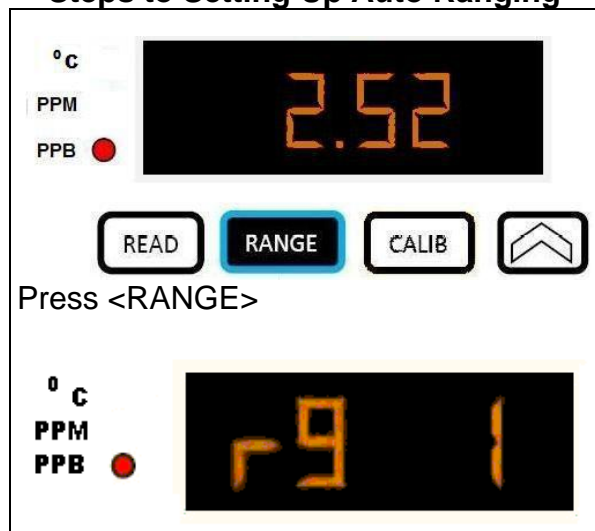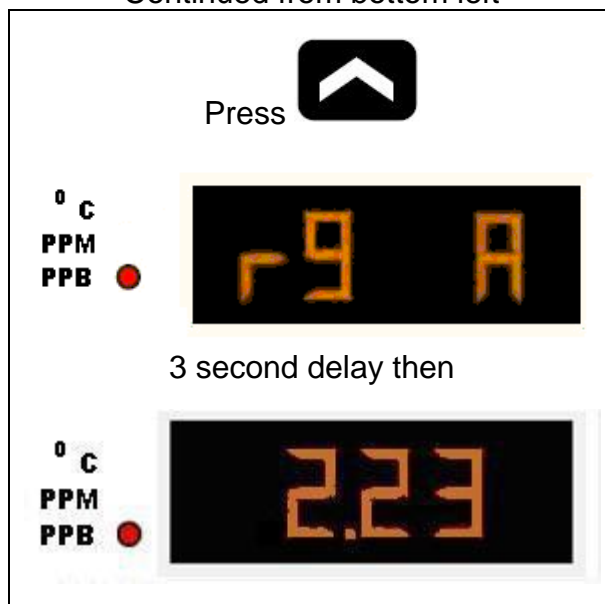
5. Maintenance

A. Troubleshooting

The Martek Mark 25 represents over thirty years of experience in conductivity measurements and, as such, has been designed to provide simple, reliable operation for many years.

To obtain optimum performance from the Mark 25, care should be taken to ensure the sensor has adequate flow and is free of obstructions. In addition, it is important to maintain correct calibration on a regular basis.

Comparison of the Mark 25 to a referee system is the preferred method of validation, however, calibration using the Mark 25's internal circuitry is also acceptable.

In the event a problem develops with the Mark 25 that cannot be resolved through recalibration of the unit, Martek recommends resetting the unit. To ensure that resetting the unit is in order contact Martek Instruments directly via telephone, fax, or e-mail located at our website,
www.martekinstruments.com.

NOTE: *Resetting the Mark 25 erases all calibration data previously done to unit and replaces it with factory default calibration and settings.*

Steps to Resetting Mark 25

Turn power off with switch in back.

Press and Hold CALIB

Turn power on with switch in back.

Display shows Bars for 3 sec. only

Press RUN
While Bars appear

6. Parts List

Part Number	Description
185-10DO	Mark 25 Quad Dissolved Oxygen Analyzer
185-27	Mark 25 Dissolved Oxygen Sensor Only
185-27ABB	Mark 25 ABB Dissolved Oxygen Sensor Only
180-51	Flow Chamber
500133	Electrolyte
400019	Membrane Kit
603173	Shortening Pin
603158	Sensor Extension Cable
140044	8 Terminal Plug Socket
820933	Adapter Plate 7 x 7
820934	Adapter Plate 9.6 x 6
800632	Mounting Brackets

Appendix A

Whipple & Whipple 1911

Temp		Barometric Pressure, mm Mercury										
°C	°F	740	742	744	746	748	750	752	754	756	758	760
2	35.6	13.44	13.47	13.51	13.55	13.58	13.62	13.66	13.69	13.73	13.77	13.80
4	39.2	12.74	12.77	12.81	12.84	12.87	12.91	12.94	12.98	13.01	13.05	13.08
6	42.8	12.09	12.13	12.16	12.19	12.23	12.26	12.29	12.33	12.36	12.39	12.42
8	46.4	11.51	11.54	11.57	11.60	11.63	11.66	11.70	11.73	11.76	11.79	11.82
10	50.0	10.97	11.00	11.03	11.06	11.09	11.12	11.15	11.18	11.21	11.24	11.27
12	53.6	10.47	10.50	10.53	10.56	10.59	10.61	10.64	10.67	10.70	10.73	10.76
14	57.2	10.01	10.04	10.07	10.10	10.12	10.15	10.18	10.21	10.23	10.26	10.29
16	60.8	9.59	9.62	9.64	9.67	9.69	9.72	9.75	9.77	9.80	9.83	9.85
18	64.4	9.20	9.22	9.25	9.27	9.30	9.32	9.35	9.37	9.40	9.43	9.45
20	68.0	8.83	8.86	8.88	8.91	8.93	8.95	8.98	9.00	9.03	9.05	9.08
22	71.6	8.49	8.52	8.54	8.56	8.59	8.61	8.63	8.66	8.68	8.71	8.73
24	75.2	8.18	8.20	8.22	8.24	8.27	8.29	8.31	8.34	8.36	8.38	8.40
26	78.8	7.88	7.90	7.92	7.95	7.97	7.99	8.01	8.03	8.06	8.08	8.10
28	82.4	7.60	7.62	7.64	7.67	7.69	7.71	7.73	7.75	7.77	7.79	7.82
30	86.0	7.34	7.36	7.38	7.40	7.42	7.44	7.46	7.49	7.51	7.53	7.55
32	89.6	7.09	7.11	7.13	7.15	7.17	7.19	7.21	7.23	7.25	7.27	7.29
34	93.2	6.86	6.88	6.90	6.92	6.94	6.96	6.98	7.00	7.02	7.04	7.06
36	96.8	6.64	6.66	6.68	6.69	6.71	6.73	6.75	6.77	6.79	6.81	6.83
38	100.4	6.43	6.44	6.46	6.48	6.50	6.52	6.54	6.56	6.57	6.59	6.61
40	104.0	6.22	6.24	6.26	6.28	6.30	6.31	6.33	6.35	6.37	6.39	6.41

Temp		Barometric Pressure, mm Mercury										
°C	°F	760	762	764	766	768	770	772	774	776	778	780
2	35.6	13.80	13.84	13.88	13.91	13.95	13.99	14.02	14.06	14.10	14.13	14.17
4	39.2	13.08	13.12	13.15	13.19	13.22	13.26	13.29	13.33	13.36	13.40	13.43
6	42.8	12.42	12.46	12.49	12.52	12.56	12.59	12.62	12.66	12.69	12.72	12.75
8	46.4	11.82	11.85	11.88	11.92	11.95	11.98	12.01	12.04	12.07	12.10	12.14
10	50.0	11.27	11.30	11.33	11.36	11.39	11.42	11.45	11.48	11.51	11.54	11.57
12	53.6	10.76	10.79	10.82	10.84	10.87	10.90	10.93	10.96	10.99	11.02	11.04
14	57.2	10.29	10.32	10.34	10.37	10.40	10.43	10.45	10.48	10.51	10.54	10.56
16	60.8	9.85	9.88	9.91	9.93	9.96	9.99	10.01	10.04	10.06	10.09	10.12
18	64.4	9.45	9.48	9.50	9.53	9.55	9.58	9.60	9.63	9.65	9.68	9.70
20	68.0	9.08	9.10	9.13	9.15	9.17	9.20	9.22	9.25	9.27	9.30	9.32
22	71.6	8.73	8.75	8.78	8.80	8.82	8.85	8.87	8.89	8.92	8.94	8.96
24	75.2	8.40	8.43	8.45	8.47	8.50	8.52	8.54	8.56	8.59	8.61	8.63
26	78.8	8.10	8.12	8.14	8.17	8.19	8.21	8.23	8.25	8.28	8.30	8.32
28	82.4	7.82	7.84	7.86	7.88	7.90	7.92	7.94	7.97	7.99	8.01	8.03
30	86.0	7.55	7.57	7.59	7.61	7.63	7.65	7.67	7.69	7.71	7.73	7.75
32	89.6	7.29	7.31	7.34	7.36	7.38	7.40	7.42	7.44	7.46	7.48	7.50
34	93.2	7.06	7.08	7.09	7.11	7.13	7.15	7.17	7.19	7.21	7.23	7.25
36	96.8	6.83	6.85	6.87	6.89	6.90	6.92	6.94	6.96	6.98	7.00	7.02
38	100.4	6.61	6.63	6.65	6.67	6.69	6.71	6.72	6.74	6.76	6.78	6.80
40	104.0	6.41	6.42	6.44	6.46	6.48	6.50	6.51	6.53	6.55	6.57	6.59