TECHNICAL ADVANTAGES
Authorised OHAUS Australia Dealer
www.techadv.com.au
sales@techadv.com.au

a-AB23PH
Bench pH Meter
Instruction Manual

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1. INTRODUCTION

This manual contains installation, operation and maintenance instructions for a-AB23PH bench pH meter. Please read it completely before installation and operation.

1.1. Safety precautions

Definition of Signal Warnings and Symbols

Safety notes are marked with signal words and warning symbols. These show safety issues and warnings. Ignoring the safety notes may lead to personal injury, damage to the instrument, malfunctions and false results.

WARNING For a hazardous situation with medium risk, possibly resulting in severe injuries or death if not avoided.

CAUTION For a hazardous situation with low risk, resulting in damage to the device or the property or in loss of data, or minor or medium injuries if not avoided.

ATTENTION For important information about the product. May lead to equipment damage if not avoided.

NOTE For useful information about the product.

Warning Symbols

General hazard

Explosion hazard

Electrical shock hazard

Safety Precautions

CAUTION: Read all safety warnings before installing, making connections, or servicing this equipment. Failure to comply with these warnings could result in personal injury and/or property damage. Retain all instructions for future reference.

- Before connecting power, verify that the AC adapter's input voltage range and plug type are compatible with the local AC mains power supply.
- Do not position the equipment such that it is difficult to reach the power connection.
- Make sure that the power cord does not pose a potential obstacle or tripping hazard.
- The equipment is for indoor use only.
- Do not operate the equipment in wet, hazardous or unstable environments.
- When using chemicals and solvents, comply with the instructions of the chemical producer and the general lab safety rules.
- Do not allow liquids to enter the equipment.
- Disconnect the equipment from the power supply when cleaning.
- Service should only be performed by authorized personnel.

WARNING: When using chemicals and solvents, comply with the instructions of the producer and the general lab safety rules.

WARNING: Never work in an environment subject to explosion hazards! The housing of the instrument is not gas tight. (Explosion hazard due to spark formation, corrosion caused by the ingress of gases)

WARNING: Electrical shock hazards exist within the housing. The housing should only be opened by authorized and qualified personnel. Remove all power connections to the unit before opening.

1.2. Intended use

This instrument is intended for use in laboratories, pharmacies, schools, businesses and light industry. It must only be used for measuring the parameters described in these operating instructions. Any other type of use and operation beyond the limits of technical specifications, without written consent from OHAUS, is considered as not intended. This instrument complies with current industry standards and the recognized safety regulations; however, it can constitute a hazard in use. If the instrument is not used according to these operating instructions, the intended protection provided by the instrument may be impaired.

1.3. Display and Controls

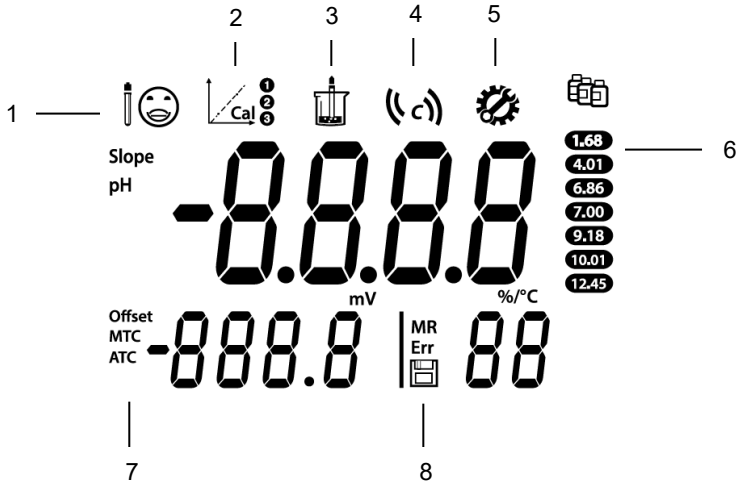


Figure 1-1 Display

1. Electrode condition

Slope: more than 95% and offset: ± (0-15) mV.	Slope: 90-95% or offset: ± (15-35) mV.	Slope: less than 90% or offset: ± (35-60) mV.
Electrode condition is good.	Electrode condition is acceptable.	Electrode condition is not good or needs cleaning.

2. Calibration icon: blinks when calibration is in progress.
3. Measurement icon: blinks when measurement or calibration is in progress.
4. Auto endpoint icon ; Continuous reading icon .
5. Setup icon: shows when the meter is in setup mode.
6. Buffer icon: displays the buffer group for calibration.
7. Auto temperature compensation icon **ATC**; Manual temperature compensation icon **MTC**.
   Note: for detailed information about **ATC** and **MTC**, please check the **Set temperature unit and MTC value** section in **SETUP** chapter**.**
8. Memory number icon **MR**; Error index icon **Err**; Store icon .

Controls

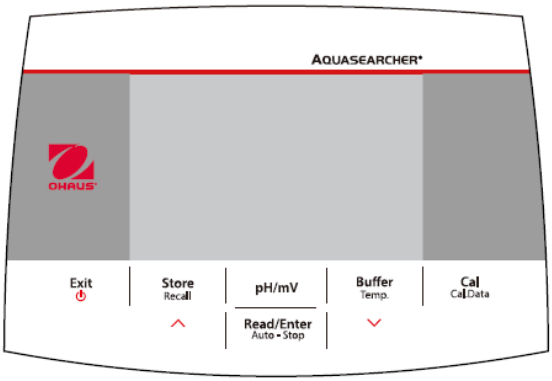


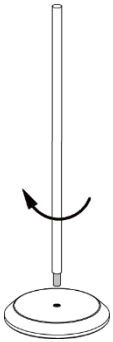
Figure 1-2 Control Panel

Button	Press & release	Press & hold for 3 seconds
Exit	• Turns on the meter • Cancels the current measurement • Exits calibration	Turns off the meter
Store **Recall**	• Stores the current measurement result • When checking the stored measurement results, moves to the previous record. • When setting parameters, increases the setting value or displays the previous option.	Recalls stored measurement results
pH/mV	Switches between pH and mV mode.	/
Read/Enter **Auto - Stop**	• Starts or ends measurement • Ends the current measurement in the auto endpoint mode and shows the result • Confirms settings and stores setting parameters	Switches between auto and continuous endpoint mode Auto Continuous
Buffer **Temp.**	• Selects buffer group • When checking the stored measurement results, moves to the next record. • When setting parameters, decreases the setting value or displays the next option.	Enters temperature setting, selects temperature unit and sets MTC temperature (The default is 25.0 C° degrees)
Cal **Cal.Data**	Starts calibration	Recalls the latest calibration data: slope and offset

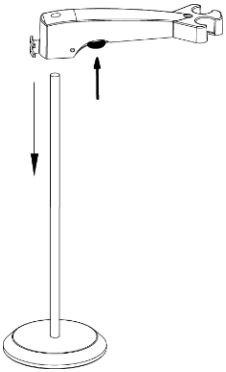
2. INSTALLATION

2.1 Install the stand-alone electrode holder

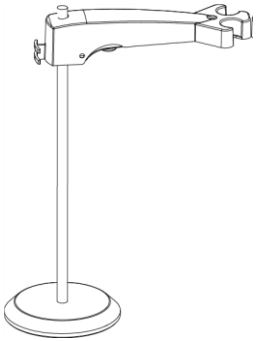
1. Screw the metal rod into the base.



2. Hold the button located at the bottom of the upper electrode arm, and pass the arm through the metal rod.

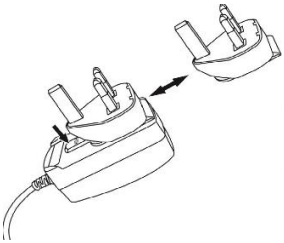


3. Release the button at the height you want to finish the installation.



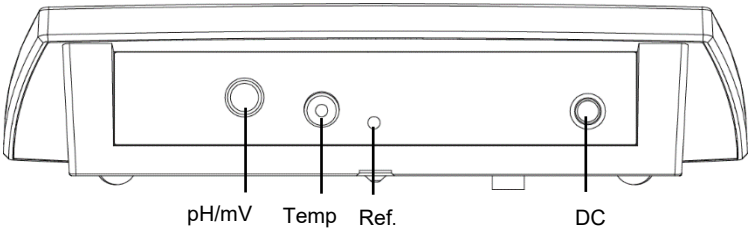
2.2 Installing the power adapter

Insert the proper adapter clip into the power adapter slot.

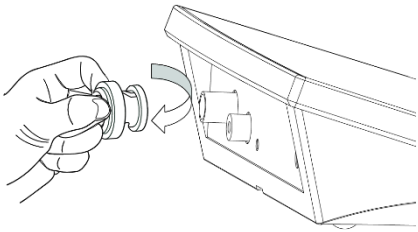


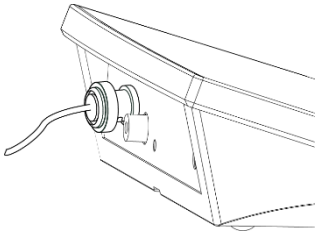
2.3 Connect the pH electrodes

There are 3 sockets for electrode. “pH/mV” socket (BNC); “Temp.” Socket (Cinch) and “Ref.” Socket (2mm banana).



For 2-in-1 pH electrode, you only need to connect to the BNC socket, while for other electrodes, you need to connect to the BNC and Cinch socket.





Note: REF socket is for separate reference electrode.

3. SETUP

3.1 Set temperature unit and MTC value

Please note:
If a temperature electrode is used, Automatic Temperature Compensation (ATC) and the sample temperature are displayed on the screen. You may then choose to skip MTC setup (below).

If the meter does not detect a temperature electrode or one is not used, the meter automatically switches to Manual Temperature Compensation (MTC) mode and MTC appears on the screen.

MTC temperature can be set as follows:
1. Press the **Exit** button to turn the meter on.
2. Long press the **Temp.** button to enter setting.
3. The symbol °C is flashing.
4. Press the ∧ or ∨ button to switch between °C and °F.
5. Press the **Read/Enter** button to confirm your selection.
6. Continue to set the MTC temperature by using ∧ or ∨ to adjust temperature compensation accordingly
7. Press the **Read/Enter** button to confirm the setting.
8. Press the **Exit** button to return to the measurement screen.

Note:
1. The default MTC temperature value is 25°C (77°F).
2. °C = 5/9 (°F - 32).

3.2 Select a predefined buffer group

After confirming the MTC compensation temperature value, select the buffer group.

To do this:
1. Press the **Buffer** button to enter the selection.
2. Press the ∧ or ∨
3. button to switch between 2 buffer groups.
4. Press the **Read/Enter** button to confirm the setting or press the **Exit** button to return to the measurement screen.

The meter will then display the selected buffer group on the right of the screen.

Check figure 3-1 as an example.

Figure 3-1 Buffer group

4. OPERATION

Standard procedure of pH measurement is as follows:
a) pH electrode preparation
b) Buffer preparation and pH electrode calibration
c) Sample preparation
d) pH measurement
e) Record measurement results or print
f) Rinse the pH electrode and properly store

pH electrode preparation: pH electrode should be rinsed with pure water before and after using. Check if the electrode is physically damaged. (Be careful with the glass bulb.)

The pH electrode should be stored in the storage bottle; the solution in the bottle is 3M KCl solution. After placing the pH electrode into the sample or buffer solution, user should stir several seconds then wait 30 to 60 seconds for the signal to stabilize, and then press the button to operate (Calibration or measurement).

WARNING Do not operate the equipment in hazardous environments. The equipment is not explosion protected.

WARNING When using chemicals and solvents, comply with the instructions of the chemical producer and the general lab safety rules.

4.1 Calibration

4.1.1 Buffer group

This meter supports **1-, 2-** or **3- point** calibrations.
There are2 buffer groups in the meter, you can select the buffer group you prefer. The default buffer is **b1 US standards**. The buffer value will be automatically recognized during calibration. The 2 predefined buffer groups are (at 25°C):

b1	**1.68**	**4.01**	**7.00**	**10.01**	**12.45**
b2	1.68	4.01	6.86	9.18	12.45

The meter automatically corrects for the temperature dependence of the buffer pH values given in the following table - buffer group b1.
This means, if the buffer solutions' temperature is 15°C, the calibration value you will get should be pH1.67 (buffer 1.68), pH4.00 (buffer 4.01), pH7.04 (buffer 7.00), pH10.12 (buffer 10.01) and pH12.81 （buffer 12.45）.

5 °C	1.67	4.01	7.09	10.25	13.21
10 °C	1.67	4.00	7.06	10.18	13.00
15 °C	1.67	4.00	7.04	10.12	12.81
20 °C	1.68	4.00	7.02	10.06	12.63
25 °C	**1.68**	**4.01**	**7.00**	**10.01**	**12.45**
30 °C	1.68	4.01	6.99	9.97	12.29
35 °C	1.69	4.02	6.98	9.93	12.13
40 °C	1.69	4.03	6.97	9.89	11.98
45 °C	1.70	4.05	6.97	9.86	11.84
50 ℃	1.71	4.06	6.96	9.83	11.70

Calibration: pH electrodes need to be calibrated with pH standard buffer solution before a proper pH measurement can be made. Calibration is to display the right pH value when meter receives the mV value signal from the pH electrode.
Slope: the linear coefficient between mV and pH according to theoretical value (e.g. -59.16mV/pH @ 25 °C which means 100% slope);
Offset: the mV value when pH value is 7.00. (Theoretical value is 0 mV);

4.1.2 Perform 1-point calibration

When performing calibration, Ohaus recommends using Auto End Point Mode. After powering the meter on, be sure the top of the screen shows to ensure the meter is in Auto End point Mode.

4.1.2.1 Auto or Continuous End Point Mode

- Press and hold the **Auto-Stop** button to change the End Point Mode.
- When in Continuous Mode, to manually reach a pH measurement or calibration value, you need to press the button **Auto-Stop** when reading is stable and displays . Then the reading freezes and blinks 2 times then disappears; blinks 3 times and freezes on the display.

- When in Auto End Point Mode, the meter determines when the reading is stable then displays and locks the reading or calibration value automatically, the reading freezes and blinks 2 times then disappears; blinks 3 times and freezes on the display.

Note: For the 1-point calibration, if only the **offset** is adjusted, theoretical **100% slope** (-59.16 mV / pH) will be used.

4.1.2.2 1-point calibration

When the meter is in pH measurement mode, place the pH electrode in a calibration buffer, stir 5 seconds, and wait for 30 seconds, then:

1 Press the **Cal** button. and appear on the top of the screen, and both are blinking during calibration.
Note:
a) Calibration starts with the Auto End Point Mode.
b) Pressing the **Auto-Stop** button during the calibration can end the process.

2 The meter reaches endpoint automatically according to the preselected auto-endpoint mode. The screen will display the calibration point pH value (e.g. 7.00) with the temperature. The calibrated buffer value in the buffer group will be marked in ▬.

The 1-point calibration is finished. There are now 3 options (OHAUS recommends conducting at least a 2 point calibration).
1. Press the **Cal** button to perform the 2-point calibration.
2. Press the **Store** button to store the 1-point calibration and exit, the offset and the slope are shown on the display for 3 seconds then return to the measurement screen.
3. Press the **Exit** button to reject the calibration, return to the measurement screen.

4.1.3 Perform 2-point calibration

After finishing the 1-point calibration as described above:
1 Rinse the pH electrode with pure water and wipe off with tissue.
2 Place the electrode in the next calibration buffer, stir and wait for 30 seconds.
3 Press the **Cal** button. and appear on the top of the screen, and both are blinking during calibration.
Note:
a) Calibration starts with the Auto End Point Mode.
b) Pressing the **Auto-Stop** button during the calibration can end the process.
4 The meter reaches endpoint automatically according to the preselected auto-endpoint mode. The screen will display the calibration point pH value (e.g. 7.00) with the temperature. The second calibrated buffer value in the buffer group will be marked in ▬.

You have the same options after the 2-point calibration as the 1-point calibration. Please check **1-point calibration** section for details.

4.1.4 Perform 3-point calibration

Repeat the steps for performing a 2-point calibration to perform a 3-point calibration using a third buffer.

After all the calibrations are finished, the meter will display electrode condition (☺, 😐, ☹, slope and offset) for 3 seconds, and then return to the measurement screen.

4.2 Sample measurement

4.2.1 pH measurement

1 Place the pH electrode in the sample. Stir for 5 seconds; wait for 30 seconds.

2 Press the **Read/Enter** button to start the pH measurement, appears on the display and is blinking during measurement.

3 When the meter reaches endpoint (blinks 2 times then disappears; blinks 3 times and freezes on the display.), it will display the pH value and the temperature.

Note: in Continuous End Point Mode, you need to press the **Auto-Stop** button to manually end the measurement.

4.2.2 mV measurement

1 Press the **pH/mV** button to switch between pH measurement mode and mV measurement mode.
2 Follow the same procedure as for pH measurement to perform mV measurement.

4.2.3 Temperature measurement

For better accuracy, we recommend to use either a built-in or a separate temperature electrode.

- If a temperature electrode is used, ATC and the sample temperature are displayed.
- If the meter does not detect a temperature electrode, it automatically switches to the manual temperature compensation mode and MTC appears. MTC temperature should be set.

Note: the meter accepts NTC 30 kΩ temperature sensor. ATC (Auto Temperature Compensation) or MTC (Manual Temperature Compensation), the Temperature Compensation only corrects for the change in the output of the electrode, not for the change in the actual solution. This means the meter corrects the signal (mV) from the electrode to get a more accurate pH value according to the real temperature.

4.3 Memory

4.3.1 Store a reading

The meter can store up to 99 endpoint results and 1 calibration result.

Press the **Store** button when the measurement reaches endpoint. flashes 3 times and after that the measurement result has been stored.

If you press the **Store** button when **M99** is displayed, **FUL** displays to indicate the memory is full. To store further data you will have to clear the memory. (See the following **Clear the memory** section for details).

4.3.2 Recall a memory

1. Press and hold the **Recall** button to recall the stored values from memory when the current measurement reaches endpoint.
2. Press the ∧ or ∨ button to scroll through the stored results. **R01** to **R99** indicates which result is being displayed.
3. Press the **Exit** button to exit.

4.3.3 Clear a memory

1. Press the ∧ or ∨ button to scroll through the stored results until "**CL**" appears.
2. Press the **Read/Enter** button. **CLr** appears and blinks.
3. There are now 2 options:
   - Press the **Read/Enter** button to confirm the deletion of all the stored data.
   - Press the **Exit** button to return to the measurement mode without deleting the memory.

5. MAINTENANCE

5.1 Error message

Error Code	Possible Cause	Possible Solution
Error 1	Self-diagnosis failed	Repeat the self-diagnosis procedure and make sure that you finish pressing all six buttons within two minutes.
Error 2	Measured values out of range	Check if the electrode is properly connected and placed in the sample solution.
Error 3	Measured buffer temperature out of range (<0 °C or >50 °C)	Keep the pH buffer temperature within the range for calibration
Error 4	Offset out of range offset > 60mV or < - 60 mV	Make sure the pH buffer is correct and fresh; Clean or replace the pH electrode.
Error 5	Slope out of range	Make sure the buffer is correct and fresh; Clean or replace the pH electrode.
Error 6	Meter cannot recognize the buffer	Make sure the buffer is correct and fresh; check if the buffer has not been used more than once.
Error 9	The current data set has already been stored once	An endpoint reading can only be stored once. Perform a new measurement to store.
Error 10	The sample temperature out of range	Check the sample temperature, the temperature sensor.

Note: If an error happens, the meter will also **beep 3 times** to alert.
If the troubleshooting section does not resolve your problem, contact an OHAUS technical support agent. For assistance in the United States, call toll-free 1-800-526-0659 between 8:00 AM and 5:00 PM Eastern Standard Time. An OHAUS Technical Support Specialist will be available to assist you. Outside the USA, please visit our website www.ohaus.com to locate the OHAUS office nearest you.

5.2 Meter maintenance

Never unscrew the two halves of the housing!
The meter does not require any maintenance other than occasional wipe with a damp cloth and the replacement of depleted batteries.
The housing is made of acrylonitrile butadiene styrene (ABS). This material is attacked by some organic solvents, such as toluene, xylene and methyl ethyl ketone (MEK). Any spillage should be immediately wiped off.

5.3 Electrode maintenance

Make sure the electrode is filled with electrolyte solution. Always store the electrode according to the electrode instruction manuals and do not allow it to dry out.
If the electrode response becomes sluggish or the slope is not acceptable, try the following:

- Soak the electrode in 0.1M HCl for at least 8 hours.
- For fat or oil contaminant, degrease the membrane with cotton wool soaked in either acetone or a soap solution.

After electrode treatment, a new calibration should be performed. If the electrode slope is still not acceptable, the electrode might need to be replaced.

5.4 Cleaning

WARNING: Electric Shock Hazard. Disconnect the equipment from the power supply before cleaning.
Make sure that no liquid enters the interior of the instrument.

Attention: Do not use solvents, harsh chemicals, ammonia or abrasive cleaning agents.

The housing may be cleaned with a cloth dampened with a mild detergent if necessary.

5.5 Self-diagnosis

When the meter is on, press and hold the **Read/Enter** button and the **Cal** button simultaneously until the meter displays the full screen. Each icon blinks one after the other.

This way you may check whether all icons are correctly shown. The next step is to check that the buttons are functioning correctly. This requires user interaction.

When **b** blinks, six icons (including **b)** are displayed.
Press the six buttons in any order. Each time you press a button, an icon disappears from the screen. Continue to press the other buttons until all the icons have disappeared.

When the self-diagnosis has been completed successfully, **PAS** appears. If self-diagnosis fails, error message **Err 1** appears.

Note: You have to finish pressing all six buttons within 2 minutes, otherwise Err 1 appears and you will have to repeat the procedure.

5.6 Recover factory settings

When the meter is off, press and hold the **Read/Enter** button, **Cal** button and **Exit** button together for 3 seconds, the screen displays and blinks, this means “Reset”. There are 2 options:

- Press the **Read/Enter** button to reset factory settings (MTC, slope and offset, etc.), display then restart the meter.

- Or press the **Exit** button to quit the setting, display nO then turn off the meter.

6. TECHNICAL DATA

6.1 Specifications

Equipment Ratings:

Indoor use only

Altitude:	2000m
Operating temperature:	5 to 40°C
Humidity:	Maximum relative humidity 80% for temperatures up to 31 °C decreasing linearly to 50% relative humidity at 40°C.
Electrical supply:	12VDC, 0.1A. (For use with certified or approved power supply, which must have a SELV and limited energy output.)
Voltage fluctuations:	Mains supply voltage fluctuations up to ±10% of the nominal voltage.
Overvoltage category (Installation category):	II
Pollution degree:	2

Benchtop Meter Model	**a-AB23PH**
Display Type	5" segment LCD with backlight
Measurement Channels	1
Measurement End-point Modes	Auto-stop, Continuous
Datalog for Measurement	99 sets
Datalog for Calibration	Last calibration
Keypad	Membrane
pH Electrode Input	BNC
Temperature Input	Cinch, NTC 30 kΩ
Power Supply	Power input: 100-240V~ 200mA 50-60Hz 12-18VA Power output: 12 VDC 0.5A
Net Weight	2.5 kg
Gross Weight	2.8 kg
Transportation Size	370 x 268 x 251 mm

pH Meter Model		**a-AB23PH**
Measurement Channels		pH/mV with temperature
PH	Measuring Range	0.00 to 14.00 pH
	Resolution	0.01 pH
	Resolution Switch	No
	Accuracy	± 0.01 pH
	Pre-Defined Buffer Groups	2
ORP, RmV	Measuring Range	± 1999 mV
	Resolution	1 mV
	Accuracy	± 1 mV
	Units	mV
Temperature	Measuring Range	0.0 to 100.0 °C,
		32.0 °F to 212.0 °F
	Resolution	0.1 °C, 0.1 °F
	Accuracy	± 0.5 °C, ±0.5 °F
	Calibration	No
Calibration	Calibration points	Up to 3 points
	Calibration Sign	Face Sign
	Calibration mode	Linear

6.2 Dimensions

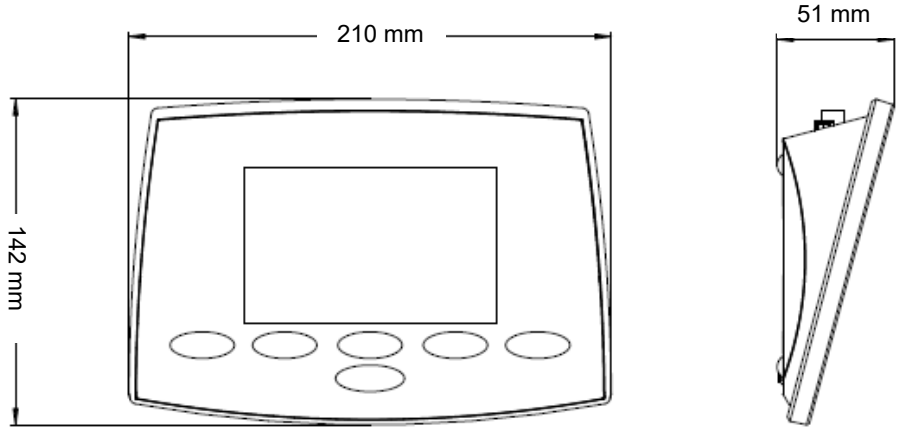


Figure 6-1 Dimensions

7. BUFFER GROUP

The meter automatically correct for the temperature dependence of the buffer group pH value given in the following tables.

Buffer group 1

Temp °C	pH1.68	pH4.01	pH7.00	pH10.01	pH12.45
5	1.67	4.01	7.09	10.25	13.21
10	1.67	4.00	7.06	10.18	13.00
15	1.67	4.00	7.04	10.12	12.81
20	1.68	4.00	7.02	10.06	12.63
25	**1.68**	**4.01**	**7.00**	**10.01**	**12.45**
30	1.68	4.01	6.99	9.97	12.29
35	1.69	4.02	6.98	9.93	12.13
40	1.69	4.03	6.97	9.89	11.98
45	1.70	4.05	6.97	9.86	11.84
50	1.71	4.06	6.96	9.83	11.70

Buffer group 2

Temp °C	pH1.68	pH4.01	pH6.86	pH9.18	pH12.45
5	1.67	4.01	6.95	9.39	13.21
10	1.67	4.00	6.92	9.33	13.00
15	1.67	4.00	6.90	9.28	12.81
20	1.68	4.00	6.88	9.23	12.63
25	**1.68**	**4.01**	**6.86**	**9.18**	**12.45**
30	1.68	4.01	6.85	9.14	12.29
35	1.69	4.02	6.84	9.11	12.13
40	1.69	4.03	6.84	9.07	11.98
45	1.70	4.04	6.83	9.04	11.84
50	1.71	4.06	6.83	9.02	11.70

8. COMPLIANCE

Compliance to the following standards is indicated by the corresponding mark on the product.

Mark	Standard
	This product complies with the applicable harmonized standards of EU Directives 2011/65/EU (RoHS), 2014/30/EU (EMC), 2014/35/EU (LVD). The EU Declaration of Conformity is available online at www.ohaus.com/ce.
	This product complies with the EU Directive 2012/19/EU (WEEE). Please dispose of this product in accordance with local regulations at the collecting point specified for electrical and electronic equipment. For disposal instructions in Europe, refer to www.ohaus.com/weee.
	EN 61326-1

ISED Canada Compliance Statement:
CAN ICES-003(A) / NMB-003(A)

ISO 9001 Registration
The management system governing the production of this product is ISO 9001 certified.

FCC Supplier Declaration of Conformity

Unintentional Radiator per 47CFR Part B
Trade Name: OHAUS CORPORATION
Model or Family identification: Aquasercher a-AB

Issuing Party that Assembled the Product:
Ohaus Instruments (Changzhou) Co., Ltd.
2F, 22 Block, 538 West Hehai Road, Xinbei District, Changzhou
Jiangsu 213022
China
Phone: +86 519 85287270

Responsible Party – U.S. Contact Information:
Ohaus Corporation
7 Campus Drive, Suite 310
Parsippany, NJ 07054
United States
Phone: +1 973 377 9000
Web: www.ohaus.com

FCC Compliance Statement:
Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.
Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

OHAUS® and Defender® are either registered trademarks or trademarks of OHAUS Corporation in the United States and/or other countries.

OHAUS Corporation
7 Campus Drive
Suite 310
Parsippany, NJ 07054 USA
Tel: +1 973 377 9000
Fax: +1 973 944 7177

With offices worldwide / Con oficinas en todo el mundo / Avec des bureaux partoutdans le monde

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