



**STARTER 300
Portable pH Meter
Instruction Manual**

**Manual de instrucciones
del pHmetro portátil
STARTER 300**

**STARTER 300
PH-mètre portable
Manuel d'instructions**

**STARTER 300
Medidor de pH Portátil
Manual de Instruções**

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1 INTRODUCTION



Thank you for choosing OHAUS.

Please read the manual completely before using the STARTER 300 portable pH meter to avoid incorrect operation.

STARTER 300 has an excellent performance/price ratio and is designed with many useful features. Other accessories such as different electrodes for different applications, bottle buffer solutions are also available from OHAUS.

Starter 300 offers many practical features such as:

- Ergonomic, multifunctional design for ambidextrous measurements or table top use
- Integrated table top stand for counter use and semi-permanent installations
- Integrated labeling design for quick product identification
- IP54 protection against dust and water
- Ohaus renowned user friendly software

1.1 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.

Signal Words

WARNING

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

Attention

For important information about the product.

Note

For useful information about the product

Warning Symbols



General hazard



Explosion hazard



Corrosive hazard



Alternating current



Direct current

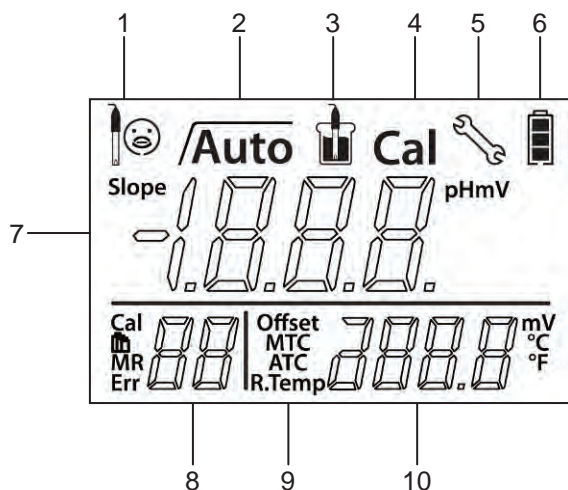
1.2 Safety Precautions

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.

- Use the equipment only in dry locations.
- Dry off any liquid spills immediately. The instrument is not watertight.
- When using chemicals and solvents, comply with the instructions of the chemical producer and the general lab safety rules.
- Use only approved accessories and peripherals.
- Operate the equipment only under ambient conditions specified in these instructions.
- Do not operate the equipment in hazardous or unstable environments.
- Service should only be performed by authorized personnel.

1.3 Display and controls

Displays



- 1 Electrode condition



Slope: more than 95%
and offset: \pm (0-15) mV
Electrode condition is good



Slope: 90-95%
or offset: \pm (15-35) mV
Electrode condition is acceptable



Slope: less than 90%
or offset: \pm (>35) mV
Electrode condition is not good or needs cleaning

- 2 Endpoint stability icon ; Auto endpoint icon

- 3 Measurement icon - ; measurement or calibration is running

- 4 Calibration icon - **Cal**; calibration in progress

- 5 Setup icon - ; instrument is in the setup mode

- 6 Battery status icon shows the condition of the batteries - fully charged, half-charged or fully discharged










- 7 pH/mV reading or slope in calibration process

- 8 Calibration point **Cal** / Buffer group /Memory number **MR**/ Error index **Err**

- 9 Auto temperature compensation - **ATC** ; Manual temperature compensation - **MTC**

- 10 Temperature during measurement or offset in calibration process

Controls

Button	Press & release 	Press & hold for 3 seconds 
	<ul style="list-style-type: none"> - Start or endpoint measurement - Confirm setting, store entered value 	<ul style="list-style-type: none"> - Turn auto endpoint on / off /Auto, 
	<ul style="list-style-type: none"> - Start calibration 	<ul style="list-style-type: none"> - Review the latest calibration data (slope, offset)
	<ul style="list-style-type: none"> - Meter turn on - Return to measurement screen 	<ul style="list-style-type: none"> - Meter turn off
	<ul style="list-style-type: none"> - Store current reading to memory - Increase value during setting - Scroll up through the memory 	<ul style="list-style-type: none"> - Recall stored data
	<ul style="list-style-type: none"> - Switch between pH and mV measuring modes - Decrease value during setting - Scroll down through the memory 	<ul style="list-style-type: none"> - Enter setup mode
		<ul style="list-style-type: none"> - Start self-diagnosis

2 INSTALLATION

Carefully unpack the box.

2.1 Package contents

The ST300-B (basic) package has the following items:

ST300-B	Units
STARTER 300	1
AAA battery	4
Electrode Clip	1
IP54 seal components	1 set
Wrist Strap	1

In addition to ST300-B content, the ST300 package also includes the following:

pH Buffer Powder Set (4.01, 7.00, 10.01)	1 set
ST320 3-in-1 gel pH electrode	1

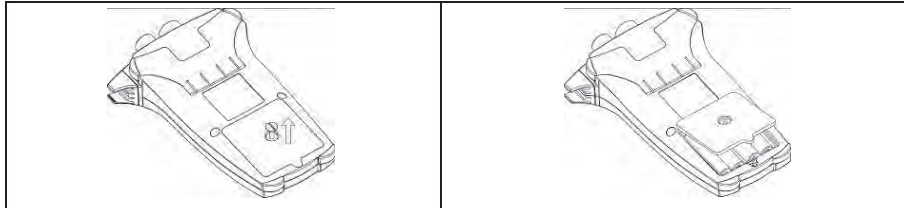
Each pH buffer powder should be dissolved in 250ml pure water or deionized water in volumetric flask.

Additional Ohaus pH electrodes are available for various applications:

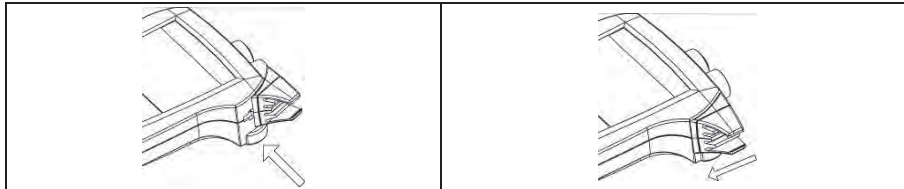
Model	Description	P/N
ST310	3-in-1 plastic refillable pH Electrode	83033965
ST210	2-in-1 plastic refillable pH Electrode	83033966
ST320	3-in-1 plastic gel pH Electrode(no need to fill)	83033967
ST230	2-in 1 glass muddy sample pH Electrode	83033968
STORP1	Gel plastic ORP electrode	30038555
STORP2	Refillable glass ORP electrode	30038553
STTEMP30	Temperature Electrode	83033970

Buffers and Accessories:

Buffer powder set (4.01; 7.00; 10.00)	83033971
Buffer pH1.68 250ml	30100424
Buffer pH4.01 250ml	30100425
Buffer pH7.00 250ml	30100427
Buffer pH10.01 250ml	30100429
Buffer pH12.45 250ml	30100430
Portable Bag for portable meters	30031635

2.2 Installing the batteries

- Remove the battery cover screw using a coin or screwdriver and remove the battery cover.
- Insert the batteries in the battery compartment as shown.
- Replace the battery cover and tighten the battery cover screw.

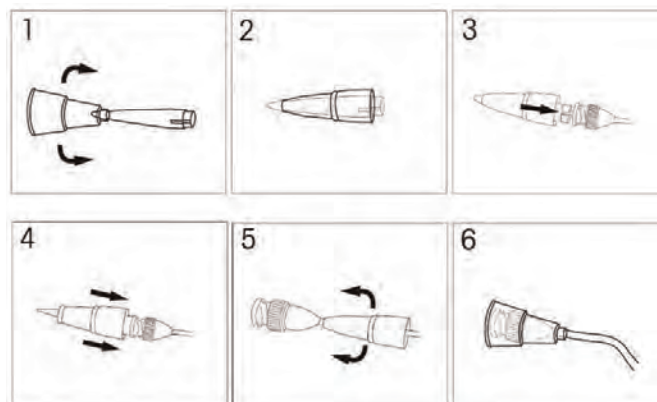
2.3 Installing the electrode clip

The electrode clip is an electrode holder that can be placed on either side of the housing.

- Attach the clip by inserting the tabs into the recess.
- Slide the clip forward to lock in position.
- Slide the shaft of the sensor into the clip from above.

2.4 Installing the IP54 seal components

Use the small plastic tool as shown to install the seal components:

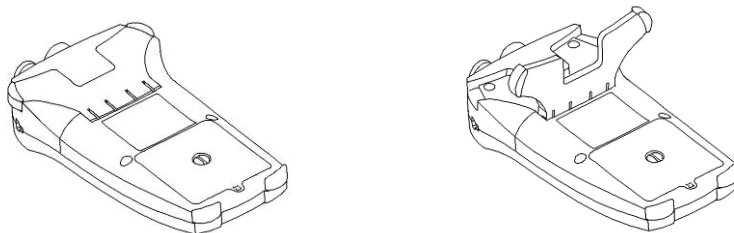


STARTER 300 Portable pH Meter

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2.5 Integrated stand for table top use

STARTER 300 has an integrated table stand as shown, which can be pushed out to use the meter on a lab bench or desk. To close the stand, push the middle edge of the stand toward the meter.



3 STARTER 300 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 can be set as follows:

- Power the meter on by pressing .
- Press and hold  until the setup icon  appears on the display and the current temperature unit blinks (°C or °F).
- Press  or  to switch between °C and °F.
- Press  to confirm your selection.

Then





- ❖ Continue with MTC temperature setting by using  or  to adjust temperature compensation accordingly
- ❖ Press button-  to confirm the setting
- ❖ Press  to return to the measurement screen.

The default MTC temperature value setting is 25 °C (77° F).

Note: °C = 5/9 (°F - 32)

3.2 Selecting a predefined buffer group

After confirming the MTC value (or if you are using ATC) you have the option of making a buffer group selection. In most cases the default buffer group will be used, buffer group **b1**.

If it is necessary to switch the buffer group, use button-  or button-  to select a buffer group among 4 buffer groups shown in section 4.1.1 in this manual. Press button-  to confirm the setting or press button-  to return to the measurement screen.

The default buffer group is **b1**.

b1	1.68	4.01	7.00	10.01
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4 STARTER 300 OPERATION

The basic procedure for 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
- f) Rinse the pH electrode and store properly

For 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 included storage bottle; the solution in the bottle is 3M KCl. After placing pH electrode into the sample or buffer solution, carefully stir with the electrode for several seconds then wait **30 to 60 seconds** for the signal to be 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.

STARTER 300 will turn off the power automatically without any press operation after 10 minutes.

4.1 Calibration

4.1.1 Buffer group

STARTER 300 can perform **1-, 2- or 3- point** calibrations.

There are 4 buffer groups in the meter, you can select the buffer group you prefer (see 4.3), default buffer group is **b1 (US standard)**, and the buffer value will be automatically recognized during calibration.

The 4 predefined buffer groups are (at 25°C):

b1	1.68	4.01	7.00	10.01	
b2	2.00	4.01	7.00	9.21	11.00
b3	1.68	4.00	6.86	9.18	12.46
b4	1.68	4.01	6.86	9.18	

STARTER 300 automatically corrects for the temperature dependence of the buffer pH values given in the following table - buffer group **b1**.

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5 °C	1.67	4.01	7.09	10.25
10 °C	1.67	4.00	7.06	10.18
15 °C	1.67	4.00	7.04	10.12
20 °C	1.68	4.00	7.02	10.06
25 °C	1.68	4.01	7.00	10.01
30 °C	1.68	4.01	6.99	9.97
35 °C	1.69	4.02	6.98	9.93
40 °C	1.69	4.03	6.97	9.89
45 °C	1.70	4.05	6.97	9.86
50 °C	1.71	4.06	6.96	9.83

pH electrodes need to be calibrated with pH standard buffer solution before a proper pH measurement can be made. **Calibration** is to display the correct 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 Performing 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 **/Auto** to ensure the meter is in **Auto End point Mode**.

Auto or Manual End point Mode:




- Press and hold  to change the **End Point Mode**.
- When in Manual Mode, to manually reach a pH measurement or calibration value, you need to press button- when reading is stable and displays : then the sample reading or calibration value freezes,  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 3 times then disappears; **/Auto** blinks 3 times and freezes on the display.
- **Please note stability criterion:** the signal of the sensor input may not change by more than 0.1mV in 6 seconds.

Note: With the 1-point calibration only the **offset** is adjusted. If the sensor was previously calibrated with multi-point calibration the previously stored **slope** will remain. Otherwise theoretical **100% slope** (-59.16 mV / pH) will be used.







When STARTER 300 is in **pH measurement mode** (see 4.2) and **Auto End point Mode.**; place the pH electrode in your chosen calibration buffer, stir for 10 seconds, and wait 30-60 seconds, then:

- Press button- . “Cal 1” displays on the bottom left of the screen and “Cal ” is blinking. **Cal** and  appear on the top of the screen,  is blinking during calibration.
- The meter reaches the calibration (e.g. 7.00) value with the temperature display on the screen.

The 1-point calibration is finished. There are now 3 options (OHAUS recommends conducting at least a 2 point calibration);

1. Press 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.
2. Press button-  to reject the calibration, the meter then returns to the measurement screen.
3. Rinse pH electrode then put into another buffer, press button-  to do the 2-point calibration.(see 4.1.3)




4.1.3 Performing 2-point calibration

- Perform 1-point calibration as described above.
- Rinse the pH electrode with pure water.
- Place the electrode in the next calibration buffer, stir and wait, then press button- , “Cal 2” displays on the bottom left of the screen and “Cal ” is blinking. **Cal** and  appear on the top of the screen,  is blinking during calibration.
- The meter reaches the calibration (e.g. 4.01) with the temperature display on the screen. The 2 point calibration is finished. There are now 3 options :
 1. Press button-  to do the 3-point calibration.
 2. Press button-  to reject the calibration, the meter then returns to the measurement screen.
 3. Press button-  to store the 2-point calibration and exit, the **offset** and the **slope** are shown on the display for 3 seconds then return to the measurement screen.


Note: To perform a 3 point calibration, follow the instructions for performing a 2 point calibration using a third buffer.

4.2 Sample measurement

4.2.1 pH measurement

- Place the electrode in the sample, stir for 10 seconds, and wait 30-60 seconds.
- Press button-  to start the pH measurement,  appears on the display.  is blinking during measurement.
- When meter reaches the proper value, the pH value with the temperature is displayed on the screen.

4.2.2 mV measurement

- Press button-  to switch between **pH** and **mV measurement**.
- Follow the same procedure as for pH measurement to perform a mV measurement.

4.3 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. (See section 3.1 in this manual)


Note: STARTER 300 accepts **NTC 30 kΩ** temperature sensor.

4.4 Using the memory





4.4.1 Storing a reading

The STARTER 300 can store up to 30 results.






- Press button-  when the measurement reaches its final reading, **M01** indicates that one result has been stored.

If you press button-  when **M30** is displayed, **FUL** displays to indicate the memory is full. To store further data you will have to clear the memory. (See 4.4.3 below)

4.4.2 Recalling from memory

- Press and hold button-  to recall the stored values from memory when the current measurement reaches its final reading and freezing.
 - Press button-  or button-  to scroll through the stored results. **R01** to **R30** indicates which result is being displayed.
- Press button-  to exit.

4.4.3 Clearing the memory

- ❖ Pressing button-  or button-  to scroll through the stored results until “MRCL” appears.
- ❖ Press button- , CLr blinks;
- ❖ There are now two choices:
- ❖ Press button-  to confirm the deletion of all the stored data.
- ❖ Press button-  to return to the measurement mode without deleting the memory.

5 MAINTENANCE

5.1 Error message

Error 0	Memory access error	Reset to factory settings
Error 1	Self-diagnosis failed	Repeat the self-diagnosis procedure and make sure that you finish pressing all five keys 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 (<5 or >40 °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.

For further technical support please contact Ohaus. (US please contact 1-800-672-7722)

5.2 Meter maintenance

Never unscrew the two halves of the housing!

The STARTER 300 series instruments do not require any maintenance other than replacement of depleted batteries. To clean, use a damp cloth.

The housing is made of acrylonitrile butadiene styrene (ABS). This material is susceptible to damage 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 Self-diagnosis

- Press and hold  and  simultaneously until the meter displays the full screen. Each icon blinks one after the other.

This checks whether all icons are correctly shown. The next step is to check that the keys are functioning correctly. This requires user interaction.






When **b** blinks, five icons are displayed.

- Press the five keys in any order. Each time you press a key an icon disappears from the screen, continue to press the other keys 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. In this case, repeat the self-diagnosis.

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

5.5 Recover factory settings

- When the meter is off, press and hold  &  &  together for 3 seconds, the screen displays "RST" and blinks, press  to reset factory settings (MTC, slope and offset, etc.).
- Press  to switch off the meter.

6 TECHNICAL DATA

6.1 Specifications

Ambient conditions

- Altitude: Up to 2000 m
- Specified Temperature range: 5°C to 40°C
- Humidity: maximum relative humidity 80 % for temperatures up to 30°C decreasing linearly to 50% relative humidity at 40°C
- Installation category: N/A
- Pollution degree: N/A
- Operability is assured at ambient temperatures between 5°C to 40°C

Model	ST300
Measuring range	0.00...14.00 pH -1999...1999 mV 0 °C...100 °C
Resolution	0.01 pH 1 mV 0.1 °C
Error limits	± 0.01 pH ± 1 mV ± 0.5 °C
Calibration	3 points 4 predefined buffer groups
Memory	30 measurements Current calibration
Power supply	4 x AAA (LR03) batteries > 500 operating hours
Size/weight	90 W x 150 D x 35 H mm / 0.18 kg (without batteries)
Display	Liquid crystal
Input	BNC, impedance > 10e+12 Ω Cinch, NTC 30 kΩ
Temperature-compensation	ATC & MTC
IP protection	IP54
Housing	ABS

6.2 Compliance



This product conforms to the EMC Directive 2004/108/EC and the Low Voltage Directive 2006/95/EC.



In conformance with the European Directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE) this device may not be disposed of in domestic waste. This also applies to countries outside the EU, per their specific requirements. Please dispose of this product in accordance with local regulations at the collecting point specified for electrical and electronic equipment. If you have any questions, please contact the responsible authority or the distributor from which you purchased this device. Should this device be passed on to other parties (for private or professional use), the content of this regulation must also be related. Thank you for your contribution to environmental protection.

FCC 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.

ISO 9001 Registration

In 1994, OHAUS Corporation, USA, was awarded a certificate of registration to ISO 9001 by Bureau Veritas Quality International (BVQI), confirming that the OHAUS quality management system is compliant with the ISO 9001 standards requirements. On June 21, 2012, OHAUS Corporation, USA, was re-registered to the ISO 9001:2008 standard.

7 BUFFER GROUP

STARTER 300 automatically corrects for the temperature dependence of the buffer group pH value given in the following tables (**b2**, **b3**, **b4**), you can find **b1** in 3.1.1.

Buffer group **b2** Europe standard

Temp °C	pH2.00	pH4.01	pH7.00	pH9.21	pH11.00
5	2.02	4.01	7.09	9.45	11.72
10	2.01	4.00	7.06	9.38	11.54
15	2.00	4.00	7.04	9.32	11.36
20	2.00	4.00	7.02	9.26	11.18
25	2.00	4.01	7.00	9.21	11.00
30	1.99	4.01	6.99	9.16	10.82
35	1.99	4.02	6.98	9.11	10.64
40	1.98	4.03	6.97	9.06	10.46
45	1.98	4.04	6.97	9.03	10.28
50	1.98	4.06	6.97	8.99	10.10

Buffer group **b3** JJG119

Temp °C	pH1.68	pH4.00	pH6.86	pH9.18	pH12.46
5	1.67	4.00	6.95	9.39	13.21
10	1.67	4.00	6.92	9.33	13.01
15	1.67	4.00	6.90	9.28	12.82
20	1.68	4.00	6.88	9.23	12.64
25	1.68	4.00	6.86	9.18	12.46
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	11.83
50	1.71	4.06	6.83	9.02	11.70

Buffer group **b4** JIS Z 8802

Temp °C	pH1.68	pH4.01	pH6.86	pH9.18
5	1.67	4.00	6.95	9.40
10	1.67	4.00	6.92	9.33
15	1.67	4.00	6.90	9.28
20	1.68	4.00	6.88	9.23
25	1.68	4.01	6.86	9.18
30	1.68	4.02	6.85	9.14
35	1.69	4.02	6.84	9.10
40	1.69	4.04	6.84	9.07
45	1.70	4.05	6.83	9.04
50	1.70	4.06	6.83	9.01

LIMITED WARRANTY

Ohaus products are warranted against defects in materials and workmanship from the date of delivery through the duration of the warranty period. During the warranty period Ohaus will repair, or, at its option, replace any component(s) that proves to be defective at no charge, provided that the product is returned, freight prepaid, to Ohaus.

This warranty does not apply if the product has been damaged by accident or misuse, exposed to radioactive or corrosive materials, has foreign material penetrating to the inside of the product, or as a result of service or modification by other than Ohaus. In lieu of a properly returned warranty registration card, the warranty period shall begin on the date of shipment to the authorized dealer. No other express or implied warranty is given by Ohaus Corporation. Ohaus Corporation shall not be liable for any consequential damages.

As warranty legislation differs from state to state and country to country, please contact Ohaus or your local Ohaus dealer for further details.