



**TECHNICAL
ADVANTAGES**

Authorised **OHAUS** Australia Dealer
www.techadv.com.au
sales@techadv.com.au

STARTER 2200 Bench pH Meter Instruction Manual

TABLE OF CONTENTS

1	INTRODUCTION	2
1.1	Definition of Signal Warnings and Symbols	2
1.2	Safety Precautions	3
1.3	Package contents	4
2	INSTALLATION	5
2.1	Display and controls	5
2.2	Installing the built-in electrode arm	7
2.3	Installing power adapter	7
2.4	Installing the electrodes	8
3	SETUP	9
3.1	Set temperature unit and MTC value	9
3.2	Selecting a predefined buffer group	9
4	STARTER 2200 OPERATION	10
4.1	Calibration	10
4.1.1	Buffer group	10
4.1.2	Reading Mode:	10
4.1.3	Performing 1-point calibration	11
4.1.4	Performing 2-point calibration	11
4.2	Sample measurement	12
4.2.1	pH measurement	13
4.2.2	mV measurement	13
4.3	Temperature measurement	13
4.4	Using the memory	14
4.4.1	Storing a reading	14
4.4.2	Recalling from memory	14
4.4.3	Clearing the memory	14
5	MAINTENANCE	15
5.1	Error message	15
5.2	Meter maintenance	15
5.3	Electrode maintenance	16
5.4	Self-diagnosis	16
5.5	Recover factory settings	16
6	TECHNICAL DATA	17
6.1	Specifications	17
7	COMPLIANCE	18

1 INTRODUCTION

😊 Thank you for choosing OHAUS.

Please read the manual completely before using the STARTER 2200 bench pH meter to ensure proper setup, operation and maintenance.

STARTER 2200 has an excellent performance/price ratio and is designed with many useful features. Other accessories and various electrodes are available for different applications. Contact your preferred Authorized OHAUS Distributor for details and pricing.

Starter 2200 offers many practical features such as:

- Large liquid crystal screen with well-organized display
- Electrode condition icon on the display to show the pH electrode performance
- Recall of last calibration data
- Quick Guide attached under the meter to assist with operation

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

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.

- Verify that the input voltage range printed on the data label and the plug type matches the local AC power to be used.
- Make sure that the power cord does not pose a potential obstacle or tripping hazard.
- 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.
- Disconnect the equipment from the power supply when cleaning.
- Do not operate the equipment in hazardous or unstable environments.
- Service should only be performed by authorized personnel.

1.3 Package contents

The model ST2200-B (basic model) has the following items:

ST2200-B	Units
STARTER 2200	1
Built-in electrode arm	1
12V Power supply	1 set

In addition to ST2200-B content, the model ST2200-F package also includes the following:

ST320 3-in-1 pH electrode	1
pH Buffer mini bottle kits (4.01, 7.00, 10.01)	1 set

2 INSTALLATION




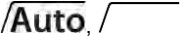



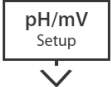
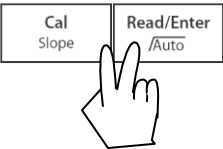
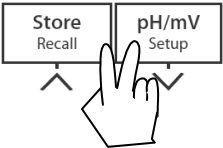
2.1 Display and controls

Displays



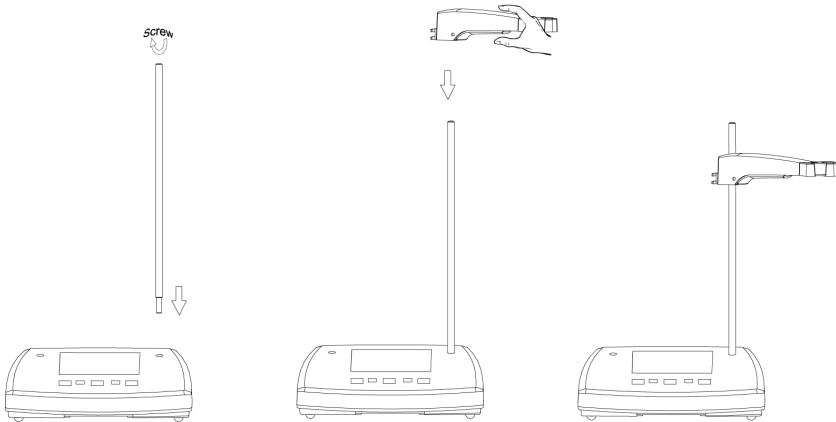
1	Electrode condition		
	😊 Slope: more than 95% and offset: ± (0-15) mV Electrode condition is good	😐 Slope: 90-95% or offset: ± (15-35) mV Electrode condition is acceptable	😞 Slope: less than 90% or offset: ± (35-60) mV Electrode condition is not good or needs cleaning
2	Endpoint stability icon ; Auto endpoint icon		
3	Measurement icon - ; means measurement or calibration is running when blinks		
4	Calibration icon - Cal ; means calibration in progress when display		
5	Setup icon - ; instrument is in the setup mode, can set temperature(MTC), buffer group etc.		
6	pH/mV reading or slope in calibration process		
7	Calibration point Cal / Buffer group /Memory number MR / Error index Err		
8	Auto temperature compensation - ATC ; Manual temperature compensation - MTC		
9	Temperature during measurement or offset (mV) in calibration process		

Controls

<p>Button</p>	<p>Press & release </p>	<p>Press & hold for 3 seconds </p>
	<ul style="list-style-type: none"> - Start or finish measurement - Confirm setting, store entered value 	<ul style="list-style-type: none"> - Turn auto endpoint on / off 
	<ul style="list-style-type: none"> - Start calibration 	<ul style="list-style-type: none"> - Recall the latest calibration data : slope and offset
	<ul style="list-style-type: none"> - Meter turn on - Exit and 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 - Print current memory data
	<ul style="list-style-type: none"> - Switch between pH and mV - 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 	
		<p>Turn on/turn off the backlight of the LCD</p>

2.2 Installing the built-in electrode arm

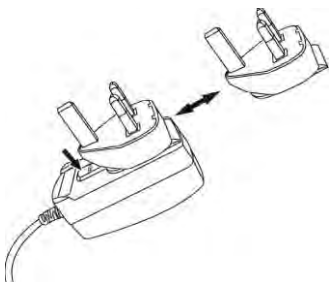
Install the built-in electrode arm on the left or right side of the STARTER 2200 meter.



- Remove the rubber hole cover from the meter, insert the metal stick into the hole and screw to fasten it.
- Install the upper electrode arm upon the metal stick from above; adjust it to a desired height.

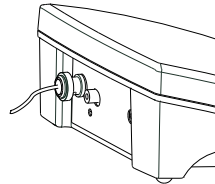
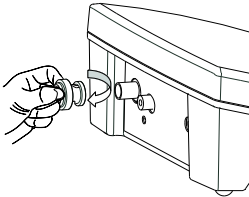
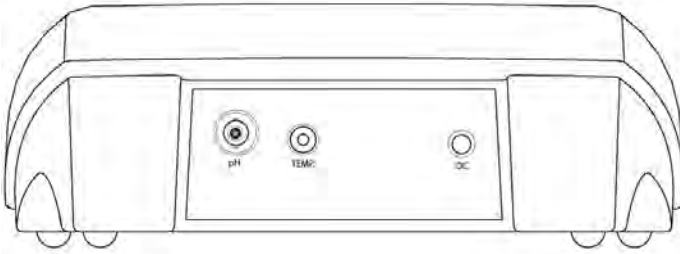
2.3 Installing power adapter

- Choose the proper adapter clip, insert into the power adapter slot.
- Use of other power adapters can damage the meter and void the warranty.
- A surge protector or uninterruptible power supply (UPS) is also recommended.



2.4 Installing the electrodes

The following diagram depicts ST2200 meter connections.



- DC : Connect the universal power adapter (included with meter) to power the meter
- pH (BNC): Connect a pH electrode, ORP/redox electrode or ion selective electrode (ISE) with BNC connector
- Temp. (Cinch): Connect an ATC temperature probe, such as temperature electrode STTEMP30

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 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  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 compensation temperature value, make the buffer group selection. Use

-  or  to select a buffer group among 3 buffer groups (4.1.1). Press  to confirm the setting or press  to leave to return to the measurement screen.

The default buffer group is **b1**.

b1	1.68	4.01	7.00	10.01
-----------	------	------	------	-------

4 STARTER 2200 OPERATION

4.1 Calibration

4.1.1 Buffer group

STARTER 2200 can perform 1 or 2-point calibrations. **OHAUS recommends conducting a 2 point calibration.**

There is 1 buffer group (the US group) stored in the meter. The US buffer group is (at 25°C):


1.68	4.01	7.00	10.01
------	------	------	-------

STARTER 2200 automatically corrects for the temperature dependence of the buffer pH values given in the following table.


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

4.1.2 Reading Mode:

Continuous (Manual 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 $\sqrt{\quad}$: then the sample reading or calibration value freezes, $\sqrt{\quad}$ blinks 3 times and freezes on the display.

Auto-stop Mode

- 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; $\sqrt{\text{Auto}}$ blinks 3 times and freezes on the display.

- After powering the meter on, be sure the top of the screen shows $\overline{\text{Auto}}$ to ensure the meter is in **Auto End point Mode**.

Mode Switch






- Press and hold  to change the **End Point Mode**.

4.1.3 Performing 1-point calibration




Calibration: pH electrodes need to be calibrated with pH standard buffer solutions before a proper pH measurement can be made. **Calibration** is to display the correct **pH** value when the 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);

- Begin by ensuring the meter is plugged in, the electrode is properly attached and the meter is powered on by pressing .
- Place the pH electrode in the prepared buffer solution, stir for approximately 5 seconds and wait for an additional 30-60 seconds.
- Press button-, "**Cal 1**" displays on the top left of the screen and is blinking. The measurement icon  appears on the top of the screen,  is blinking during calibration.
- When the reading is stable (normally the reading does not change in 5s), press button- to lock the reading and finish 1 point calibration. The buffer value (e.g. pH 7.00) with the temperature is displayed on the screen; the meter can recognize the buffer automatically (auto buffer recognition).





The 1-point calibration is finished; now we have 3 options:

- ❖ Press button- to store the 1-point calibration data and exit, the **offset** and the **slope** are shown on the display for 3 seconds then returns to the measurement screen.
- ❖ Press button- to reject the calibration and return to the measurement screen.
- ❖ Press button- to do the 2-point calibration.

Note: With the 1-point calibration only the **offset** is adjusted. If the pH electrode was previously calibrated with 2-point calibration the previously stored **slope** will remain. Otherwise theoretical **100% slope** (-59.16 mV / pH @25°C) will be used.



4.1.4 Performing 2-point calibration

- Perform 1-point calibration as described above.
- Rinse the pH electrode with pure water and wipe off water with a tissue.

- Place the electrode in the next calibration buffer stir and wait, then press button-, "Cal 2" displays on the top left of the screen and is blinking.  appears and is blinking during calibration.
- When reading is stable (normally the reading does not change in 5s), press button- to lock the reading and finish 2-point calibration,  disappears. The buffer pH value (e.g. **4.01 pH**) with the temperature display on the screen.

The 2-point calibration is finished, now we have 2 options:



- ❖ Press button- to store the 2-point calibration, the **offset** and **slope** are shown on the display for 3 seconds then returns to the measurement screen.
- ❖ Press button- to reject the calibration and return to the measurement screen.

Note: The use of a temperature electrode (e.g. STTEMP30) or a pH electrode with a built-in temperature sensor (3-in-1 pH electrode) is recommended. If you use the **MTC** mode, you should enter the correct temperature value and keep all buffer and sample solutions at the set temperature. (See 3.1)

4.2 Sample measurement

Standard procedure of pH measurement is as follows:

- Connect pH (and Temperature if necessary) electrode to the meter and rinse
- Prepare buffer
- Calibrate pH electrode
- Prepare sample & measure
- Record measurement results
- Rinse and properly store pH and other electrodes

pH electrode preparation: pH electrode should be rinsed with pure water before and after using.



CAUTION Check if the electrode is physically damaged. (Be careful with the glass bulb)

The pH electrode should be stored in the storage bottle.

After the pH electrode is put into the sample or buffer solution, the user should stir several seconds then wait **30 to 60 seconds** for the signal to stabilize, and then press the proper 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.

4.2.1 pH measurement

- Place the electrode in the sample, stir 5 seconds then wait 30-60 seconds.
- Press button-  to start the pH measurement,  appears on the display.  is blinking during measurement.
- When the reading is stable, press button-  to lock the reading,  disappears, the pH value with the temperature is displayed on the screen, you can record the measurement result. If you want to do another measurement, press button- .

4.2.2 mV measurement

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

4.3 Temperature measurement

For better accuracy, we recommend using a temperature electrode or pH electrode with a temperature sensor built in.


- ❖ If a temperature electrode is used, **ATC (Auto Temperature Compensation)** 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 (3.1).


Note: STARTER 2200 accepts **NTC 30 kΩ** temperature sensor.

4.4 Using the memory





4.4.1 Storing a reading

The STARTER 2200 can store up to 99 endpoint results.




- Press button  when the measurement reaches endpoint. **M01** indicates that one result has been stored.

If you press  when **M99** 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)



4.4.2 Recalling from memory

- Press and hold  to recall the stored values from memory when the current measurement reaches endpoint.
- Press button  or  to scroll through the stored results. **R01** to **R99** indicates which result is being displayed.
- Press  to exit.

4.4.3 Clearing the memory

- Pressing  or  to scroll through the stored results until "**MRCL**" appears.
- Press , **CLr** blinks;

There are now 2 options:

- ❖ Press  to confirm the deletion of all the stored data.
- ❖ Press  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.
Error 10	The sample temperature out of range	Check the sample temperature, the temperature sensor.

If an error happens, the meter will also **beep 3 times** to alert.

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



5.2 Meter maintenance

Attention: Never unscrew the two halves of the housing!

For routine meter maintenance, dust and wipe with a damp cloth. If necessary, warm water or mild water-based detergent can be used.

Meter maintenance can be performed on a daily, weekly or monthly basis, as required by the operating environment.

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

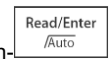

Attention: Make sure the electrode is filled with electrolyte solution. Always store the electrode according to the electrode instruction manuals and do not allow it to dry out.



- If the electrode response becomes sluggish or the slope is not good enough, try:
- Soak the electrode in 0.1M HCl for more than 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 good, the electrode might need to be replaced.

5.4 Self-diagnosis

- Press and hold button-  and button-  simultaneously until the meter display 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 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, means “pass”. If self-diagnosis fails, error message **Err** appears.

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

5.5 Recover factory settings

- When the meter is off, press and hold button-  & button-  & button-  together for 3 seconds, the screen displays *RSF* and blinks, means “Reset”.

Then we have 2 choice:

- ❖ Press button-  to reset factory settings (MTC, slope and offset, etc.), display *YES* then restart the meter.
- ❖ Or press button-  to quit the setting, display *NO* then turn off the meter.

6 TECHNICAL DATA

6.1 Specifications




Ambient conditions

- Indoor use only
- Altitude: Up to 2000 m
- Humidity: maximum relative humidity 80 % for temperatures up to 30°C decreasing linearly to 50% relative humidity at 40°C
- Mains supply voltage fluctuations: up to $\pm 10\%$ of the nominal voltage
- Installation category II
- Pollution degree: 2
- Operability is assured at ambient temperatures between 5°C to 40°C

Model	ST2200
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	1 or 2 points 1 predefined buffer group (1.68, 4.01, 7.00, 10.01)
Memory	Recall last calibration data, 99 sets of measurement data
Power supply	AC Adapter Input: 100-240V ~ X.XA 50/60 Hz AC Adapter Output: 12V \square X.XA
Size/weight	220 W x 175 D x 78 H mm / 0.75 kg
Display	Liquid crystal
Input	BNC, impedance > 10e+12 Ω Cinch, NTC 30 k Ω
Temperature-compensation	ATC & MTC
Housing	ABS

7 COMPLIANCE

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

Mark	Standard
	<p>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.</p>
	<p>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.</p>
	<p>EN 61326-1</p>

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: STARTER 2200

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.

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.



OHAUS® is the registered trademark 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 partout dans le monde

www.ohaus.com



PN 30655947 B ©2021 OHAUS Corporation, all rights reserved / todos los derechos reservados / tous droits réservés