a-AB23EC
Bench Conductivity Meter
Instruction Manual

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1. INTRODUCTION

This manual contains installation, operation and maintenance instructions for a-AB23EC bench conductivity 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

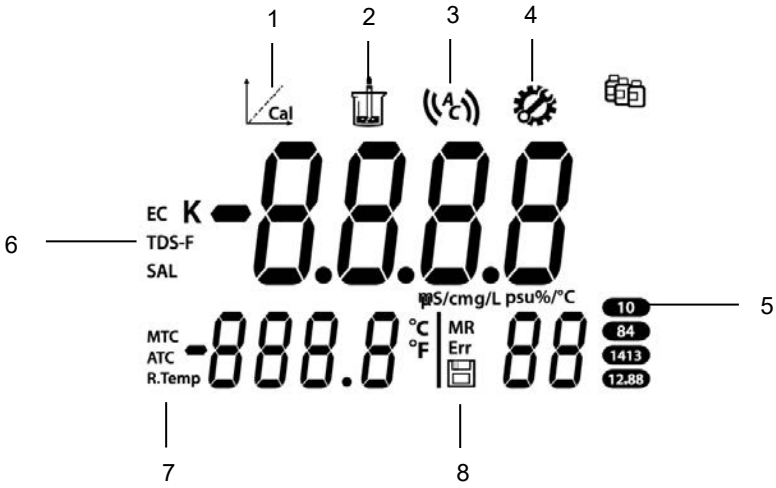


Figure 1-1 Display

1. Calibration icon: blinks when calibration is in progress.
2. Measurement icon: blinks when measurement or calibration is in progress.
3. Auto endpoint icon ; Continuous reading icon .
4. Setup icon: shows when the meter is in setup mode.
5. Standard solution icon: displays the standard solution for calibration.
6. Measurement mode icon: displays measurement mode, Conductivity, TDS and Salinity.
7. Auto temperature compensation icon **ATC**; Manual temperature compensation icon **MTC**; Reference temperature icon **R.Temp**.
8. Memory number icon **MR**; Error index icon **Err**; Store icon .

Controls

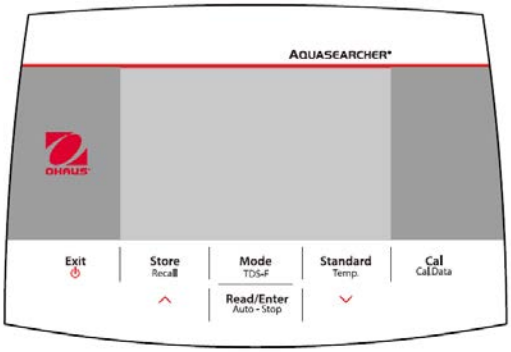
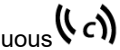


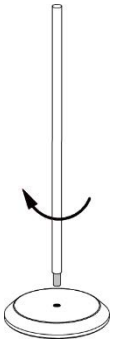
Figure 1-2 Control Panel

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
Mode **TDS-F**	Switches between EC, TDS and SAL mode.	Sets TDS-F value (Ranging from 0.4 to 1.00, and the default is 0.5.)
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 
Standard **Temp** 	• Selects standard solution • 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: 1. Selects temperature unit. 2. Sets MTC temperature. (The defaut is 25° C.) 3. Sets reference temperature. 4. Sets temperature correction coefficient value. (Ranging from 0 to 10, and the default is 2%/degree)
Cal **Cal.Data**	Starts calibration	Recalls the latest calibration data

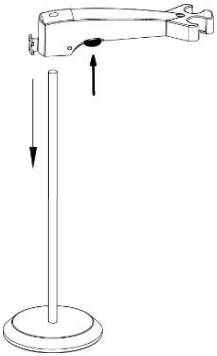
2. INSTALLATION

2.1 Install the stand-alone electrode holder

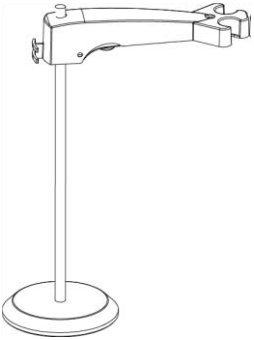
1. Screw the metal rod into the base.



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

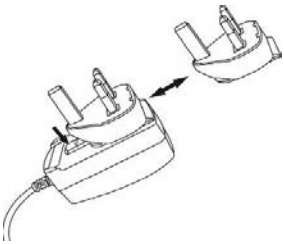


3. Release the button at the height you want to finish the installation.



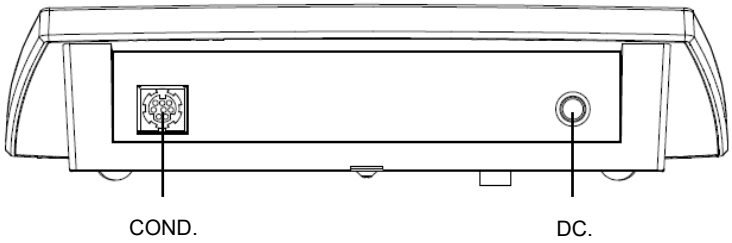
2.2 Installing the power adapter

Insert the proper adapter clip into the power adapter slot.



2.3 Connect the conductivity electrodes

There is one socket “COND.” for conductivity electrode.



Note: If you use a STCON3 electrode, please keep the plastic shield and make sure the 4 metal rings on the electrode are totally submerged in the standard solution.

3. SETUP

3.1 Set temperature unit, MTC temperature and temperature correction coefficient

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 ∨ button to adjust.
7. Press the **Read/Enter** button to confirm the setting.
8. Continue to select the Reference temperature by using ∧ or ∨ button to adjust.
9. Press the **Read/Enter** button to confirm the setting.
10. Continue to set the temperature correction coefficient by using ∧ or ∨ button to adjust.
11. Press the **Read/Enter** button to confirm the setting.

Note:

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

3.2 Set TDS factor

To set TDS factor:

1. Long press the **TDS-F** button.
2. The default value 0.50 is flashing.
3. Press the ∧ or ∨ button to adjust the value.
4. Press the **Read/Enter** button to confirm the setting.

4. OPERATION

The first time you use the conductivity electrode, it should be calibrated before taking any 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

When using the conductivity meter, you have to select a standard solution for calibration.

4.1.1 Select a standard solution

To do this:

1. Press the **Standard** button.
2. Press the ^ or v button to switch between the 4 standard solutions.
3. Press the **Read/Enter** button to confirm the setting or press the **Exit** button to return to the measurement screen.

The 4 predefined standard solutions are:

10 µS/cm	84 µS/cm	1413 µS/cm	12.88 m S/cm

The meter will then display the selected standard solution.

Check figure 4-1 as an example. The display shows **1413** at the right corner of the screen.

Figure 4-1 Standard solution

Tables for automatic temperature compensation are programmed in the meter for each standard (see the appendix).

4.1.2 Perform a calibration

When performing a calibration, Ohaus recommends using Auto End Point Mode. After powering the meter on, be sure the top of the screen shows (A) 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 calibration value, you need to press the **Auto-Stop** button 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.

4.1.2.2 Calibration

Place the conductivity sensor in the selected calibration standard, wait for 10-15 seconds, then:

1 Press the **Cal** button. Cal 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 K value. The calibrated standard solution value will be marked in .

The calibration is finished, the calibration result will be stored automatically.

Note:
To ensure the most accurate conductivity readings, you should verify your cell constant with a standard solution before measurement and recalibrate if necessary. Always use fresh standards.
For STCON3 the normal cell constant range is 1.50 – 2.00. (e.g. 1.71 /cm) if the cell constant is outside the range due to an improper calibration, you may need to recover factory settings, then repeat calibration.

4.2 Sample measurement

Place the conductivity sensor in the sample, wait for 10-15 seconds, then:

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

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

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

Stability criterion for conductivity measurement: The sensor input signal of the meter may not change by more than 0.4% from the measured average conductivity of the probe in 6 seconds.
When measuring low-range conductivity, a flow-through cell is required to isolate the air.

4.2.1 TDS and Salinity measurement

1 Press the **Mode** button to switch between conductivity, TDS and SAL measurement modes.
2 Follow the same procedure as for conductivity measurement.

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 standard temperature out of range (0 ... 35 °C)	Keep the standard temperature within the range for calibration
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.

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

Conductivity Cell Storage
Conductivity cells can be stored in distilled or deionized water between measurements. For overnight storage or long-term storage, conductivity cells should be thoroughly rinsed and stored dry.

Conductivity Probe Maintenance
Cleaning Recommendations:

Contaminant	Cleaning Solution	Cleaning Time
Water soluble contaminants	Rinse with deionized water	No limit
Lubricants and oils	Soak in warm water about 60℃ and liquid detergent	10 to 30 minutes
Lime or hydroxide coating	Soak in 10% acetic acid or 10% hydrochloric acid	10 to 30 minutes

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 RSt and blinks, this means “Reset”. There are 2 options:

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

- Or press the **Exit** button to quit the setting, display n0 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℃ 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-AB23EC**
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
Conductivity input	Mini-Din
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

Conductivity Meter Model		**a-AB23EC**
Measurement Channels		Conductivity/TDS/Salinity/Resistivity with temperature
Conductivity	Measuring Range	0.01 µS/cm to 19.99 µS/cm 20 µS/cm to 199.9 µS/cm 200 µS/cm to 1999 µS/cm 2.00 mS/cm to 19.99 mS/cm 20.0 mS/cm to 199.9 mS/cm
	Resolution	0.01 µS/cm minimum; auto ranging
	Accuracy	± 1 % Reading ± 3 LSD
	Reference Temperature	20 °C, 25 °C
	Cell Constants	0.08 to 2.0 cm^{-1}
	Temperature Compensation	Linear (0 to 10.0%/ºC), off
TDS	Measuring range	0.1 mg/L to 199.9 g/L
	Resolution	0.01 mg/L minimum, auto ranging
	Accuracy	± 1 % Reading ± 3 LSD
	TDS Factor Range	Linear, 0.04 to 10.00, default 0.5
Practical Salinity	Measuring range	0 to 99.9 psu
	Resolution	0.01 psu minimum, auto ranging
	Accuracy	± 1 % Reading ± 3 LSD
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	1 point cell constant calibration; 4 buffers available(10, 84, 1413 µS/cm, 12.88mS/cm)
	Calibration mode	Linear

6.2 Dimensions

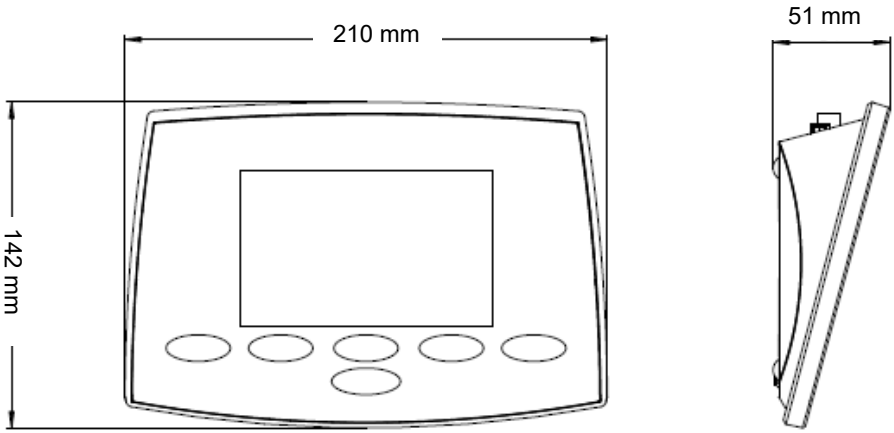


Figure 6-1 Dimensions

7. Appendix

7.1 Conductivity standards

T(°C)	**10 µS/cm**	**84 µS/cm**	**1413 µS/cm**	**12.88 mS/cm**
5	6.1 µS/cm	53 µS/cm	896 µS/cm	8.22 mS/cm
10	7.0 µS/cm	60 µS/cm	1020 µS/cm	9.33 mS/cm
15	8.0 µS/cm	68 µS/cm	1147 µS/cm	10.48 mS/cm
20	9.0 µS/cm	76 µS/cm	1278 µS/cm	11.67 mS/cm
25	10.0 µS/cm	84 µS/cm	1413 µS/cm	12.88 mS/cm
30	11.0 µS/cm	92 µS/cm	1552 µS/cm	14.12 mS/cm
35	12.1 µS/cm	101 µS/cm	1667 µS/cm	15.39 mS/cm

7.2 Examples of temperature coefficients (α-value)

Substance at 25 °C	**Concentration [%]**	**Temperature coefficient α [%/°C]**
HCl	10	1.56
KCl	10	1.88
CH3COOH	10	1.69
NaCl	10	2.14
H2SO4	10	1.28
HF	1.5	7.20

α-coefficients of conductivity standards for a calculation to reference temperature of 25°C

Standard	Measurement temp.: 15°C	Measurement temp.: 20°C	Measurement temp.: 30°C	Measurement temp.: 35°C
84 µS/cm	1.95	1.95	1.95	2.01
1413 µS/cm	1.94	1.94	1.94	1.99
12.88 mS/cm	1.90	1.89	1.91	1.95

7.3 Conductivity to TDS conversion factors

Conductivity At 25 °C	TDS KCl		TDS NaCl	
	ppm value	Factor	ppm value	Factor
84 µS	40.38	0.5048	38.04	0.4755
447 µS	225.6	0.5047	215.5	0.4822
1413 µS	744.7	0.527	702.1	0.4969
1500 µS	757.1	0.5047	737.1	0.4914
8974 µS	5101	0.5685	4487	0.5000
12.88 µS	7447	0.5782	7230	0.5613
15 µS	8759	0.5839	8532	0.5688
80 mS	52.168	0.6521	48.384	0.6048

8. COMPLIANCE

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

Mark	Standard
CE	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 Corporation

With offices worldwide

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